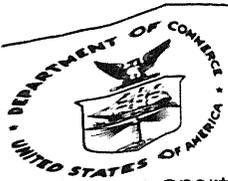


# Industrial Gases



U.S. Department of Commerce  
 BUREAU OF THE CENSUS  
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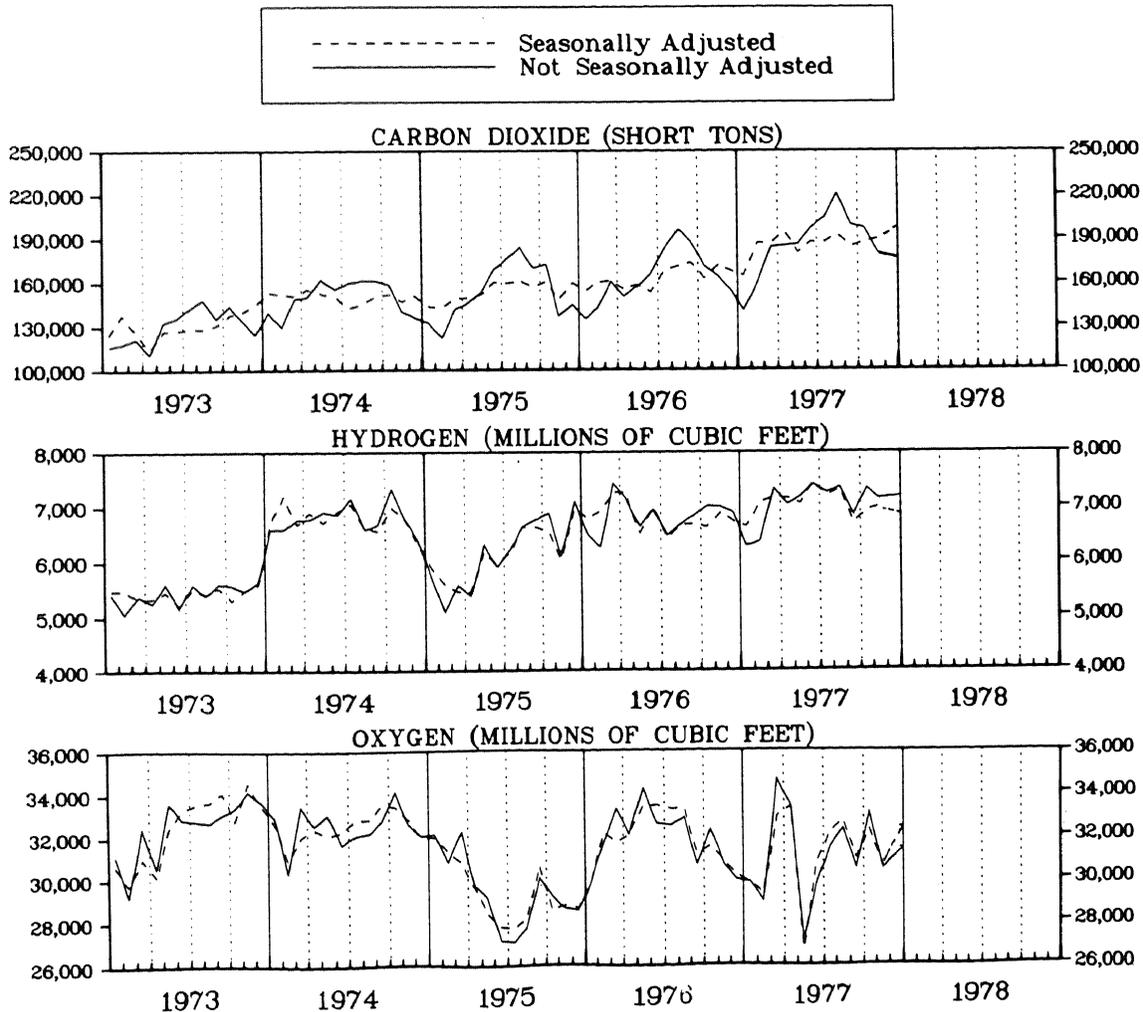
JANUARY 1978

M28C(78)-1  
 Issued April 1978

The statistics in this publication are based on a survey of manufacturers and represent total U.S. production of industrial gases. Estimates are included for companies whose reports were not received in time for tabulation. A more complete description of this survey appears on page 4. An annual current industrial report is published in this series. The annual report includes all months for the current and previous years and incorporates all known revisions in the series.

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## PRODUCTION OF SELECTED INDUSTRIAL GASES 1973 TO 1978



83 1388

Address inquiries concerning these figures to U.S. Department of Commerce, Bureau of the Census, Industry Division, Washington, D.C. 20233, or call Melva Martin, (301) 763-7107.  
 For sale by the Subscriber Services Section (Publications), Bureau of the Census, Washington, D.C. 20233, or any U.S. Department of Commerce district office. Postage stamps not acceptable; currency submitted at sender's risk. Remittances from foreign countries must be by international money order or by a draft on a U.S. bank. Price 25 cents per copy, \$3.50 per year.

Table IA.--SUMMARY OF PRODUCTION OF PRINCIPAL GASES: 1976 TO 1978

Month and year	(Seasonally adjusted)				
	Acetylene (2813200)	Carbon dioxide (2813311) and (2813331)	Hydrogen, high and low purity (100%) (2813420)	Nitrogen, high and low purity (100%) (2813440)	Oxygen, high and low purity (100%) (2813450)
	(Mil. cu. ft.)	(Short tons)	(Mil. cu. ft.)	(Mil. cu. ft.)	(Mil. cu. ft.)
1978					
January.....	440	180,658	7,536	30,951	32,594
1977					
December.....	435	195,730	6,953	30,372	32,162
November.....	428	189,622	6,998	29,667	30,537
October.....	445	187,190	6,906	28,803	32,265
September.....	434	184,423	6,684	29,133	30,910
August.....	489	192,444	7,309	27,879	32,696
July.....	478	187,349	7,187	27,479	32,140
June.....	512	187,367	7,449	30,631	33,910
May.....	548	180,177	7,042	26,692	34,157
April.....	457	194,283	7,145	25,836	33,401
March.....	557	186,723	7,164	25,457	32,940
February.....	559	186,664	7,061	25,100	29,289
January.....	594	164,649	6,623	24,381	29,867
1976					
December.....	517	167,567	6,721	26,290	30,231
November.....	526	171,862	6,882	26,147	30,852
October.....	557	162,734	6,615	25,205	31,555
September.....	584	173,501	6,671	24,347	31,190
August.....	609	170,987	6,650	24,606	33,317
July.....	620	168,466	6,405	23,813	33,286
June.....	616	153,400	6,981	23,528	33,439
May.....	621	158,295	6,505	23,929	33,442
April.....	635	155,282	7,252	23,600	32,057
March.....	626	161,169	7,259	23,366	31,707
February.....	595	160,068	6,906	22,861	32,137
January.....	592	154,465	6,768	21,790	29,811

Table IB.--SUMMARY OF PRODUCTION OF PRINCIPAL GASES: 1976 TO 1978

Month and year	(Not seasonally adjusted)					
	Acetylene (2813200)	Carbon dioxide, liquid and gas (2813311)	Carbon dioxide, solid (2813331)	Hydrogen, high and low purity (100%) (2813420)	Nitrogen, high and low purity (100%) (2813440)	Oxygen, high and low purity (100%) (2813450)
	(Mil. cu. ft.)	(Short tons)	(Short tons)	(Mil. cu. ft.)	(Mil. cu. ft.)	(Mil. cu. ft.)
1978						
January.....	429	137,292	22,952	7,091	31,539	32,594
1977						
December.....	449	154,711	25,361	7,127	30,099	31,841
November.....	451	154,385	26,325	7,117	29,163	30,415
October.....	458	168,168	28,756	7,328	29,466	33,072
September.....	467	167,493	31,499	6,831	29,191	30,446
August.....	509	183,138	37,403	7,346	28,688	32,304
July.....	457	168,856	34,980	7,244	27,342	31,401
June.....	509	164,063	32,672	7,404	29,651	33,028
May.....	544	156,955	28,807	7,169	27,119	34,943
April.....	428	158,736	26,212	7,031	25,576	33,401
March.....	538	156,321	27,785	7,329	26,349	34,653
February.....	531	135,583	24,058	6,348	23,655	28,938
January.....	565	117,726	22,888	6,265	24,744	29,867
1976						
December.....	537	130,811	23,383	6,876	26,159	29,989
November.....	557	136,514	27,262	6,985	25,568	30,729
October.....	577	141,185	30,049	6,999	25,886	32,312
September.....	621	153,589	33,703	6,818	24,444	30,691
August.....	633	156,005	39,895	6,677	25,042	32,884
July.....	603	146,984	36,337	6,456	23,623	32,520
June.....	615	130,529	35,020	6,939	23,122	32,603
May.....	600	128,621	28,258	6,629	24,214	34,245
April.....	610	124,594	25,767	7,143	23,107	32,089
March.....	596	132,165	28,650	7,426	24,425	33,292
February.....	584	117,828	24,593	6,250	22,221	31,719
January.....	578	112,029	22,956	6,470	22,115	29,841

Table 2.--PRIMARY PRODUCTION (QUANTITY) OF SPECIFIED INDUSTRIAL GASES

Product code	Chemical and basis	Unit of measure	January 1978	December 1977	January 1977
2813200	Acetylene <sup>1</sup> .....	Mil. cu. ft.	429	449	565
	Produced for compression, including cylinder and pipeline.....	do	108	<sup>r</sup> 115	111
	Produced for pipeline shipment (excluding that shipped to be compressed) and for consumption in this plant...	do	321	334	454
2813415	Argon, high purity.....	do	514	542	380
	Produced for cylinder and bulk delivery and pipeline shipments, and for consumption in this plant.....	do	514	542	380
2813311	Carbon dioxide:				
	Liquid and gas <sup>2</sup> .....	Short tons	137,292	154,711	117,726
2813331	Solid (dry ice).....	do	22,952	25,361	22,888
2813420	Hydrogen, total <sup>3</sup> .....	Mil. cu. ft.	7,091	7,127	6,265
	Liquid and gas:				
	Produced for cylinder and bulk delivery shipment, and liquid produced for conversion to gas.....	do	831	844	768
	Produced for pipeline and Government use.....	do	1,906	2,253	1,744
	Produced for consumption in this plant.....	do	4,354	4,030	3,753
2813440	Nitrogen, total <sup>4</sup> .....	do	31,539	30,099	24,744
	Gas:				
	Produced for pipeline shipment.....	do	19,471	18,742	<sup>5</sup> 15,633
	Liquid:				
	Produced for bulk delivery shipment to pipeline or to air separation plants.....	do	458	534	( <sup>6</sup> )
	Liquid and gas:				
	Produced for cylinder and bulk delivery shipment.....	do	6,784	7,690	<sup>7</sup> 6,590
	Produced for consumption in this plant.....	do	4,826	3,133	<sup>6</sup> 2,521
2813450	Oxygen, total.....	do	32,594	31,841	29,867
	Gas:				
	Produced for pipeline shipments.....	do	23,522	22,404	20,239
	Liquid:				
	Produced for bulk delivery shipment to pipelines or to other air separation plants.....	do	615	633	417
	Liquid and gas:				
	Produced for cylinder and bulk delivery shipment.....	do	4,913	<sup>r</sup> 5,156	4,779
	Produced for consumption in this plant.....	do	3,544	<sup>r</sup> 3,648	4,432

(NA) Not available.

<sup>r</sup>Revised by 5 percent or more from previously published figures.<sup>1</sup>Excludes quantities of acetylene produced and consumed by railroad shops, shipyards, and small establishments using portable generators.<sup>2</sup>Excludes production of liquid and gas CO<sub>2</sub> converted to and reported as dry ice and also amounts converted from pure CO<sub>2</sub> (liquid or solid) purchased or received from other plants. Also, excludes quantities produced and consumed in plants manufacturing soda ash or urea.<sup>3</sup>Excludes quantities produced and consumed in the manufacture of methanol and ammonia, but includes an unspecified amount of hydrogen produced for sale or interplant transfer to plants consuming this gas in the production of ammonia. Also, excludes amounts of hydrogen produced in petroleum refineries for captive use; however, of the total shown for lower purity hydrogen prior to 1969, 70 to 75 percent was accounted for by petroleum refiners with captive hydrogen production. Not all such petroleum refineries were canvassed in this survey.<sup>4</sup>Excludes amounts produced and used in the manufacture of ammonia and ammonia derivatives.<sup>5</sup>1977 data for nitrogen (gas) produced for pipeline shipments, combined with produced for cylinder and bulk delivery shipments.<sup>6</sup>1977 data for nitrogen (liquid) produced for bulk delivery shipment to pipeline or to air separation plants included in nitrogen (liquid and gas) produced for consumption in this plant.<sup>7</sup>1977 data for nitrogen (liquid and gas) produced for cylinder and bulk delivery shipments. Excludes nitrogen (gas) produced for cylinder and bulk delivery shipments.

## DESCRIPTION OF SURVEY

*Scope of Survey*—This survey covers firms engaged in the manufacture of industrial gases. Excluded from this survey are industrial gases vented or used for fuel by the producer.

*Survey Description*—The statistics in this publication were collected on Bureau of the Census monthly reporting form M-28A.2, Production of Industrial Gases. The mailing panel for this survey consisted of all known producers of industrial gases, approximately 670 producers of elemental gases, carbon dioxide, and acetylene.

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## EXPLANATION OF TERMS

*Production*—Data shown for production represent total quantity of each chemical produced, including quantity consumed in plants, and for sale or transfer to other plants or warehouses of the same company. The statistics presented in the tables provide an up-to-date measure of activity in the inorganic field,

but do not necessarily indicate amounts entering the market. In some cases, figures are included for material produced "in process" as an intermediate to the end products.

## RELATIONSHIP BETWEEN M28C AND M28C-14 SERIES FOR INDUSTRIAL GASES

The data as shown in Table 1 reflect levels of production as reported by establishments on monthly form M28A.2. These data are revised in the annual publication collected on form MA-28E.2 and are shown in Table 9 of the annual report M28C-14. The actual data reported by establishments canvassed on the annual differ by varying amounts from those collected monthly due to receipt of revised data from the respondent and establishments reporting on the annual and not on the monthly. For these reasons, the monthly and annual data comprise two separate series and should be used as such for analytical purposes. Specifically, the monthly data should be useful in describing month-to-month changes while the annual data provide a better indication of the level of production. Revisions to the 1976 monthly series based on findings from the 1976 annual will be forthcoming as soon as research into the differences are resolved.

## RELATED REPORTS

An annual current industrial report is published in this series. The annual report summarizes monthly figures and incorporates all known revisions in the series for both current and previous year, thus providing a single reference copy to replace the monthly publications. This annual summary provides additional information on the history of this survey.

The Bureau of the Census also publishes reports on other related products as follows:

Series	Frequency	Title
<i>Current Industrial Reports</i>		
M3-1	Monthly	Manufacturers' Shipments, Inventories, and Orders
M28A	Monthly	Inorganic Chemicals
M28B	Monthly	Inorganic Fertilizer Materials
<i>Foreign Trade Reports</i>		
FT-410	Monthly	U.S. Exports
FT-135	Monthly	U.S. General Imports

## CONTACTS FOR DATA USERS

Subject Area	Contact	Phone Number
Current Industrial Report M28C	Melva Martin	(301) 763-7107
Foreign Trade publications	Juanita Noone	(301) 763-5140
Bureau of Domestic Business Development	Chemicals Program (OBRA)	(202) 377-5496
To order a Census publication	Daisy Williams	(301) 763-7472
To order microfilm of Census publications	Theresa Allen	(301) 763-5042

# Industrial Gases



U.S. Department of Commerce  
 BUREAU OF THE CENSUS  
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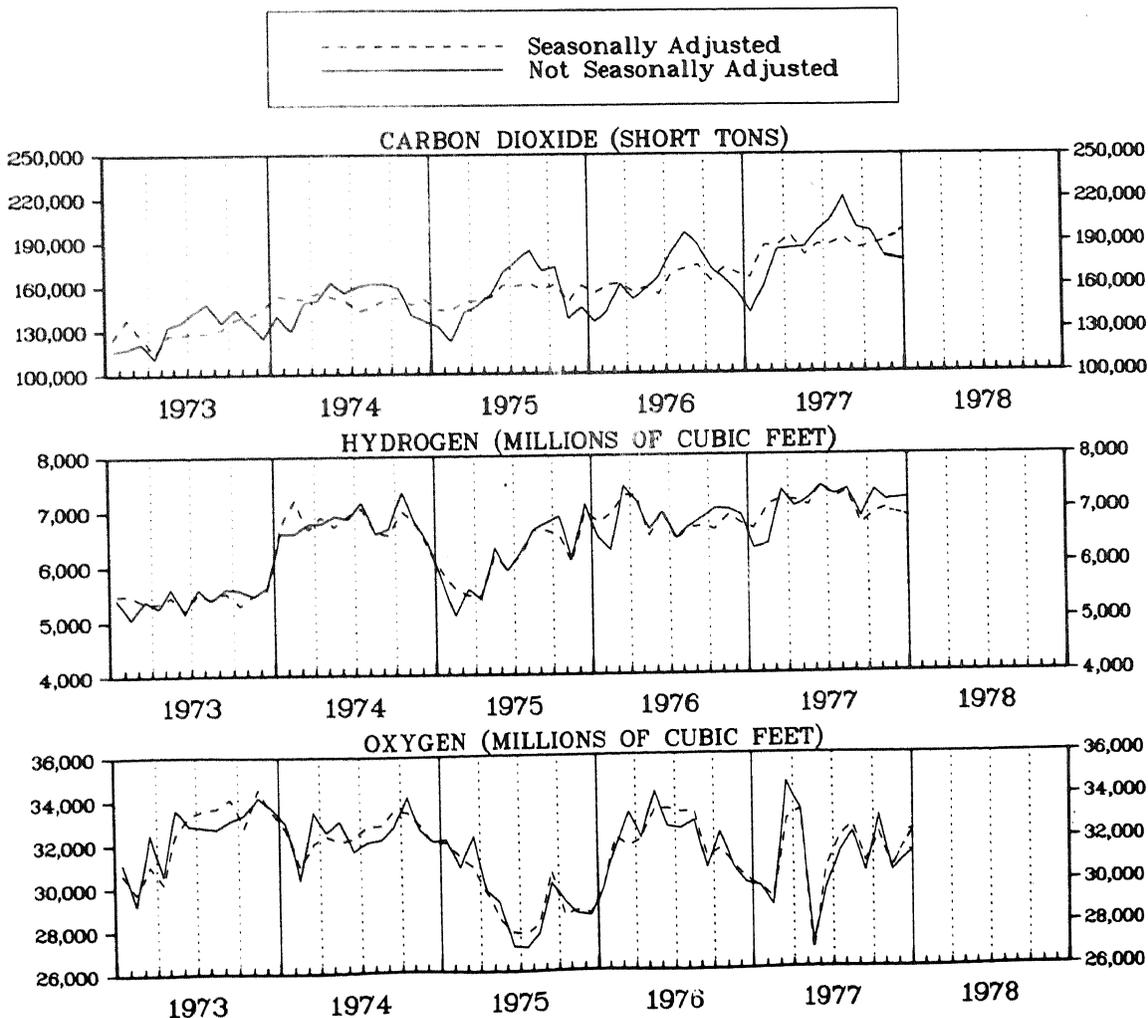
FEBRUARY 1978

M28C(78)-2  
 Issued April 1978

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## PRODUCTION OF SELECTED INDUSTRIAL GASES 1973 TO 1978



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Table 1A.--SUMMARY OF PRODUCTION OF PRINCIPAL GASES: 1976 TO 1978

(Seasonally adjusted)

Month and year	Acetylene (2813200)	Carbon dioxide (2813311) and (2813331)	Hydrogen, high and low purity (100%) (2813420)	Nitrogen, high and low purity (100%) (2813440)	Oxygen, high and low purity (100%) (2813450)
	(Mil. cu. ft.)	(Short tons)	(Mil. cu. ft.)	(Mil. cu. ft.)	(Mil. cu. ft.)
1978					
February.....	435	184,793	7,352	30,453	30,50
January.....	443	165,369	7,482	31,259	32,01
1977					
December.....	435	195,730	6,953	30,372	32,11
November.....	428	189,622	6,998	29,667	30,51
October.....	445	187,190	6,906	28,803	32,21
September.....	434	184,423	6,684	29,133	30,91
August.....	489	192,444	7,309	27,879	32,61
July.....	478	187,349	7,187	27,479	32,14
June.....	512	187,367	7,449	30,631	33,91
May.....	548	180,177	7,042	26,692	34,15
April.....	457	194,283	7,145	25,836	33,40
March.....	557	186,723	7,164	25,457	32,94
February.....	559	186,664	7,061	25,100	29,21
January.....	594	164,649	6,623	24,381	29,81
1976					
December.....	517	167,567	6,721	26,290	30,23
November.....	526	171,862	6,882	26,147	30,85
October.....	557	162,734	6,615	25,205	31,55
September.....	584	173,501	6,671	24,347	31,19
August.....	609	170,987	6,650	24,606	33,31
July.....	620	168,466	6,405	23,813	33,21
June.....	616	153,400	6,981	23,528	33,43
May.....	621	158,295	6,505	23,929	33,44
April.....	635	155,282	7,252	23,600	32,05
March.....	626	161,169	7,259	23,366	31,70
February.....	595	160,068	6,906	22,861	32,13

Table 1B.--SUMMARY OF PRODUCTION OF PRINCIPAL GASES: 1976 TO 1978

(Not seasonally adjusted)

Month and year	Acetylene (2813200)	Carbon dioxide, liquid and gas (2813311)	Carbon dioxide, solid (2813331)	Hydrogen, high and low purity (100%) (2813420)	Nitrogen, high and low purity (100%) (2813440)	Oxygen, high and low purity (100%) (2813450)
	(Mil. cu. ft.)	(Short tons)	(Short tons)	(Mil. cu. ft.)	(Mil. cu. ft.)	(Mil. cu. ft.)
1978						
February.....	413	139,149	18,849	6,595	28,687	30,137
January.....	431	123,760	22,922	7,041	31,853	32,011
1977						
December.....	449	154,711	25,361	7,127	30,099	31,841
November.....	451	154,385	26,325	7,117	29,163	30,415
October.....	458	168,168	28,756	7,328	29,466	33,072
September.....	467	167,493	31,499	6,831	29,191	30,446
August.....	509	183,138	37,403	7,346	28,688	32,304
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March.....	538	156,321	27,785	7,329	26,349	34,653
February.....	531	135,583	24,058	6,348	23,655	28,938
January.....	565	117,726	22,888	6,265	24,744	29,867
1976						
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May.....	600	128,621	28,258	6,629	24,214	34,245
April.....	610	124,594	25,767	7,143	23,107	32,089
March.....	596	132,165	28,650	7,426	24,425	33,292
February.....	584	117,828	24,593	6,250	22,221	31,719

Table 2.--PRIMARY PRODUCTION (QUANTITY) OF SPECIFIED INDUSTRIAL GASES

Product code	Chemical and basis	Unit of measure	February 1978	January 1978	February 1977
2813200	Acetylene <sup>1</sup> .....	Mil. cu. ft.	413	431	531
	Produced for compression, including cylinder and pipeline.....	do	110	109	110
	Produced for pipeline shipment (excluding that shipped to be compressed) and for consumption in this plant...	do	303	322	421
2813415	Argon, high purity.....	do			
	Produced for cylinder and bulk delivery and pipeline shipments, and for consumption in this plant.....	do	511	515	449
	Carbon dioxide:				
2813311	Liquid and gas <sup>2</sup> .....	Short tons	139,149	<sup>r</sup> 123,760	135,583
2813331	Solid (dry ice).....	do	18,849	22,922	24,058
2813420	Hydrogen, total <sup>3</sup> .....	Mil. cu. ft.	6,595	7,041	6,348
	Liquid and gas:				
	Produced for cylinder and bulk delivery shipment, and liquid produced for conversion to gas.....	do	554	834	753
	Produced for pipeline and Government use.....	do	1,978	1,922	1,861
	Produced for consumption in this plant.....	do	4,063	4,285	3,734
2813440	Nitrogen, total <sup>4</sup> .....	do	28,687	31,853	23,655
	Gas:				
	Produced for pipeline shipment.....	do	16,958	19,484	<sup>5</sup> 14,633
	Liquid:				
	Produced for bulk delivery shipment to pipeline or to air separation plants.....	do	600	466	474
	Liquid and gas:				
	Produced for cylinder and bulk delivery shipment.....	do	6,914	7,006	<sup>6</sup> 6,817
	Produced for consumption in this plant.....	do	4,215	4,837	1,731
2813450	Oxygen, total.....	do	30,137	32,012	28,938
	Gas:				
	Produced for pipeline shipments.....	do	21,544	22,768	19,570
	Liquid:				
	Produced for bulk delivery shipment to pipelines or to other air separation plants.....	do	639	631	399
	Liquid and gas:				
	Produced for cylinder and bulk delivery shipment.....	do	4,738	5,072	4,827
	Produced for consumption in this plant.....	do	3,216	3,541	4,142

<sup>r</sup>Revised by 5 percent or more from previously published figures.

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<sup>4</sup>Excludes amounts produced and used in the manufacture of ammonia and ammonia derivatives.

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but do not necessarily indicate amounts entering the market. In some cases, figures are included for material produced "in process" as an intermediate to the end products.

## RELATIONSHIP BETWEEN M28C AND M28C-14 SERIES FOR INDUSTRIAL GASES

The data as shown in Table 1 reflect levels of production as reported by establishments on monthly form M28A.2. These data are revised in the annual publication collected on form MA-28E.2 and are shown in Table 9 of the annual report M28C-14. The actual data reported by establishments canvassed on the annual differ by varying amounts from those collected monthly due to receipt of revised data from the respondent and establishments reporting on the annual and not on the monthly. For these reasons, the monthly and annual data comprise two separate series and should be used as such for analytical purposes. Specifically, the monthly data should be useful in describing month-to-month changes while the annual data provide a better indication of the level of production. Revisions to the 1976 monthly series based on findings from the 1976 annual will be forthcoming as soon as research into the differences are resolved.

## RELATED REPORTS

An annual current industrial report is published in this series. The annual report summarizes monthly figures and incorporates all known revisions in the series for both current and previous year, thus providing a single reference copy to replace the monthly publications. This annual summary provides additional information on the history of this survey.

The Bureau of the Census also publishes reports on other related products as follows

Series	Frequency	Title
<i>Current Industrial Reports</i>		
M3-1	Monthly	Manufacturers' Shipments, Inventories, and Orders
M28A	Monthly	Inorganic Chemicals
M28B	Monthly	Inorganic Fertilizer Materials
<i>Foreign Trade Reports</i>		
FT-410	Monthly	U.S. Exports
FT-135	Monthly	U.S. General Imports

## CONTACTS FOR DATA USERS

Subject Area	Contact	Phone Number
Current Industrial Report M28C	Melva Martin	(301) 763-7107
Foreign Trade publications	Juanita Noone	(301) 763-5140
Bureau of Domestic Business Development	Chemicals Program (OBRA)	(202) 377-5496
To order a Census publication	Daisy Williams	(301) 763-7472
To order microfilm of Census publications	Theresa Allen	(301) 763-5042

# Industrial Gases



U.S. Department of Commerce  
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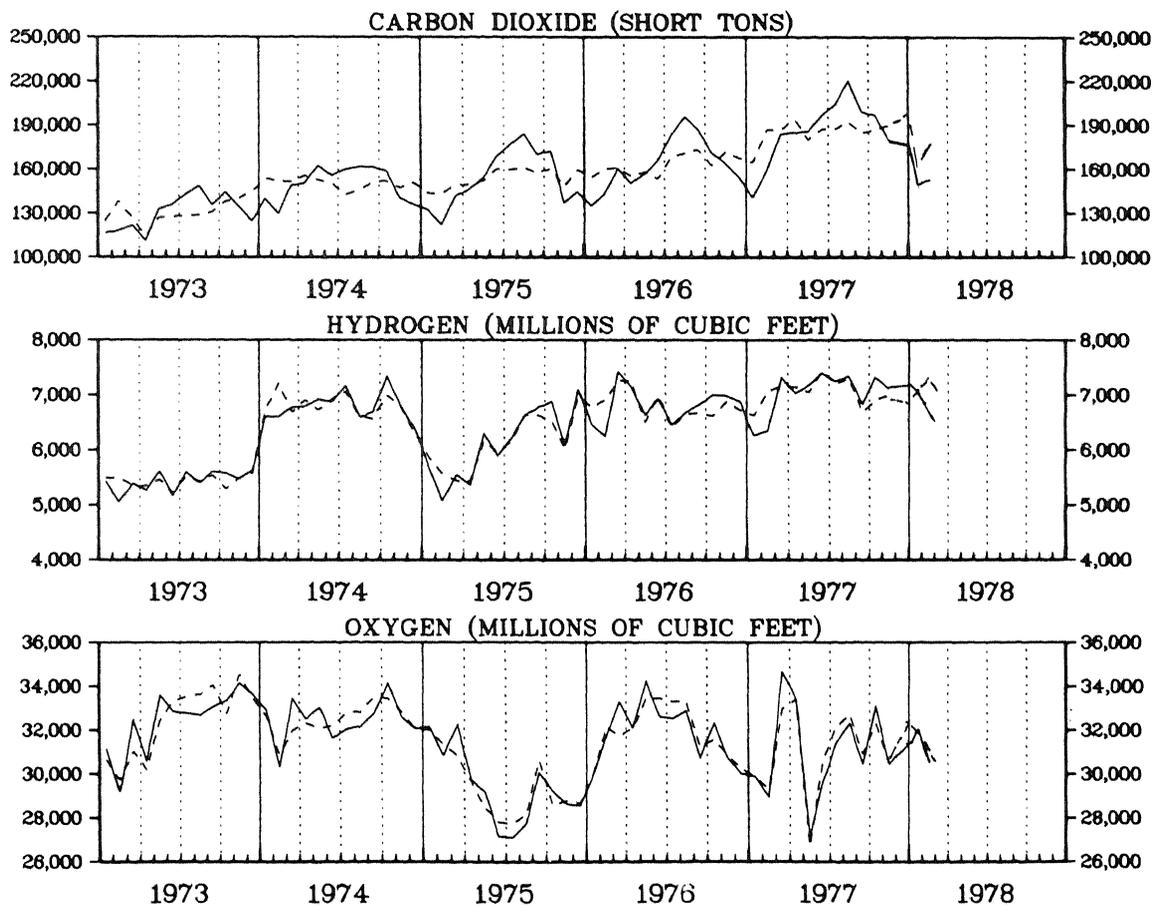
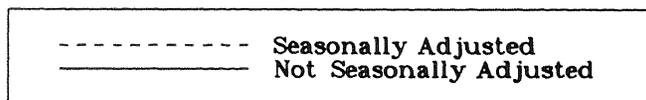
MARCH 1978

M28C(78)-3  
Issued May 1978

The statistics in this publication are based on a survey of manufacturers and represent total U.S. production of industrial gases. Estimates are included for companies whose reports were not received in time for tabulation. A more complete descrip-

tion of this survey appears on page 4. An annual current industrial report is published in this series. The annual report includes all months for the current and previous years and incorporates all known revisions in the series.

## PRODUCTION OF SELECTED INDUSTRIAL GASES 1973 TO 1978



Address inquiries concerning these figures to U.S. Department of Commerce, Bureau of the Census, Industry Division, Washington, D.C. 20233, or call Melva Martin, (301) 763-7107.

For sale by the Subscriber Services Section (Publications), Bureau of the Census, Washington, D.C. 20233, or any U.S. Department of Commerce district office. Postage stamps not acceptable; currency submitted at sender's risk. Remittances from foreign countries must be by international money order or by a draft on a U.S. bank. Price 25 cents per copy, \$3.50 per year.

Table 1A.--SUMMARY OF PRODUCTION OF PRINCIPAL GASES: 1976 TO 1978

Month and year	(Seasonally adjusted)				
	Acetylene (2813200) (Mil. cu. ft.)	Carbon dioxide (2813311) and (2813331) (Short tons)	Hydrogen, high and low purity (100%) (2813420) (Mil. cu. ft.)	Nitrogen, high and low purity (100%) (2813440) (Mil. cu. ft.)	Oxygen, high and low purity (100%) (2813450) (Mil. cu. ft.)
1978					
March.....	440	186,059	7,689	32,417	32,041
February.....	435	184,793	7,348	30,682	30,365
January.....	443	165,369	7,482	31,259	32,012
1977					
December.....	435	195,730	6,953	30,372	32,162
November.....	428	189,622	6,998	29,667	30,537
October.....	445	187,190	6,906	28,803	32,265
September.....	434	184,423	6,684	29,133	30,910
August.....	489	192,444	7,309	27,879	32,696
July.....	478	187,349	7,187	27,479	32,140
June.....	512	187,367	7,449	30,631	33,910
May.....	548	180,177	7,042	26,692	34,157
April.....	457	194,283	7,145	25,836	33,401
March.....	557	186,723	7,164	25,457	32,940
February.....	559	186,664	7,061	25,100	29,289
January.....	594	164,649	6,623	24,381	29,867
1976					
December.....	517	167,567	6,721	26,290	30,231
November.....	526	171,862	6,882	26,147	30,852
October.....	557	162,734	6,615	25,205	31,555
September.....	584	173,501	6,671	24,347	31,190
August.....	609	170,987	6,650	24,606	33,317
July.....	620	168,466	6,405	23,813	33,286
June.....	616	153,400	6,981	23,528	33,439
May.....	621	158,295	6,505	23,929	33,442
April.....	635	155,282	7,252	23,600	32,057
March.....	626	161,169	7,259	23,366	31,707

Table 1B.--SUMMARY OF PRODUCTION OF PRINCIPAL GASES: 1976 TO 1978

Month and year	(Not seasonally adjusted)					
	Acetylene (2813200) (Mil. cu. ft.)	Carbon dioxide, liquid and gas (2813311) (Short tons)	Carbon dioxide, solid (2813331) (Short tons)	Hydrogen, high and low purity (100%) (2812420) (Mil. cu. ft.)	Nitrogen, high and low purity (100%) (2813440) (Mil. cu. ft.)	Oxygen, high and low purity (100%) (2813450) (Mil. cu. ft.)
1978						
March.....	421	166,202	22,276	7,843	33,519	33,707
February.....	413	139,149	18,849	6,591	28,902	30,001
January.....	431	123,760	22,922	7,041	31,853	32,012
1977						
December.....	449	154,711	25,361	7,127	30,099	31,841
November.....	451	154,385	26,325	7,117	29,163	30,415
October.....	458	168,168	28,756	7,328	29,466	33,072
September.....	467	167,493	31,499	6,831	29,191	30,446
August.....	509	183,138	37,403	7,346	28,688	32,304
July.....	457	168,856	34,980	7,244	27,342	31,401
June.....	509	164,063	32,672	7,404	29,651	33,028
May.....	544	156,955	28,807	7,169	27,119	34,943
April.....	428	158,736	26,212	7,031	25,576	33,401
March.....	538	156,321	27,785	7,329	26,349	34,653
February.....	531	135,583	24,058	6,348	23,655	28,938
January.....	565	117,726	22,888	6,265	24,744	29,867
1976						
December.....	537	130,811	23,383	6,876	26,159	29,989
November.....	557	136,514	27,262	6,985	25,568	30,729
October.....	577	141,185	30,049	6,999	25,886	32,312
September.....	621	153,589	33,703	6,818	24,444	30,691
August.....	633	156,005	39,895	6,677	25,042	32,884
July.....	603	146,984	36,337	6,456	23,623	32,520
June.....	615	130,529	35,020	6,939	23,122	32,603
May.....	600	128,621	28,258	6,629	24,214	34,245
April.....	610	124,594	25,767	7,143	23,107	32,089
March.....	596	132,165	28,650	7,426	24,425	33,292

Table 2.--PRIMARY PRODUCTION (QUANTITY) OF SPECIFIED INDUSTRIAL GASES

Product code	Chemical and basis	Unit of measure	March 1978	February 1978	March 1977
2813200	Acetylene <sup>1</sup> .....	Mil. cu. ft.	421	413	538
	Produced for compression, including cylinder and pipeline.....	do	131	110	124
	Produced for pipeline shipment (excluding that shipped to be compressed) and for consumption in this plant...	do	290	303	414
2813415	Argon, high purity: Produced for cylinder and bulk delivery and pipeline shipments, and for consumption in this plant.....	do	610	514	503
2813311	Carbon dioxide: Liquid and gas <sup>2</sup> .....	Short tons	166,202	139,149	156,321
2813331	Solid (dry ice).....	do	22,276	18,849	27,785
2813420	Hydrogen, total <sup>3</sup> .....	Mil. cu. ft.	7,843	6,591	7,329
	Liquid and gas: Produced for cylinder and bulk shipment, and liquid produced for conversion to gas.....	do	958	554	693
	Produced for pipeline and government use.....	do	2,260	1,972	2,091
	Produced for consumption in this plant.....	do	4,625	4,065	4,545
2813440	Nitrogen, total <sup>4</sup> .....	do	33,519	28,902	26,349
	Gas: Produced for pipeline shipment.....	do	20,102	17,171	<sup>5</sup> 16,642
	Liquid: Produced for bulk delivery shipment to pipeline or to air separation plants.....	do	601	600	449
	Liquid and gas: Produced for cylinder and bulk delivery shipment....	do	7,929	6,915	<sup>6</sup> 7,592
	Produced for consumption in this plant.....	do	4,887	4,216	1,666
2813450	Oxygen, total.....	do	33,707	30,001	34,643
	Gas: Produced for pipeline shipments.....	do	23,858	21,405	23,565
	Liquid: Produced for bulk delivery shipment to pipelines or to air separation plants.....	do	872	642	613
	Liquid and gas: Produced for cylinder and bulk delivery shipment....	do	5,558	4,738	5,516
	Produced for consumption in this plant.....	do	3,419	3,216	4,949

<sup>1</sup>Excludes quantities of acetylene produced and consumed by railroad shops, shipyards, and small establishments using portable generators.

<sup>2</sup>Excludes production of liquid and gas CO<sub>2</sub> converted to and reported as dry ice and also amounts converted from pure CO<sub>2</sub> (Liquid or solid) purchased or received from other plants. Also excludes quantities produced and consumed in plants manufacturing soda ash or urea.

<sup>3</sup>Excludes quantities produced and consumed in the manufacture of methanol and ammonia, but includes an unspecified amount of hydrogen produced for sale or interplant transfer to plants consuming this gas in the production of ammonia. Also excludes amounts of hydrogen produced in petroleum refineries for captive use. However, of the total shown for lower purity hydrogen prior to 1969, 70 to 75 percent was accounted for by petroleum refiners with captive hydrogen production. Not all such petroleum refineries were canvassed in this survey.

<sup>4</sup>Excludes amounts produced and used in the manufacture of ammonia and ammonia derivatives.

<sup>5</sup>1977 Data for nitrogen (gas) produced for pipeline shipments, combined with produced for cylinder and bulk delivery shipments.

<sup>6</sup>1977 data for nitrogen (liquid) produced for bulk delivery shipment to pipeline or to air separation plants included in nitrogen (liquid and gas) produced for consumption in this plant.

<sup>7</sup>1977 data for nitrogen (liquid and gas) produced for cylinder and bulk delivery shipments excludes nitrogen (gas) produced for cylinder and bulk delivery shipments.

## DESCRIPTION OF SURVEY

**Scope of Survey**—This survey covers firms engaged in the manufacture of industrial gases. Excluded from this survey are industrial gases vented or used for fuel by the producer.

**Survey Description**—The statistics in this publication were collected on Bureau of the Census monthly reporting form M-28A.2, Production of Industrial Gases. The mailing panel for this survey consisted of all known producers of industrial gases, approximately 670 producers of elemental gases, carbon dioxide, and acetylene.

**Survey Error**—Figures for the current month may include estimates for respondents whose reports were not received in time for tabulation. Such missing figures are "imputed" from month-to-month movements shown by reporting firms and are generally limited to a maximum of 25 percent for any one item. Individual items with imputation greater than 25 percent are footnoted.

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**Revision to Previous Period Data**—Statistics for previous months may be revised due to receipt of corrected data from respondents, including late reports for which imputations were previously made as described above, and other corrections. Figures which have been revised by more than 5 percent from previously published figures are indicated by footnotes.

**Reporting Period Adjustment**—Since January 1975, the data have been adjusted for number of working days in the reporting period in order to compensate for differences in individual company reporting patterns, i.e., calendar month, 4-week, 5-week periods. Since the calendar month accounting system prevails in this industry, adjustments have been made to those reporting on other than a calendar month basis.

**Seasonal Adjustment**—This report presents seasonally adjusted data in table 1A for selected series shown in table 1B. The data were seasonally adjusted using the X-11 variant of the Bureau of the Census Method II seasonal adjustment program. This program is a ratio-to-moving average method. It largely eliminates the effect of seasonal variations (intra-year variations repeated constantly from year to year) within the series. The seasonally adjusted data provide a better measure of the month-to-month variations which are due to factors other than seasonal pattern. Additional information concerning seasonal adjustment is available in the seasonal adjustment supplement issued in this series.

## EXPLANATION OF TERMS

**Production**—Data shown for production represent total quantity of each chemical produced, including quantity consumed in plants, and for sale or transfer to other plants or warehouses of the same company. The statistics presented in the tables provide an up-to-date measure of activity in the inorganic field,

but do not necessarily indicate amounts entering the market. In some cases, figures are included for material produced "in process" as an intermediate to the end products.

## RELATIONSHIP BETWEEN M28C AND M28C-14 SERIES FOR INDUSTRIAL GASES

The data as shown in Table 1 reflect levels of production as reported by establishments on monthly form M28A.2. These data are revised in the annual publication collected on form MA-28E.2 and are shown in Table 9 of the annual report M28C-14. The actual data reported by establishments canvassed on the annual differ by varying amounts from those collected monthly due to receipt of revised data from the respondent and establishments reporting on the annual and not on the monthly. For these reasons, the monthly and annual data comprise two separate series and should be used as such for analytical purposes. Specifically, the monthly data should be useful in describing month-to-month changes while the annual data provide a better indication of the level of production. Revisions to the 1976 monthly series based on findings from the 1976 annual will be forthcoming as soon as research into the differences are resolved.

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## CONTACTS FOR DATA USERS

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Bureau of Domestic Business Development	Chemicals Program (OBRA)	(202) 377-5496
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# Industrial Gases



U.S. Department of Commerce  
BUREAU OF THE CENSUS

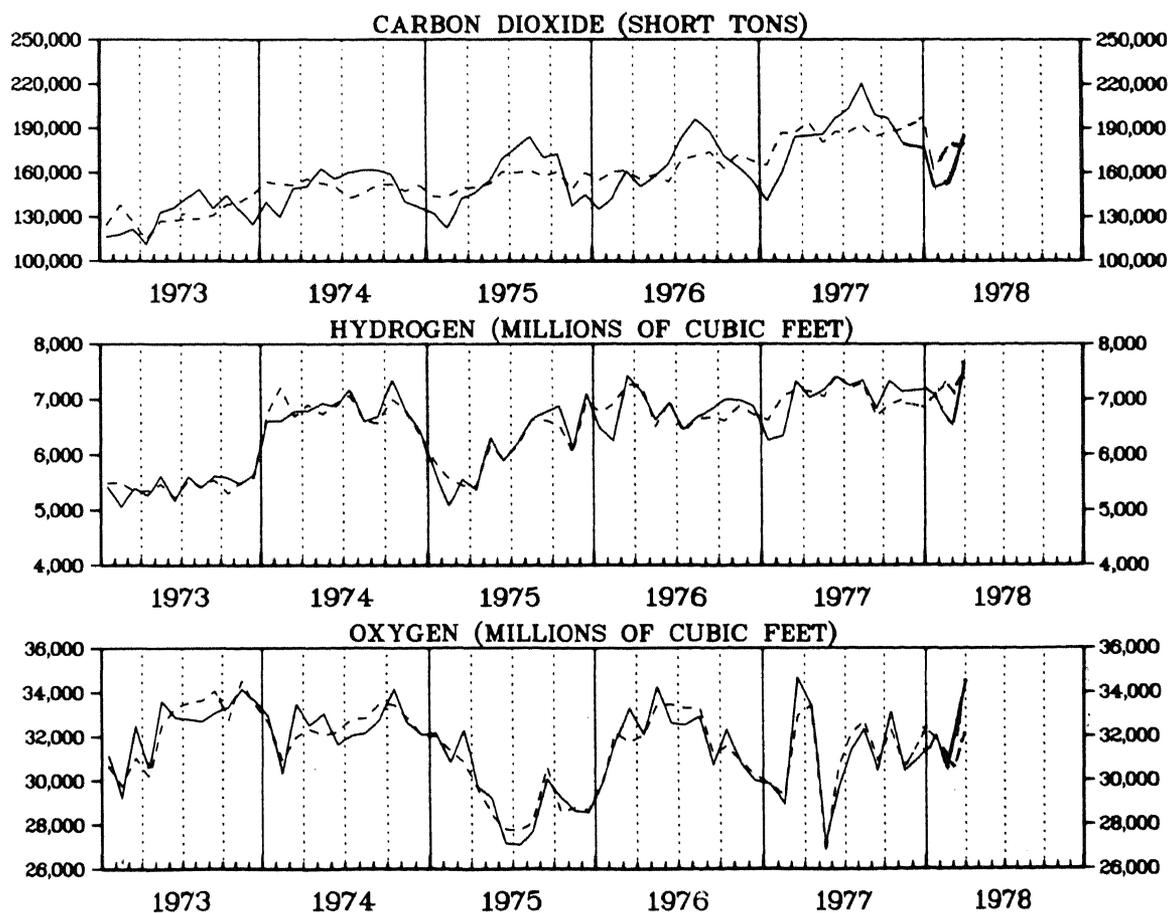
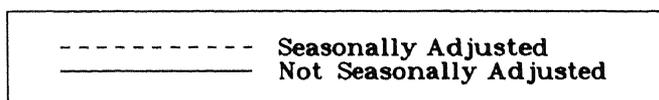
APRIL 1978

M28C(78)-4  
Issued June 1978

The statistics in this publication are based on a survey of manufacturers and represent total U.S. production of industrial gases. Estimates are included for companies whose reports were not received in time for tabulation. A more complete descrip-

tion of this survey appears on page 4. An annual current industrial report is published in this series. The annual report includes all months for the current and previous years and incorporates all known revisions in the series.

## PRODUCTION OF SELECTED INDUSTRIAL GASES 1973 TO 1978



Address inquiries concerning these figures to U.S. Department of Commerce, Bureau of the Census, Industry Division, Washington, D.C. 20233, or call Geoff Embrey, (301) 763-7837.

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(Seasonally adjusted)

Month and year	Acetylene (2813200)	Carbon dioxide (2813311) and (2813331)	Hydrogen, high and low purity (100%) (2813420)	Nitrogen, high and low purity (100%) (2813440)	Oxygen, high and low purity (100%) (2813450)
	(Mil. cu. ft.)	(Short tons)	(Mil. cu. ft.)	(Mil. cu. ft.)	(Mil. cu. ft.)
1978					
April.....	486	205,037	7,397	32,611	33,768
March.....	441	186,118	7,633	32,396	32,706
February.....	435	184,793	7,348	30,682	30,365
January.....	443	165,369	7,482	31,259	32,011
1977					
December.....	435	195,730	6,953	30,372	32,162
November.....	428	189,622	6,998	29,667	30,537
October.....	445	187,190	6,906	28,803	32,265
September.....	434	184,423	6,684	29,133	30,916
August.....	489	192,444	7,309	27,879	32,696
July.....	478	187,349	7,187	27,479	32,146
June.....	512	187,367	7,449	30,631	33,916
May.....	548	180,177	7,042	26,692	34,157
April.....	457	194,283	7,145	25,836	33,401
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February.....	559	186,664	7,061	25,100	29,289
January.....	594	164,649	6,623	24,381	29,867
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December.....	517	167,567	6,721	26,290	30,231
November.....	526	171,862	6,882	26,147	30,852
October.....	557	162,734	6,615	25,205	31,555
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July.....	620	168,466	6,405	23,813	33,286
June.....	616	153,400	6,981	23,528	33,439
May.....	621	158,295	6,505	23,929	33,442
April.....	635	155,282	7,252	23,600	32,057

Table 1B.--SUMMARY OF PRODUCTION OF PRINCIPAL GASES: 1976 TO 1978

(Not seasonally adjusted)

Month and year	Acetylene (2813200)	Carbon dioxide, liquid and gas (2813311)	Carbon dioxide, solid (2813331)	Hydrogen, high and low purity (100%) (2812420)	Nitrogen, high and low purity (100%) (2813440)	Oxygen, high and low purity (100%) (2813450)
	(Mil. cu. ft.)	(Short tons)	(Short tons)	(Mil. cu. ft.)	(Mil. cu. ft.)	(Mil. cu. ft.)
1978						
April.....	451	166,311	22,528	7,271	32,024	33,768
March.....	422	166,213	22,325	7,809	33,497	34,409
February.....	413	139,149	18,849	6,591	28,902	30,001
January.....	431	123,760	22,922	7,041	31,853	32,012
1977						
December.....	449	154,711	25,361	7,127	30,099	31,841
November.....	451	154,385	26,325	7,117	29,163	30,415
October.....	458	168,168	28,756	7,328	29,466	33,072
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February.....	531	135,583	24,058	6,348	23,655	28,938
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May.....	600	128,621	28,258	6,629	24,214	34,245
April.....	610	124,594	25,767	7,143	23,107	32,089

Table 2.--PRIMARY PRODUCTION (QUANTITY) OF SPECIFIED INDUSTRIAL GASES

Product code	Chemical and basis	Unit of measure	April 1978	March 1978	April 1977
2813200	Acetylene <sup>1</sup> .....	Mil. cu. ft.	451	422	428
	Produced for compression, including cylinder and pipeline.....	do	126	131	104
	Produced for pipeline shipment (excluding that shipped to be compressed) and for consumption in this plant...	do	325	291	324
2813415	Argon, high purity: Produced for cylinder and bulk delivery and pipeline shipments, and for consumption in this plant.....	do	575	605	536
	Carbon dioxide:				
2813311	Liquid and gas <sup>2</sup> .....	Short tons	166,311	166,213	158,736
2813331	Solid (dry ice).....	do	22,528	22,325	26,212
2813420	Hydrogen, total <sup>3</sup> .....	Mil. cu. ft.	7,271	7,809	7,031
	Liquid and gas:				
	Produced for cylinder and bulk shipment, and liquid produced for conversion to gas.....	do	857	962	879
	Produced for pipeline and government use.....	do	2,222	2,270	2,073
	Produced for consumption in this plant.....	do	4,192	4,577	4,079
2813440	Nitrogen, total <sup>4</sup> .....	do	32,024	33,497	25,576
	Gas:				
	Produced for pipeline shipment.....	do	19,419	20,090	<sup>5</sup> 15,885
	Liquid:				
	Produced for bulk delivery shipment to pipeline or to air separation plants.....	do	982	635	556
	Liquid and gas:				
	Produced for cylinder and bulk delivery shipment....	do	7,370	7,933	<sup>6</sup> 7,051
	Produced for consumption in this plant.....	do	4,253	4,839	2,084
2813450	Oxygen, total.....	do	33,768	34,409	33,401
	Gas:				
	Produced for pipeline shipments.....	do	23,872	23,855	23,504
	Liquid:				
	Produced for bulk delivery shipment to pipelines or to air separation plants.....	do	925	873	820
	Liquid and gas:				
	Produced for cylinder and bulk delivery shipment.....	do	4,756	<sup>r</sup> 5,558	5,313
	Produced for consumption in this plant.....	do	4,215	<sup>r</sup> 4,123	3,764

<sup>r</sup>Revised by 5 percent or more from previously published figures.

<sup>1</sup>Excludes quantities of acetylene produced and consumed by railroad shops, shipyards, and small establishments using portable generators.

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<sup>4</sup>Excludes amounts produced and used in the manufacture of ammonia and ammonia derivatives.

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## DESCRIPTION OF SURVEY

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*Revision to Previous Period Data*—Statistics for previous months may be revised due to receipt of corrected data from respondents, including late reports for which imputations were previously made as described above, and other corrections. Figures which have been revised by more than 5 percent from previously published figures are indicated by footnotes.

*Reporting Period Adjustment*—Since January 1975, the data have been adjusted for number of working days in the reporting period in order to compensate for differences in individual company reporting patterns, i.e., calendar month, 4-week, 5-week periods. Since the calendar month accounting system prevails in this industry, adjustments have been made to those reporting on other than a calendar month basis.

*Seasonal Adjustment*—This report presents seasonally adjusted data in table 1A for selected series shown in table 1B. The data were seasonally adjusted using the X-11 variant of the Bureau of the Census Method II seasonal adjustment program. This program is a ratio-to-moving average method. It largely eliminates the effect of seasonal variations (intra-year variations repeated constantly from year to year) within the series. The seasonally adjusted data provide a better measure of the month-to-month variations which are due to factors other than seasonal pattern. Additional information concerning seasonal adjustment is available in the seasonal adjustment supplement issued in this series.

## EXPLANATION OF TERMS

*Production*—Data shown for production represent total quantity of each chemical produced, including quantity consumed in plants, and for sale or transfer to other plants or warehouses of the same company. The statistics presented in the tables provide an up-to-date measure of activity in the inorganic field,

but do not necessarily indicate amounts entering the market. In some cases, figures are included for material produced "in process" as an intermediate to the end products.

## RELATIONSHIP BETWEEN M28C AND M28C-14 SERIES FOR INDUSTRIAL GASES

The data as shown in Table 1 reflect levels of production as reported by establishments on monthly form M28A.2. These data are revised in the annual publication collected on form MA-28E.2 and are shown in Table 9 of the annual report M28C-14. The actual data reported by establishments canvassed on the annual differ by varying amounts from those collected monthly due to receipt of revised data from the respondent and establishments reporting on the annual and not on the monthly. For these reasons, the monthly and annual data comprise two separate series and should be used as such for analytical purposes. Specifically, the monthly data should be useful in describing month-to-month changes while the annual data provide a better indication of the level of production. Revisions to the 1976 monthly series based on findings from the 1976 annual will be forthcoming as soon as research into the differences are resolved.

## RELATED REPORTS

An annual current industrial report is published in this series. The annual report summarizes monthly figures and incorporates all known revisions in the series for both current and previous year, thus providing a single reference copy to replace the monthly publications. This annual summary provides additional information on the history of this survey.

The Bureau of the Census also publishes reports on other related products as follows:

Series	Frequency	Title
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M28B	Monthly	Inorganic Fertilizer Materials
<i>Foreign Trade Reports</i>		
FT-410	Monthly	U.S. Exports
FT-135	Monthly	U.S. General Imports

## CONTACTS FOR DATA USERS

Subject Area	Contact	Phone Number
Current Industrial Report M28C	Géoff Embrey	(301) 763-7837
Foreign Trade publications	Juanita Noone	(301) 763-5140
Bureau of Domestic Business Development	Chemicals Program (OBRA)	(202) 377-5496
To order a Census publication	Daisy Williams	(301) 763-7472
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# Industrial Gases



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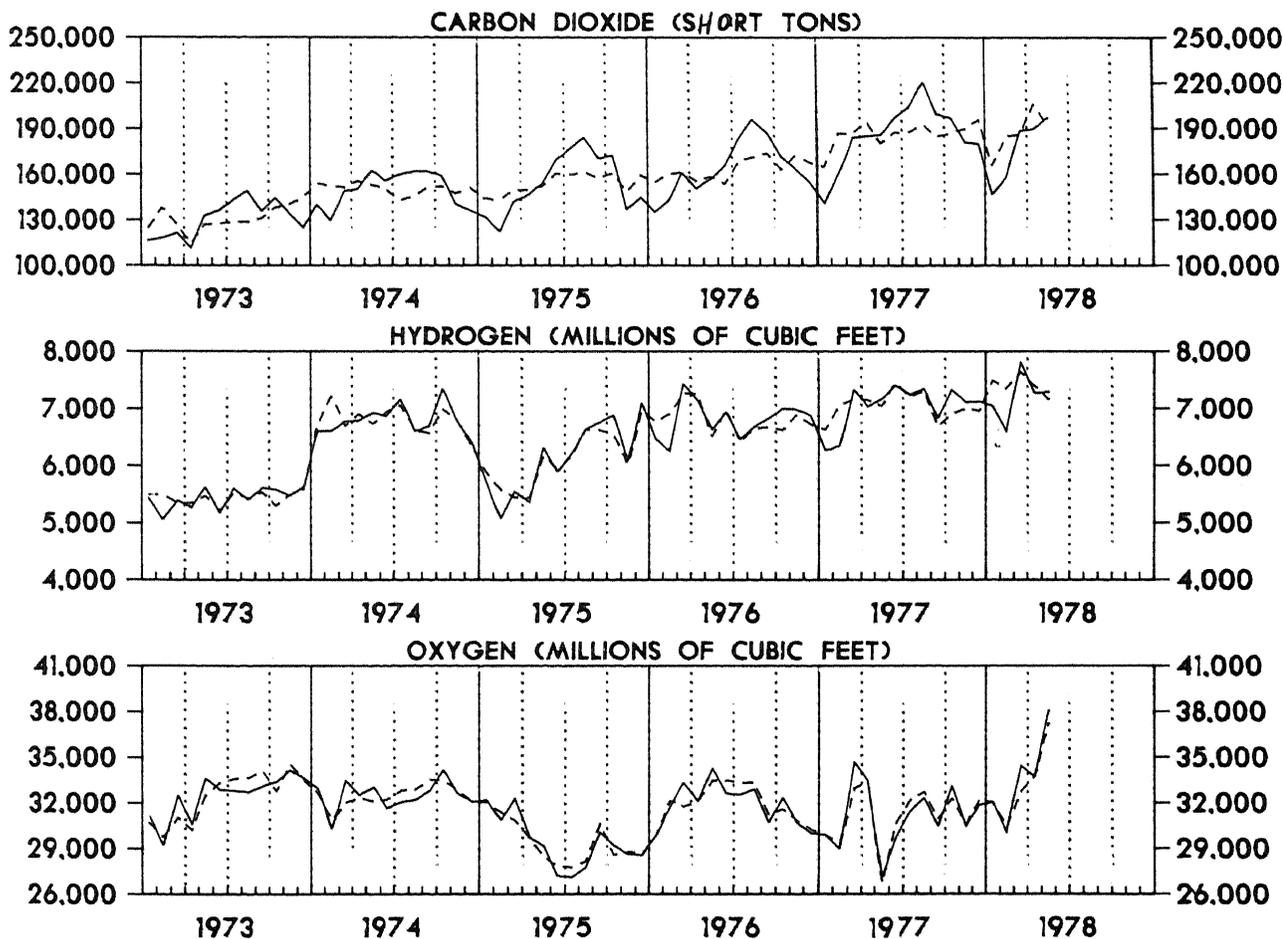
MAY 1978

M28C(78)-5  
Issued July 1978

The statistics in this publication are based on a survey of manufacturers and represent total U.S. production of industrial gases. Estimates are included for companies whose reports were not received in time for tabulation. A more complete descrip-

tion of this survey appears on page 4. An annual current industrial report is published in this series. The annual report includes all months for the current and previous years and incorporates all known revisions in the series.

## PRODUCTION OF SELECTED INDUSTRIAL GASES 1973 TO 1978



Address inquiries concerning these figures to U.S. Department of Commerce, Bureau of the Census, Industry Division, Washington, D.C. 20233, or call Geoff Embrey, (301) 763-7837.

For sale by the Subscriber Services Section (Publications), Bureau of the Census, Washington, D.C. 20233, or any U.S. Department of Commerce district office. Postage stamps not acceptable; currency submitted at sender's risk. Remittances from foreign countries must be by international money order or by a draft on a U.S. bank. Price 25 cents per copy, \$3.50 per year.

Table 1A.--SUMMARY OF PRODUCTION OF PRINCIPAL GASES: 1976 TO 1978

(Seasonally adjusted)

Month and year	Acetylene (2813200)  (Mil. cu. ft.)	Carbon dioxide (2813311) and (2813331)  (Short tons)	Hydrogen, high and low purity (100%) (2813420)  (Mil. cu. ft.)	Nitrogen, high and low purity (100%) (2813440)  (Mil. cu. ft.)	Oxygen, high and low purity (100%) (2813450)  (Mil. cu. ft.)
1978					
May.....	437	191,292	7,164	32,623	37,18
April.....	485	205,882	7,395	32,358	33,88
March.....	441	186,118	7,634	32,397	32,70
February.....	435	184,793	7,348	30,682	30,38
January.....	443	165,369	7,482	31,259	32,01
1977					
December.....	435	195,730	6,953	30,372	32,16
November.....	428	189,622	6,998	29,667	30,57
October.....	445	187,190	6,906	28,803	32,26
September.....	434	184,423	6,684	29,133	30,91
August.....	489	192,444	7,309	27,879	32,69
July.....	478	187,349	7,187	27,479	32,14
June.....	512	187,367	7,449	30,631	33,91
May.....	548	180,177	7,042	26,692	34,15
April.....	457	194,283	7,145	25,836	33,40
March.....	557	186,723	7,164	25,457	32,94
February.....	559	186,664	7,061	25,100	29,28
January.....	594	164,649	6,623	24,381	29,86
1976					
December.....	517	167,567	6,721	26,290	30,23
November.....	526	171,862	6,882	26,147	30,85
October.....	557	162,734	6,615	25,205	31,55
September.....	584	173,501	6,671	24,347	31,19
August.....	609	170,987	6,650	24,606	33,31
July.....	620	168,466	6,405	23,813	33,28
June.....	616	153,400	6,981	23,528	33,43
May.....	621	158,295	6,505	23,929	33,44

Table 1B.--SUMMARY OF PRODUCTION OF PRINCIPAL GASES: 1976 TO 1978

(Not seasonally adjusted)

Month and year	Acetylene (2813200)  (Mil. cu. ft.)	Carbon dioxide, liquid and gas (2813311)  (Short tons)	Carbon dioxide, solid (2813331)  (Short tons)	Hydrogen, high and low purity (100%) (2813420)  (Mil. cu. ft.)	Nitrogen, high and low purity (100%) (2813440)  (Mil. cu. ft.)	Oxygen, high and low purity (100%) (2813450)  (Mil. cu. ft.)
1978						
May.....	434	170,640	26,391	7,293	33,145	38,039
April.....	450	167,089	22,528	7,269	31,776	33,694
March.....	422	166,213	22,325	7,810	33,498	34,408
February.....	413	139,149	18,849	6,591	28,902	30,001
January.....	431	123,760	22,922	7,041	31,853	32,012
1977						
December.....	449	154,711	25,361	7,127	30,099	31,841
November.....	451	154,385	26,325	7,117	29,163	30,415
October.....	458	168,168	28,756	7,328	29,466	33,072
September.....	467	167,493	31,499	6,831	29,191	30,446
August.....	509	183,138	37,403	7,346	28,688	32,304
July.....	457	168,856	34,980	7,244	27,342	31,401
June.....	509	164,063	32,672	7,404	29,651	33,028
May.....	544	156,955	28,807	7,169	27,119	34,943
April.....	428	158,736	26,212	7,031	25,576	33,401
March.....	538	156,321	27,785	7,329	26,349	34,653
February.....	531	135,583	24,058	6,348	23,655	28,938
January.....	565	117,726	22,888	6,265	24,744	29,867
1976						
December.....	537	130,811	23,383	6,876	26,159	29,989
November.....	557	136,514	27,262	6,985	25,568	30,729
October.....	577	141,185	30,049	6,999	25,886	32,312
September.....	621	153,589	33,703	6,818	24,444	30,691
August.....	633	156,005	39,895	6,677	25,042	32,884
July.....	603	146,984	36,337	6,456	23,623	32,520
June.....	615	130,529	35,020	6,939	23,122	32,603
May.....	600	128,621	28,258	6,629	24,214	34,245

Table 2.--PRIMARY PRODUCTION (QUANTITY) OF SPECIFIED INDUSTRIAL GASES

Product code	Chemical and basis	Unit of measure	May 1978	April 1978	May 1977
2813200	Acetylene <sup>1</sup> .....	Mil. cu. ft.	434	450	544
	Produced for compression, including cylinder and pipeline.....	do	129	125	105
	Produced for pipeline shipment (excluding that shipped to be compressed) and for consumption in this plant...	do	305	325	439
2813415	Argon, high purity: Produced for cylinder and bulk delivery and pipeline shipments, and for consumption in this plant.....	do	597	562	483
	Carbon dioxide:				
2813311	Liquid and gas <sup>2</sup> .....	Short tons	170,640	167,089	156,955
2813331	Solid (dry ice).....	do	26,391	22,528	28,807
2813420	Hydrogen, total <sup>3</sup> .....	Mil. cu. ft.	7,293	7,269	7,169
	Liquid and gas:				
	Produced for cylinder and bulk shipment, and liquid produced for conversion to gas.....	do	902	856	722
	Produced for pipeline and government use.....	do	2,003	2,222	2,072
	Produced for consumption in this plant.....	do	4,388	4,191	4,375
2813440	Nitrogen, total <sup>4</sup> .....	do	33,145	31,776	27,119
	Gas:				
	Produced for pipeline shipment.....	do	19,618	19,189	<sup>5</sup> 16,563
	Liquid:				
	Produced for bulk delivery shipment to pipeline or to air separation plants.....	do	837	961	588
	Liquid and gas:				
	Produced for cylinder and bulk delivery shipment....	do	7,751	7,253	<sup>6</sup> 7,708
	Produced for consumption in this plant.....	do	4,939	4,373	2,260
2813450	Oxygen, total.....	do	38,039	33,694	34,943
	Gas:				
	Produced for pipeline shipments.....	do	26,095	23,621	24,975
	Liquid:				
	Produced for bulk delivery shipment to pipelines or to air separation plants.....	do	1,087	922	689
	Liquid and gas:				
	Produced for cylinder and bulk delivery shipment....	do	6,117	4,734	7,708
	Produced for consumption in this plant.....	do	4,740	4,417	3,771

<sup>r</sup>Revised by 5 percent or more from previously published figures.

<sup>1</sup>Excludes quantities of acetylene produced and consumed by railroad shops, shipyards, and small establishments using portable generators.

<sup>2</sup>Excludes production of liquid and gas CO<sub>2</sub> converted to and reported as dry ice and also amounts converted from pure CO<sub>2</sub> (liquid or solid) purchased or received from other plants. Also excludes quantities produced and consumed in plants manufacturing soda ash or urea.

<sup>3</sup>Excludes quantities produced and consumed in the manufacture of methanol and ammonia, but includes an unspecified amount of hydrogen produced for sale or interplant transfer to plants consuming this gas in the production of ammonia. Also excludes amounts of hydrogen produced in petroleum refineries for captive use. However, of the total shown for lower purity hydrogen prior to 1969, 70 to 75 percent was accounted for by petroleum refiners with captive hydrogen production. Not all such petroleum refineries were canvassed in this survey.

<sup>4</sup>Excludes amounts produced and used in the manufacture of ammonia and ammonia derivatives.

<sup>5</sup>1977 Data for nitrogen (gas) produced for pipeline shipments, combined with produced for cylinder and bulk delivery shipments.

<sup>6</sup>1977 data for nitrogen (liquid) produced for bulk delivery shipment to pipeline or to air separation plants included in nitrogen (liquid and gas) produced for consumption in this plant.

## DESCRIPTION OF SURVEY

*Scope of Survey*—This survey covers firms engaged in the manufacture of industrial gases. Excluded from this survey are industrial gases vented or used for fuel by the producer.

*Survey Description*—The statistics in this publication were collected on Bureau of the Census monthly reporting form M28A.2, Production of Industrial Gases. The mailing panel for this survey consisted of all known producers of industrial gases, approximately 670 producers of elemental gases, carbon dioxide, and acetylene.

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*Production*—Data shown for production represent total quantity of each chemical produced, including quantity consumed in plants, and for sale or transfer to other plants or warehouses of the same company. The statistics presented in the tables provide an up-to-date measure of activity in the inorganic field,

but do not necessarily indicate amounts entering the market. In some cases, figures are included for material produced "in process" as an intermediate to the end products.

## RELATIONSHIP BETWEEN M28C AND M28C-14 SERIES FOR INDUSTRIAL GASES

The data as shown in Table 1 reflect levels of production as reported by establishments on monthly form M28A.2. These data are revised in the annual publication collected on form MA-28E.2 and are shown in Table 9 of the annual report M28C-14. The actual data reported by establishments canvassed on the annual differ by varying amounts from those collected monthly due to receipt of revised data from the respondent and establishments reporting on the annual and not on the monthly. For these reasons, the monthly and annual data comprise two separate series and should be used as such for analytical purposes. Specifically, the monthly data should be useful in describing month-to-month changes while the annual data provide a better indication of the level of production. Revisions to the 1976 monthly series based on findings from the 1976 annual will be forthcoming as soon as research into the differences are resolved.

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## CONTACTS FOR DATA USERS

Subject Area	Contact	Phone Number
Current Industrial Report M28C	Géoff Embrey	(301) 763-7837
Foreign Trade publications	Juanita Noone	(301) 763-5140
Bureau of Domestic Business Development	Chemicals Program (OBRA)	(202) 377-5496
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# Industrial Gases



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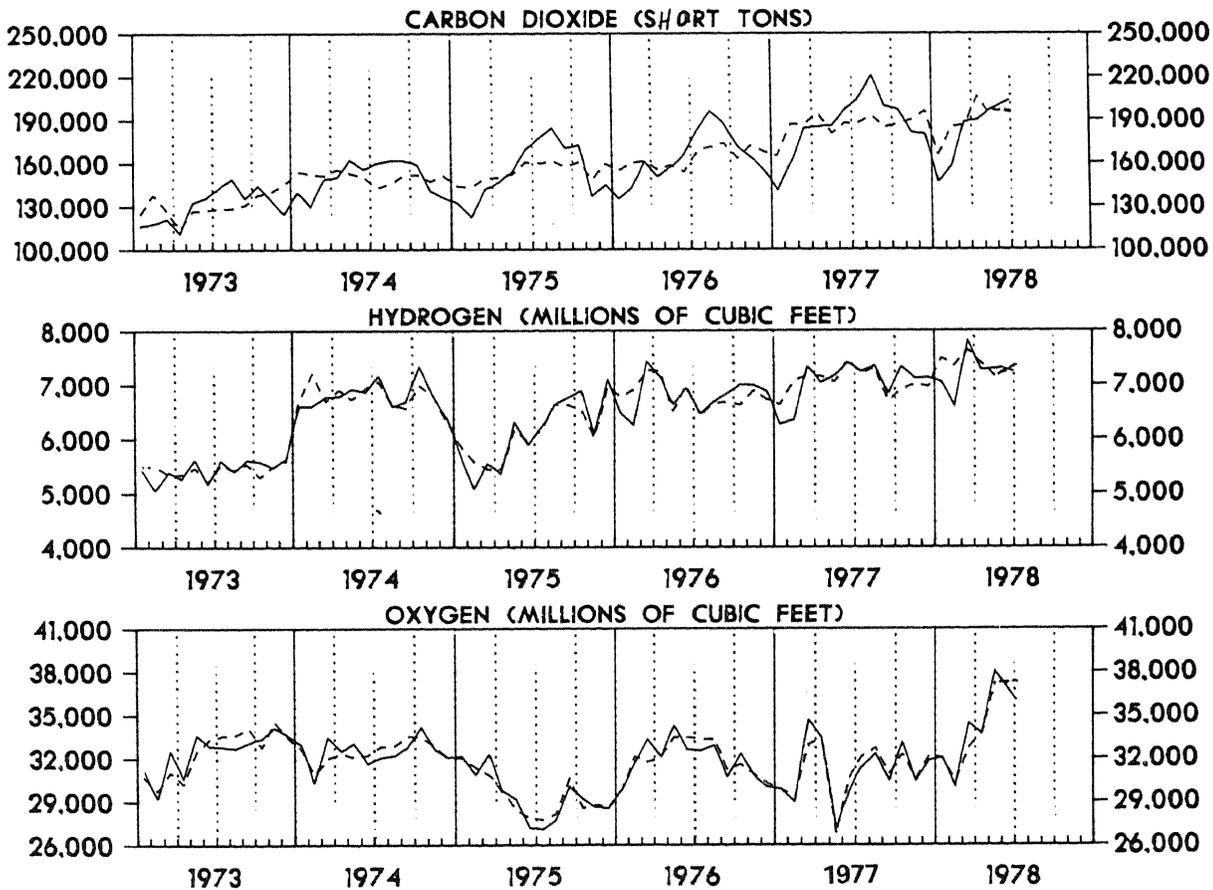
JUNE 1978

M28C(78)-6  
Issued August 1978

The statistics in this publication are based on a survey of manufacturers and represent total U.S. production of industrial gases. Estimates are included for companies whose reports were not received in time for tabulation. A more complete descrip-

tion of this survey appears on page 4. An annual current industrial report is published in this series. The annual report includes all months for the current and previous years and incorporates all known revisions in the series.

## PRODUCTION OF SELECTED INDUSTRIAL GASES 1973 TO 1978



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Table IA. SUMMARY OF PRODUCTION OF PRINCIPAL GASES: 1976 TO 1978

(Seasonally adjusted)

Month and year	Acetylene (2813200)	Carbon dioxide (2813311) and (2813331)	Hydrogen, high and low purity (100%) (2813420)	Nitrogen, high and low purity (100%) (2813440)	Oxygen, high and low purity (100%) (2813450)
	(Mil. cu. ft.)	(Short tons)	(Mil. cu. ft.)	(Mil. cu. ft.)	(Mil. cu. ft.)
1978					
June.....	465	195,462	7,240	33,472	37.24
May.....	437	193,714	7,212	32,712	36.95
April.....	485	205,882	7,395	32,358	33.66
March.....	441	186,118	7,634	32,397	32.70
February.....	435	184,793	7,348	30,682	30.34
January.....	443	165,369	7,482	31,259	32.01
1977					
December.....	435	195,730	6,953	30,372	32.24
November.....	428	189,622	6,998	29,667	30.51
October.....	445	187,190	6,906	28,803	32.26
September.....	434	184,423	6,684	29,133	30.91
August.....	489	192,444	7,309	27,879	32.69
July.....	478	187,349	7,187	27,479	32.14
June.....	512	187,367	7,449	30,631	33.91
May.....	548	180,177	7,042	26,692	34.17
April.....	457	194,283	7,145	25,836	33.40
March.....	557	186,723	7,164	25,457	32.94
February.....	559	186,664	7,061	25,100	29.28
January.....	594	164,649	6,623	24,381	29.86
1976					
December.....	517	167,567	6,721	26,290	30.21
November.....	526	171,862	6,882	26,147	30.85
October.....	557	162,734	6,615	25,205	31.53
September.....	584	173,501	6,671	24,347	31.19
August.....	609	170,987	6,650	24,606	33.31
July.....	620	168,466	6,405	23,813	33.26
June.....	616	153,400	6,981	23,528	33.43

Table IB. SUMMARY OF PRODUCTION OF PRINCIPAL GASES: 1976 TO 1978

(Not seasonally adjusted)

Month and year	Acetylene (2813200)	Carbon dioxide, liquid and gas (2813311)	Carbon dioxide, solid (2813331)	Hydrogen, high and low purity (100%) (2813420)	Nitrogen, high and low purity (100%) (2813440)	Oxygen, high and low purity (100%) (2813450)
	(Mil. cu. ft.)	(Short tons)	(Short tons)	(Mil. cu. ft.)	(Mil. cu. ft.)	(Mil. cu. ft.)
1978						
June.....	463	174,322	30,913	7,197	32,401	36.28
May.....	434	173,090	26,629	7,342	33,235	37.80
April.....	450	167,089	22,528	7,269	31,776	33.69
March.....	422	166,213	22,325	7,810	33,498	34.40
February.....	413	139,149	18,849	6,591	28,902	30.00
January.....	431	123,760	22,922	7,041	31,853	32.01
1977						
December.....	449	154,711	25,361	7,127	30,099	31.84
November.....	451	154,385	26,325	7,117	29,163	30.41
October.....	458	168,168	28,756	7,328	29,466	33.07
September.....	467	167,493	31,499	6,831	29,191	30.44
August.....	509	183,138	37,403	7,346	28,688	32.30
July.....	457	168,856	34,980	7,244	27,342	31.40
June.....	509	164,063	32,672	7,404	29,651	33.02
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February.....	531	135,583	24,058	6,348	23,655	28.93
January.....	565	117,726	22,888	6,265	24,744	29.86
1976						
December.....	537	130,811	23,383	6,876	26,159	29.98
November.....	557	136,514	27,262	6,985	25,568	30.72
October.....	577	141,185	30,049	6,999	25,886	32.31
September.....	621	153,589	33,703	6,818	24,444	30.69
August.....	633	156,005	39,895	6,677	25,042	32.88
July.....	603	146,984	36,337	6,456	23,623	32.52
June.....	615	130,529	35,020	6,939	23,122	32.60

Table 2. PRIMARY PRODUCTION (QUANTITY) OF SPECIFIED INDUSTRIAL GASES

Product code	Chemical and basis	Unit of measure	June 1978	May 1978	June 1977
28132 00	Acetylene <sup>1</sup> .....	Mil. cu. ft.	463	434	509
	Produced for compression, including cylinder and pipeline.....	.....do.....	123	129	106
	Produced for pipeline shipment (excluding that shipped to be compressed) and for consumption in this plant....	.....do.....	340	305	403
28134 15	Argon, high purity: Produced for cylinder and bulk delivery and pipeline shipments, and for consumption in this plant.....	.....do.....	593	612	484
	Carbon dioxide:				
28133 11	Liquid and gas <sup>2</sup> .....	Short tons.	174,322	173,090	164,063
28133 31	Solid (dry ice).....	.....do.....	30,913	26,629	32,672
28134 20	Hydrogen, total <sup>3</sup> .....	Mil. cu. ft.	7,197	7,342	7,404
	Liquid and gas:				
	Produced for cylinder and bulk shipment, and liquid produced for conversion to gas.....	.....do.....	824	901	718
	Produced for pipeline and government use.....	.....do.....	2,043	<sup>r</sup> 2,103	2,220
	Produced for consumption in this plant.....	.....do.....	4,330	4,338	4,466
28134 40	Nitrogen, total <sup>4</sup> .....	.....do.....	32,401	33,235	29,651
	Gas:				
	Produced for pipeline shipment.....	.....do.....	19,181	19,618	<sup>5</sup> 19,352
	Liquid:				
	Produced for bulk delivery shipment to pipeline or to air separation plants.....	.....do.....	962	<sup>r</sup> 921	<sup>6</sup> 2,866
	Liquid and gas:				
	Produced for cylinder and bulk delivery shipment.....	.....do.....	7,767	7,760	<sup>7</sup> 7,433
	Produced for consumption in this plant.....	.....do.....	4,491	4,936	( <sup>6</sup> )
28134 50	Oxygen, total.....	.....do.....	36,280	37,805	33,028
	Gas:				
	Produced for pipeline shipments.....	.....do.....	25,469	26,095	23,325
	Liquid:				
	Produced for bulk delivery shipment to pipelines or to air separation plants.....	.....do.....	1,035	1,175	643
	Liquid and gas:				
	Produced for cylinder and bulk delivery shipment.....	.....do.....	5,627	6,161	5,295
	Produced for consumption in this plant.....	.....do.....	4,149	4,374	3,765

<sup>r</sup>Revised by 5 percent or more from previously published figures.

<sup>1</sup>Excludes quantities of acetylene produced and consumed by railroad shops, shipyards, and small establishments using portable generators.

<sup>2</sup>Excludes production of liquid and gas CO<sub>2</sub> converted to and reported as dry ice and also amounts converted from pure CO<sub>2</sub> (liquid or solid) purchased or received from other plants. Also excludes quantities produced and consumed in plants manufacturing soda ash or urea.

<sup>3</sup>Excludes quantities produced and consumed in the manufacture of methanol and ammonia, but includes an unspecified amount of hydrogen produced for sale or interplant transfer to plants consuming this gas in the production of ammonia. Also excludes amounts of hydrogen produced in petroleum refineries for captive use. However, of the total shown for lower purity hydrogen prior to 1969, 70 to 75 percent was accounted for by petroleum refiners with captive hydrogen production. Not all such petroleum refineries were canvassed in this survey.

<sup>4</sup>Excludes amounts produced and used in the manufacture of ammonia and ammonia derivatives.

<sup>5</sup>1977 data for nitrogen (gas) produced for pipeline shipments, combined with produced for cylinder and bulk delivery shipments.

<sup>6</sup>1977 data for nitrogen (liquid) produced for bulk delivery shipment to pipeline or to air separation plants, combined with nitrogen (liquid and gas) produced for consumption in this plant.

<sup>7</sup>1977 data for nitrogen (liquid and gas) produced for cylinder and bulk delivery shipments excludes nitrogen (gas) produced for cylinder and bulk delivery shipments.

## DESCRIPTION OF SURVEY

*Scope of Survey*—This survey covers firms engaged in the manufacture of industrial gases. Excluded from this survey are industrial gases vented or used for fuel by the producer.

*Survey Description*—The statistics in this publication were collected on Bureau of the Census monthly reporting Form M28A.2, Production of Industrial Gases. The mailing panel for this survey consisted of all known producers of industrial gases, approximately 670 producers of elemental gases, carbon dioxide, and acetylene.

*Survey Error*—Figures for the current month include estimates for respondents whose reports were not received in time for tabulation. Such missing figures are "imputed" from month-to-month movements shown by reporting firms and are generally limited to a maximum of 25 percent for any one item. Individual items with imputation greater than 25 percent are footnoted.

The imputation rate is not an explicit indicator of the potential error in published figures due to nonresponse, because the actual monthly movements for nonrespondents may or may not closely agree with the imputed movements. The probable range of difference between the actual and imputed figures is unknown. The degree of uncertainty regarding the accuracy of the data, however, increases as the percentage of imputation increases. Figures with imputation rates above 25 percent should be used with caution.

*Revision to Previous Period Data*—Statistics for previous months may be revised due to receipt of corrected data from respondents, including late reports for which imputations were previously made as described above, and other corrections. Figures which have been revised by more than 5 percent from previously published figures are indicated by footnotes.

*Reporting Period Adjustment*—Since January 1975, the data have been adjusted for number of working days in the reporting period in order to compensate for differences in individual company reporting patterns, i.e., calendar month, 4-week, 5-week periods. Since the calendar month accounting system prevails in this industry, adjustments have been made to those reporting on other than a calendar month basis.

*Seasonal Adjustment*—This report presents seasonally adjusted data in table 1A for selected series shown in table 1B. The data were seasonally adjusted using the X-11 variant of the Bureau of the Census Method II seasonal adjustment program. This program is a ratio-to-moving average method. It largely eliminates the effect of seasonal variations (intra-year variations repeated constantly from year to year) within the series. The seasonally adjusted data provide a better measure of the month-to-month variations which are due to factors other than seasonal pattern. Additional information concerning seasonal adjustment is available in the seasonal adjustment supplement issued in this series.

## EXPLANATION OF TERMS

*Production*—Data shown for production represent total quantity of each chemical produced, including quantity consumed in plants, and for sale or transfer to other plants or warehouses of the same company. The statistics presented in the tables provide an up-to-date measure of activity in the inorganic field,

but do not necessarily indicate amounts entering the market. In some cases, figures are included for material produced "in process" as an intermediate to the end products.

## RELATIONSHIP BETWEEN M28C AND M28C-14 SERIES FOR INDUSTRIAL GASES

The data as shown in Table 1 reflect levels of production as reported by establishments on monthly form M28A.2. These data are revised in the annual publication collected on form MA-28E.2 and are shown in Table 9 of the annual report M28C-14. The actual data reported by establishments canvassed on the annual differ by varying amounts from those collected monthly due to receipt of revised data from the respondent and establishments reporting on the annual and not on the monthly. For these reasons, the monthly and annual data comprise two separate series and should be used as such for analytical purposes. Specifically, the monthly data should be useful in describing month-to-month changes while the annual data provide a better indication of the level of production. Revisions to the 1976 monthly series based on findings from the 1976 annual will be forthcoming as soon as research into the differences are resolved.

## RELATED REPORTS

An annual current industrial report is published in this series. The annual report summarizes monthly figures and incorporates all known revisions in the series for both current and previous year, thus providing a single reference copy to replace the monthly publications. This annual summary provides additional information on the history of this survey.

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M28A	Monthly	Inorganic Chemicals
M28B	Monthly	Inorganic Fertilizer Materials
<i>Foreign Trade Reports</i>		
FT-410	Monthly	U.S. Exports
FT-135	Monthly	U.S. General Imports

## CONTACTS FOR DATA USERS

Subject Area	Contact	Phone Number
Current Industrial Report M28C	Géoff Embrey	(301) 763-7837
Foreign Trade publications	Juanita Noone	(301) 763-5140
Bureau of Domestic Business Development	Chemicals Program (OBRA)	(202) 377-5496
To order a Census publication	Daisy Williams	(301) 763-7472
To order microfiche of Census publications	Dorothy Dunham	(301) 763-5511

## Industrial Gases



U.S. Department of Commerce  
BUREAU OF THE CENSUS

JULY 1978

M28C(78)-7  
Issued September 1978

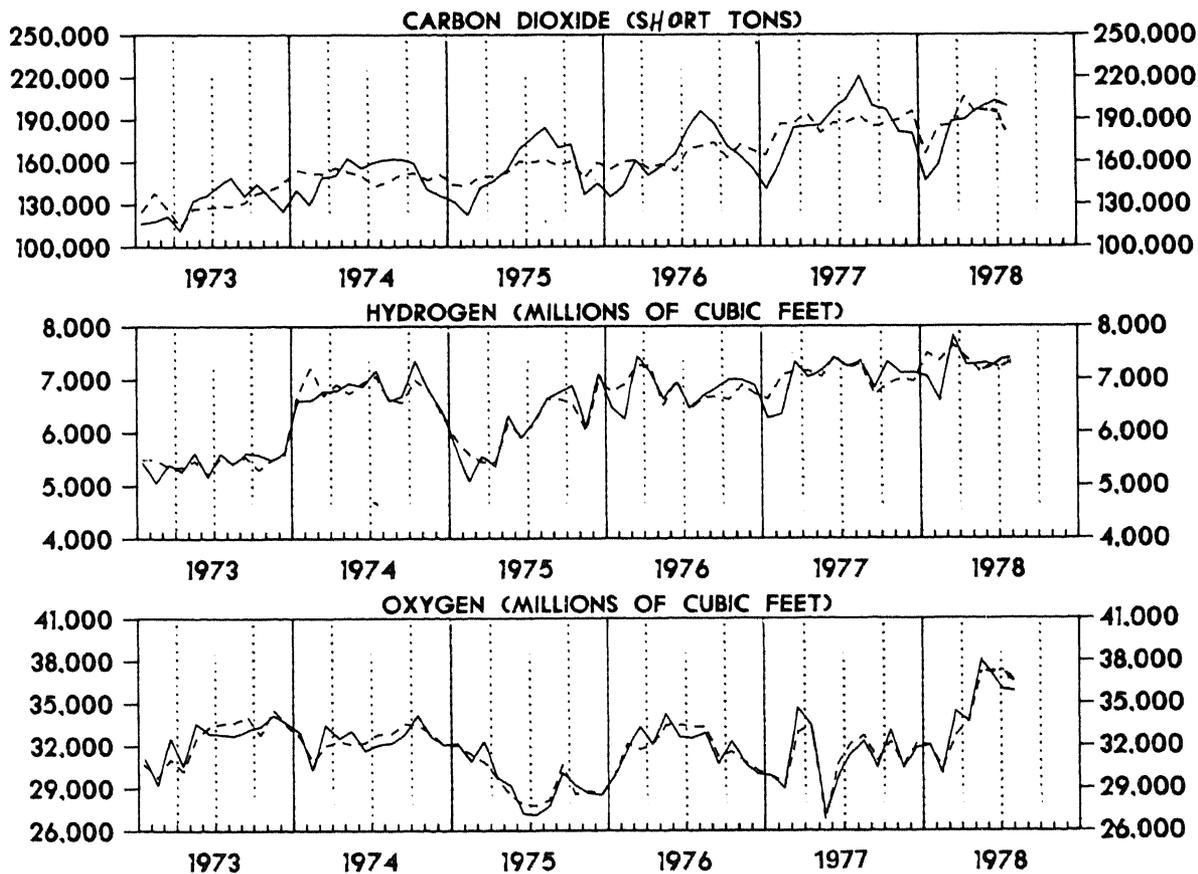
The statistics in this publication are based on a survey of manufacturers and represent total U.S. production of industrial gases. Estimates are included for companies whose reports were not received in time for tabulation. A more complete descrip-

tion of this survey appears on page 4. An annual Current Industrial Report is published in this series. The annual report includes all months for the current and previous years and incorporates all known revisions in the series.

THIS REPORT INCLUDES DATA COMPARING DOMESTIC OUTPUT, EXPORTS, AND IMPORTS

PRODUCTION OF SELECTED INDUSTRIAL GASES  
1973 TO 1978

----- Seasonally Adjusted  
———— Not Seasonally Adjusted



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Table 1A. SUMMARY OF PRODUCTION OF PRINCIPAL GASES: 1976 TO 1978

(Seasonally adjusted)

Month and year	Acetylene (2813200) (Mil. cu. ft.)	Carbon dioxide (2813311) and (2813331) (Short tons)	Hydrogen, high and low purity (100%) (2813420) (Mil. cu. ft.)	Nitrogen, high and low purity (100%) (2813440) (Mil. cu. ft.)	Oxygen, high and low purity (100%) (2813450) (Mil. cu. ft.)
1978					
July.....	409	182,229	7,468	32,434	36,820
June.....	451	194,026	7,229	33,340	37,267
May.....	437	193,714	7,212	32,712	36,955
April.....	485	205,882	7,395	32,358	33,694
March.....	441	186,118	7,634	32,397	32,707
February.....	435	184,793	7,348	30,682	30,365
January.....	443	165,369	7,482	31,259	32,012
1977					
December.....	435	195,730	6,953	30,372	32,162
November.....	428	189,622	6,998	29,667	30,537
October.....	445	187,190	6,906	28,803	32,265
September.....	434	184,423	6,684	29,133	30,910
August.....	489	192,444	7,309	27,879	32,696
July.....	478	187,349	7,187	27,479	32,140
June.....	512	187,367	7,449	30,631	33,910
May.....	548	180,177	7,042	26,692	34,157
April.....	457	194,283	7,145	25,836	33,401
March.....	557	186,723	7,164	25,457	32,940
February.....	559	186,664	7,061	25,100	29,289
January.....	594	164,649	6,623	24,381	29,867
1976					
December.....	517	167,567	6,721	26,290	30,231
November.....	526	171,862	6,882	26,147	30,852
October.....	557	162,734	6,615	25,205	31,555
September.....	584	173,501	6,671	24,347	31,190
August.....	609	170,987	6,650	24,606	33,317
July.....	620	168,466	6,405	23,813	33,286

Table 1B. SUMMARY OF PRODUCTION OF PRINCIPAL GASES: 1976 TO 1978

(Not seasonally adjusted)

Month and year	Acetylene (2813200) (Mil. cu. ft.)	Carbon dioxide, liquid and gas (2813311) (Short tons)	Carbon dioxide, solid (2813331) (Short tons)	Hydrogen, high and low purity (100%) (2813420) (Mil. cu. ft.)	Nitrogen, high and low purity (100%) (2813440) (Mil. cu. ft.)	Oxygen, high and low purity (100%) (2813450) (Mil. cu. ft.)
1978						
July.....	391	163,831	34,434	7,528	32,272	35,973
June.....	449	168,412	35,315	7,186	32,273	36,298
May.....	434	173,090	26,629	7,342	33,235	37,805
April.....	450	167,089	22,528	7,269	31,776	33,694
March.....	422	166,213	22,325	7,810	33,498	34,408
February.....	413	139,149	18,849	6,591	28,902	30,001
January.....	431	123,760	22,922	7,041	31,853	32,012
1977						
December.....	449	154,711	25,361	7,127	30,099	31,841
November.....	451	154,385	26,325	7,117	29,163	30,415
October.....	458	168,168	28,756	7,328	29,466	33,072
September.....	467	167,493	31,499	6,831	29,191	30,446
August.....	509	183,138	37,403	7,346	28,688	32,304
July.....	457	168,856	34,980	7,244	27,342	31,401
June.....	509	164,063	32,672	7,404	29,651	33,028
May.....	544	156,955	28,807	7,169	27,119	34,943
April.....	428	158,736	26,212	7,031	25,576	33,401
March.....	538	156,321	27,785	7,329	26,349	34,653
February.....	531	135,583	24,058	6,348	23,655	28,938
January.....	565	117,726	22,888	6,265	24,744	29,867
1976						
December.....	537	130,811	23,383	6,876	26,159	29,989
November.....	557	136,514	27,262	6,985	25,568	30,729
October.....	577	141,185	30,049	6,999	25,886	32,312
September.....	621	153,589	33,703	6,818	24,444	30,691
August.....	633	156,005	39,895	6,677	25,042	32,884
July.....	603	146,984	36,337	6,456	23,623	32,520

Table 2. PRIMARY PRODUCTION (QUANTITY) OF SPECIFIED INDUSTRIAL GASES

Product code	Chemical and basis	Unit of measure	July 1978	June 1978	July 1977
28132 00	Acetylene <sup>1</sup> .....	Mil. cu. ft....	391	449	457
	Produced for compression, including cylinder and pipeline.....	..do.....	88	109	79
	Produced for pipeline shipment (excluding that shipped to be compressed) and for consumption in this plant.....	..do.....	303	340	378
28134 15	Argon, high purity: Produced for cylinder and bulk delivery and pipeline shipments, and for consumption in this plant.....	..do.....	559	590	498
28133 11	Carbon dioxide: Liquid and gas <sup>2</sup> .....	S. tons.....	163,831	168,412	168,856
28133 31	Solid (dry ice).....	..do.....	34,434	35,315	34,980
28134 20	Hydrogen, total <sup>3</sup> .....	Mil. cu. ft....	7,528	7,186	7,244
	Liquid and gas: Produced for cylinder and bulk shipment, and liquid produced for conversion to gas.....	..do.....	892	823	766
	Produced for pipeline and government use.....	..do.....	1,989	2,043	2,200
	Produced for consumption in this plant.....	..do.....	4,647	4,320	4,278
28134 40	Nitrogen, total <sup>4</sup> .....	..do.....	32,272	32,273	27,342
	Gas: Produced for pipeline shipment.....	..do.....	19,412	19,145	17,131
	Liquid: Produced for bulk delivery shipment to pipeline or to air separation plants.....	..do.....	1,219	958	2,802
	Liquid and gas: Produced for cylinder and bulk delivery shipment.....	..do.....	7,371	7,678	7,409
	Produced for consumption in this plant.....	..do.....	4,270	4,492	(6)
28134 50	Oxygen, total.....	..do.....	35,973	36,298	31,401
	Gas: Produced for pipeline shipments.....	..do.....	25,912	25,579	22,416
	Liquid: Produced for bulk delivery shipment to pipelines or to other air separation plants.....	..do.....	1,321	1,012	676
	Liquid and gas: Produced for cylinder and bulk delivery shipment.....	..do.....	4,910	5,559	4,487
	Produced for consumption in this plant.....	..do.....	3,830	4,148	3,822

<sup>1</sup>Revised by 5 percent or more from previously published figures.

<sup>2</sup>Excludes quantities of acetylene produced and consumed by railroad shops, shipyards, and small establishments using portable generators.

<sup>3</sup>Excludes production of liquid and gas CO<sub>2</sub> converted to and reported as dry ice and also amounts converted from pure CO<sub>2</sub> (liquid or solid) purchased or received from other plants. Also excludes quantities produced and consumed in plants manufacturing soda ash or urea.

<sup>4</sup>Excludes quantities produced and consumed in the manufacture of methanol and ammonia, but includes an unspecified amount of hydrogen produced for sale or interplant transfer to plants consuming this gas in the production of ammonia. Also excludes amounts of hydrogen produced in petroleum refineries for captive use. However, of the total shown for lower purity hydrogen prior to 1969, 70 to 75 percent was accounted for by petroleum refiners with captive hydrogen production. Not all such petroleum refineries were canvassed in this survey.

<sup>5</sup>Excludes amounts produced and used in the manufacture of ammonia and ammonia derivatives.

<sup>6</sup>1977 data for nitrogen (gas) produced for pipeline shipments, combined with produced for cylinder and bulk delivery shipments.

<sup>7</sup>1977 data for nitrogen (liquid) produced for bulk delivery shipment to pipeline or to air separation plants included in nitrogen (liquid and gas) produced for consumption in this plant.

<sup>8</sup>1977 data for nitrogen (liquid and gas) produced for cylinder and bulk delivery shipments excludes nitrogen (gas) produced for cylinder and bulk delivery shipments.

Table 3. PRODUCTION AND EXPORTS OF NITROGEN: JUNE 1978

Product code	Product	Quantity produced (m.c.f.)	Exports of domestic merchandise (m.c.f.)	Percent of exports to production
28134 40	Nitrogen.....	32,273	1,404	4.5

Note: Detailed export data for industrial gases, other than nitrogen, are not available separately. Import data for industrial gases are included in "Chemical Elements, not specially provided for," and are not separately identified.

Comparison of Standard Industrial Classification Codes and Schedule B Export Codes

Domestic output	Exports
28134 40	415.2600

## DESCRIPTION OF SURVEY

*Scope of Survey*—This survey covers firms engaged in the manufacture of industrial gases. Excluded from this survey are industrial gases vented or used for fuel by the producer.

*Survey Description*—The statistics in this publication were collected on Bureau of the Census monthly reporting Form M28A.2, Production of Industrial Gases. The mailing panel for this survey consisted of all known producers of industrial gases, approximately 670 producers of elemental gases, carbon dioxide, and acetylene.

*Survey Error*—Figures for the current month include estimates for respondents whose reports were not received in time for tabulation. Such missing figures are "imputed" from month-to-month movements shown by reporting firms and are generally limited to a maximum of 25 percent for any one item. Individual items with imputation greater than 25 percent are footnoted.

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*Seasonal Adjustment*—This report presents seasonally adjusted data in table 1A for selected series shown in table 1B. The data were seasonally adjusted using the X-11 variant of the Bureau of the Census Method II seasonal adjustment program. This program is a ratio-to-moving average method. It largely eliminates the effect of seasonal variations (intra-year variations repeated constantly from year to year) within the series. The seasonally adjusted data provide a better measure of the month-to-month variations which are due to factors other than seasonal pattern. Additional information concerning seasonal adjustment is available in the seasonal adjustment supplement issued in this series.

## EXPLANATION OF TERMS

*Production*—Data shown for production represent total quantity of each chemical produced, including quantity consumed in plants, and for sale or transfer to other plants or warehouses of the same company. The statistics presented in the tables provide an up-to-date measure of activity in the inorganic field, but do not necessarily indicate amounts entering the market. In some cases, figures are included for material produced "in process" as an intermediate to the end products.

## COMPARISON OF EXPORT, IMPORT, AND DOMESTIC OUTPUT DATA

The Standard Industrial Classification (SIC) system used for domestic output and the statistical export and import commodity classifications were developed independently and are based on somewhat differing systems of classification. This results in considerable difficulty in comparing the three types of data for many commodity areas. The domestic output classification is based on type of industry; whereas, the export and import classification system is more materials oriented. Aside from the differences in the basic commodity classifications, there are additional problems involving import data, since there are a substantial number of imported commodities, which are not produced in the United States or which are produced only in very small quantities and which, therefore, have no comparable domestic output classification. The relationships shown in this report should be considered only as approximations, since, in addition to those mentioned above, there are also the following problems affecting the comparability of the three sets of data:

(a) *Valuation*—There are different methods of valuation for the three types of data.

*Domestic Output*—Valued at the point of production. It includes the net sales price, f.o.b. plant, after discounts and allowances, exclusive of freight charges and excise taxes.

*Exports*—Valued at the point of exportation. It includes the selling price, or cost if not sold, and inland freight, insurance, and other charges to the export point.

*Imports*—Valued at the first port of entry in the United States. It includes C. I. F. (cost, insurance, and freight), duty, and other charges to the import point.

(b) *Duplication in Quantity and Value of Output*—Because producers' shipments of some commodities may be used as materials for incorporation into other commodities, combinations of data for such commodities may contain a certain amount of duplication. Thus, percentages of exports to output or imports to apparent consumption (output plus imports minus exports) at 4-digit or broader levels may be understated. Where duplication is known to be substantial, the output data are appropriately noted in the table.

(c) *Low-Valued Export and Import Transactions*—Commodity information is not shown for individual imports valued under \$251. For exports, commodity information is not reported for shipments individually valued under \$251 effective October 1969 and for shipments valued under \$100 prior to October 1969. This is believed to have only negligible effect on the statistics for most commodities.

(d) *Manufacturers' Shipments, Not Specified by Kind*—The value of manufacturers' shipments at the 4-digit industry level often includes a small amount which is not distributed among the individual 5-digit product classes. Export and import percentages at the more detailed levels might, therefore, be slightly overstated.

(e) *Time Lag Between Output and Exports*—There will be a lag between the time a commodity is produced or shipped by the producer and the time it is actually exported, especially when intermediaries (wholesalers, exporters, etc.) are involved. Ordinarily, this type of discrepancy is insignificant in annual figures.

(f) *"Direct" vs "Total" Commodity Export and Imports*—Export and import data do not include materials which are incorporated into other more finished products and exported or imported in finished form. Thus, by showing only direct exports and imports, the relation of exports to output and imports to apparent consumption for intermediate products is considerably understated.

(g) *Used Commodities*—With a few exceptions, used or rebuilt commodities are classified in the same import or export codes as is new merchandise. Percentages are thus overstated to the extent that used or rebuilt products are significant in trade.

#### RELATIONSHIP BETWEEN M28C AND M28C-14 SERIES FOR INDUSTRIAL GASES

The data as shown in Table 1 reflect levels of production as reported by establishments on monthly form M28A.2. These data are revised in the annual publication collected on Form MA-28E.2 and are shown in table 9 of the annual report M28C-14. The actual data reported by establishments canvassed on the annual differ by varying amounts from those collected monthly due to receipt of revised data from the respondent and establishments reporting on the annual and not on the monthly. For these reasons, the monthly and annual data comprise two separate series and should be used as such for analytical purposes. Specifically, the monthly data should be useful in describing month-to-month changes while the annual data provide a better indication of the level of production.

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# Industrial Gases



U.S. Department of Commerce  
BUREAU OF THE CENSUS

AUGUST 1978

M28C(78)-8  
Issued November 1978

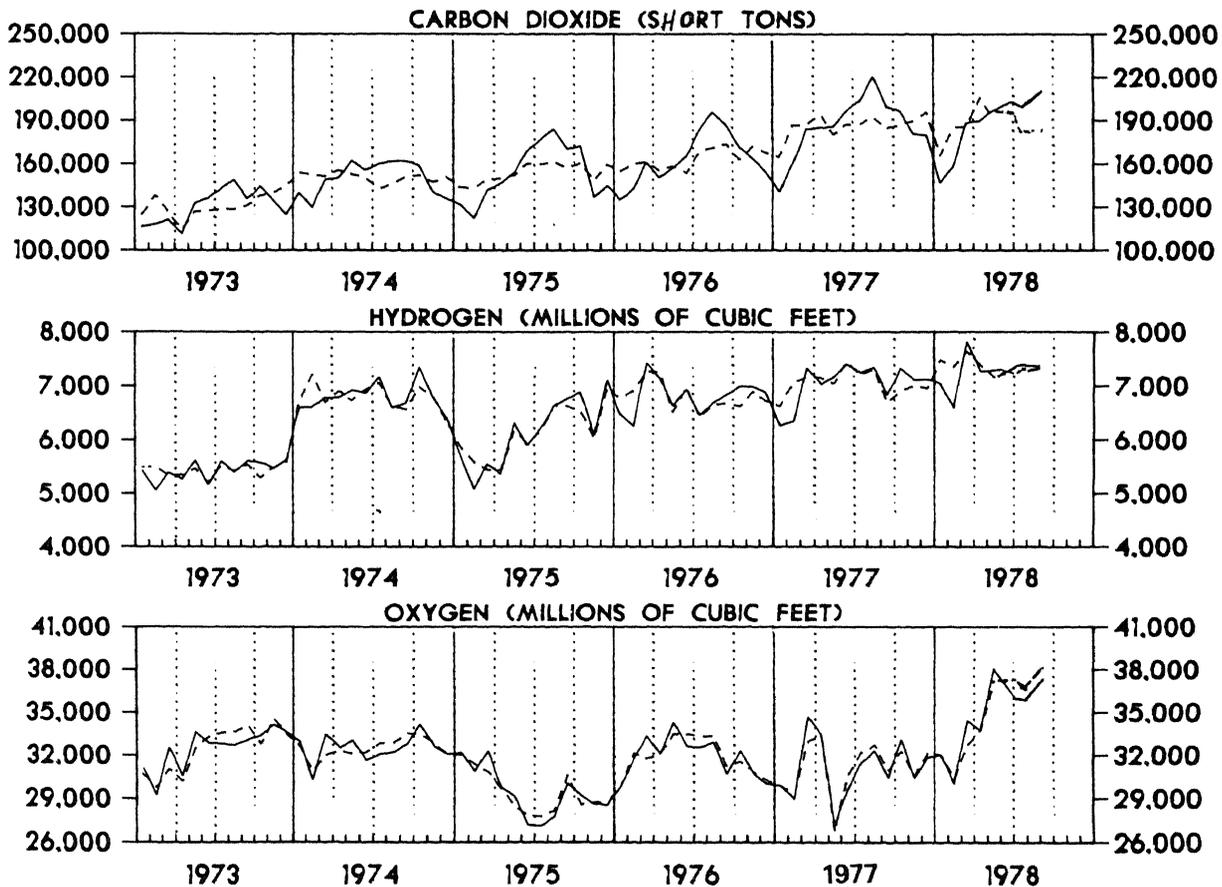
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----- Seasonally Adjusted  
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(Seasonally adjusted)

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	(Mil. cu. ft.)	(Short tons)	(Mil. cu. ft.)	(Mil. cu. ft.)	(Mil. cu. ft.)
1978					
August.....	435	184,887	7,443	34,959	38,00
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November.....	428	189,622	6,998	29,667	30,55
October.....	445	187,190	6,906	28,803	32,26
September.....	434	184,423	6,684	29,133	30,91
August.....	489	192,444	7,309	27,879	32,69
July.....	478	187,349	7,187	27,479	32,14
June.....	512	187,367	7,449	30,631	33,91
May.....	548	180,177	7,042	26,692	34,15
April.....	457	194,283	7,145	25,836	33,40
March.....	557	186,723	7,164	25,457	32,94
February.....	559	186,664	7,061	25,100	29,28
January.....	594	164,649	6,623	24,381	29,86
1976					
December.....	517	167,567	6,721	26,290	30,23
November.....	526	171,862	6,882	26,147	30,85
October.....	557	162,734	6,615	25,205	31,55
September.....	584	173,501	6,671	24,347	31,19
August.....	609	170,987	6,650	24,606	33,31

Table 1B. SUMMARY OF PRODUCTION OF PRINCIPAL GASES: 1976 TO 1978

(Not seasonally adjusted)

Month and year	Acetylene (28132 00)	Carbon dioxide, liquid and gas (28133 11)	Carbon dioxide, solid (28133 31)	Hydrogen, high and low purity (100%) (28134 20)	Nitrogen, high and low purity (100%) (28134 40)	Oxygen, high and low purity (100%) (28134 50)
	(Mil. cu. ft.)	(Short tons)	(Short tons)	(Mil. cu. ft.)	(Mil. cu. ft.)	(Mil. cu. ft.)
1978						
August.....	452	176,925	34,956	7,480	35,973	37,56
July.....	402	170,123	34,829	7,394	31,879	36,29
June.....	449	168,412	35,315	7,186	32,273	36,29
May.....	434	173,090	26,629	7,342	33,235	37,80
April.....	450	167,089	22,528	7,269	31,776	33,69
March.....	422	166,213	22,325	7,810	33,498	34,40
February.....	413	139,149	18,849	6,591	28,902	30,00
January.....	431	123,760	22,922	7,041	31,853	32,01
1977						
December.....	449	154,711	25,361	7,127	30,099	31,84
November.....	451	154,385	26,325	7,117	29,163	30,41
October.....	458	168,168	28,756	7,328	29,466	33,07
September.....	467	167,493	31,499	6,831	29,191	30,44
August.....	509	183,138	37,403	7,346	28,688	32,30
July.....	457	168,856	34,980	7,244	27,342	31,40
June.....	509	164,063	32,672	7,404	29,651	33,02
May.....	544	156,955	28,807	7,169	27,119	34,94
April.....	428	158,736	26,212	7,031	25,576	33,40
March.....	538	156,321	27,785	7,329	26,349	34,65
February.....	531	135,583	24,058	6,348	23,655	28,93
January.....	565	117,726	22,888	6,265	24,744	29,86
1976						
December.....	537	130,811	23,383	6,876	26,159	29,98
November.....	557	136,514	27,262	6,985	25,568	30,72
October.....	577	141,185	30,049	6,999	25,886	32,31
September.....	621	153,589	33,703	6,818	24,444	30,69
August.....	633	156,005	39,895	6,677	25,042	32,88

Table 2. PRIMARY PRODUCTION (QUANTITY) OF SPECIFIED INDUSTRIAL GASES

Product code	Chemical and basis	Unit of measure	August 1978	July 1978	August 1977
28132 00	Acetylene <sup>1</sup> .....	Mil. cu. ft....	452	402	509
	Produced for compression, including cylinder and pipeline.....	..do.....	120	99	109
	Produced for pipeline shipment (excluding that shipped to be compressed) and for consumption in this plant.....	..do.....	332	303	400
28134 15	Argon, high purity: Produced for cylinder and bulk delivery and pipeline shipments, and for consumption in this plant.....	..do.....	569	560	520
28133 11	Carbon dioxide: Liquid and gas <sup>2</sup> .....	S. tons.....	176,925	170,123	183,138
28133 31	Solid (dry ice).....	..do.....	34,956	34,829	37,403
28134 20	Hydrogen, total <sup>3</sup> .....	Mil. cu. ft....	7,480	7,394	7,346
	Liquid and gas: Produced for cylinder and bulk shipment, and liquid produced for conversion to gas.....	..do.....	623	<sup>r</sup> 758	847
	Produced for pipeline and government use.....	..do.....	2,101	1,992	2,332
	Produced for consumption in this plant.....	..do.....	4,756	4,644	4,167
28134 40	Nitrogen, total <sup>4</sup> .....	..do.....	35,973	31,879	28,688
	Gas: Produced for pipeline shipment.....	..do.....	22,226	19,416	<sup>5</sup> 17,957
	Liquid: Produced for bulk delivery shipment to pipeline or to air separation plants.....	..do.....	1,312	<sup>r</sup> 1,358	<sup>6</sup> 2,865
	Liquid and gas: Produced for cylinder and bulk delivery shipment.....	..do.....	7,905	7,367	<sup>7</sup> 7,866
	Produced for consumption in this plant.....	..do.....	4,530	<sup>r</sup> 3,738	( <sup>6</sup> )
28134 50	Oxygen, total.....	..do.....	37,565	36,295	32,304
	Gas: Produced for pipeline shipments.....	..do.....	26,214	25,912	22,754
	Liquid: Produced for bulk delivery shipment to pipelines or to other air separation plants.....	..do.....	1,465	1,369	718
	Liquid and gas: Produced for cylinder and bulk delivery shipment.....	..do.....	5,440	5,011	4,843
	Produced for consumption in this plant.....	..do.....	4,446	4,003	3,989

<sup>r</sup>Revised by 5 percent or more from previously published figures.

<sup>1</sup>Excludes quantities of acetylene produced and consumed by railroad shops, shipyards, and small establishments using portable generators.

<sup>2</sup>Excludes production of liquid and gas CO<sub>2</sub> converted to and reported as dry ice and also amounts converted from pure CO<sub>2</sub> (liquid or solid) purchased or received from other plants. Also excludes quantities produced and consumed in plants manufacturing soda ash or urea.

<sup>3</sup>Excludes quantities produced and consumed in the manufacture of methanol and ammonia, but includes an unspecified amount of hydrogen produced for sale or interplant transfer to plants consuming this gas in the production of ammonia. Also excludes amounts of hydrogen produced in petroleum refineries for captive use. However, of the total shown for lower purity hydrogen prior to 1969, 70 to 75 percent was accounted for by petroleum refiners with captive hydrogen production. Not all such petroleum refineries were canvassed in this survey.

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<sup>5</sup>1977 data for nitrogen (gas) produced for pipeline shipments, combined with nitrogen produced for cylinder and bulk delivery shipments.

<sup>6</sup>1977 data for nitrogen (liquid) produced for bulk delivery shipment to pipeline or to air separation plants included in nitrogen (liquid and gas) produced for consumption in this plant.

<sup>7</sup>1977 data for nitrogen (liquid and gas) produced for cylinder and bulk delivery shipments excludes nitrogen (gas) produced for cylinder and bulk delivery shipments.

Table 3. PRODUCTION AND EXPORTS OF NITROGEN: JULY 1978

Product code	Product	Quantity produced (m.c.f.)	Exports of domestic merchandise (m.c.f.)	Percent of exports to production
28134 40	Nitrogen.....	31,879	2,268	7.1

Note: Detailed export data for industrial gases, other than nitrogen, are not available separately. Import data for industrial gases are included in "Chemical Elements, not specially provided for," and are not separately identified.

Comparison of Standard Industrial Classification Codes and Schedule B Export Codes

Domestic output	Exports
28134 40	415.2600

## DESCRIPTION OF SURVEY

*Scope of Survey*—This survey covers firms engaged in the manufacture of industrial gases. Excluded from this survey are industrial gases vented or used for fuel by the producer.

*Survey Description*—The statistics in this publication were collected on Bureau of the Census monthly reporting Form M28A.2, Production of Industrial Gases. The mailing panel for this survey consisted of all known producers of industrial gases, approximately 670 producers of elemental gases, carbon dioxide, and acetylene.

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## EXPLANATION OF TERMS

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The Standard Industrial Classification (SIC) system used for domestic output and the statistical export and import commodity classifications were developed independently and are based on somewhat differing systems of classification. This results in considerable difficulty in comparing the three types of data for many commodity areas. The domestic output classification is based on type of industry; whereas, the export and import classification system is more materials oriented. Aside from the differences in the basic commodity classifications, there are additional problems involving import data, since there are a substantial number of imported commodities, which are not produced in the United States or which are produced only in very small quantities and which, therefore, have no comparable domestic output classification. The relationships shown in this report should be considered only as approximations, since, in addition to those mentioned above, there are also the following problems affecting the comparability of the three sets of data:

(a) *Valuation*—There are different methods of valuation for the three types of data.

*Domestic Output*—Valued at the point of production. It includes the net sales price, f.o.b. plant, after discounts and allowances, exclusive of freight charges and excise taxes.

*Exports*—Valued at the point of exportation. It includes the selling price, or cost if not sold, and inland freight, insurance, and other charges to the export point.

*Imports*—Valued at the first port of entry in the United States. It includes c. i. f. (cost, insurance, and freight), duty, and other charges to the import point.

(b) *Duplication in Quantity and Value of Output*—Because producers' shipments of some commodities may be used as materials for incorporation into other commodities, combinations of data for such commodities may contain a certain amount of duplication. Thus, percentages of exports to output or imports to apparent consumption (output plus imports minus exports) at four-digit or broader levels may be understated. Where duplication is known to be substantial, the output data are appropriately noted in the table.

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(d) *Manufacturers' Shipments, Not Specified by Kind*—The value of manufacturers' shipments at the four-digit industry level often includes a small amount which is not distributed among the individual five-digit product classes. Export and import percentages at the more detailed levels might, therefore, be slightly overstated.

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(f) *"Direct" vs "Total" Commodity Export and Imports*—Export and import data do not include materials which are incorporated into other more finished products and exported or imported in finished form. Thus, by showing only direct exports and imports, the relation of exports to output and imports to apparent consumption for intermediate products is considerably understated.

(g) *Used Commodities*—With a few exceptions, used or rebuilt commodities are classified in the same import or export codes as is new merchandise. Percentages are thus overstated to the extent that used or rebuilt products are significant in trade.

#### RELATIONSHIP BETWEEN M28C AND M28C-14 SERIES FOR INDUSTRIAL GASES

The data as shown in table 1 reflect levels of production as reported by establishments on monthly form M28A.2. These data are revised in the annual publication collected on Form MA-28E.2 and are shown in table 9 of the annual report M28C-14. The actual data reported by establishments canvassed on the annual differ by varying amounts from those collected monthly due to receipt of revised data from the respondent and establishments reporting on the annual and not on the monthly. For these reasons, the monthly and annual data comprise two separate series and should be used as such for analytical purposes. Specifically, the monthly data should be useful in describing month-to-month changes while the annual data provide a better indication of the level of production.

Revisions to the 1976 monthly series based on findings from the 1976 annual will be forthcoming as soon as research into the differences are resolved.

#### RELATED REPORTS

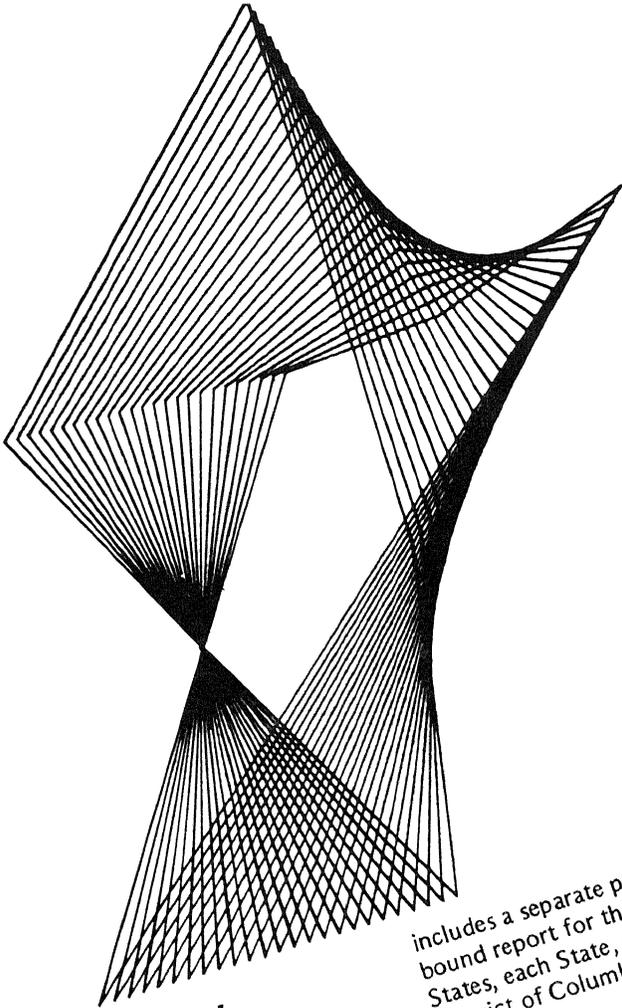
An annual Current Industrial Report is published in this series. The annual report summarizes monthly figures and incorporates all known revisions in the series for both current and previous year, thus providing a single reference copy to replace the monthly publications. This annual summary provides additional information on the history of this survey.

The Bureau of the Census also publishes reports on other related products as follows:

Series	Frequency	Title
<i>Current Industrial Reports</i>		
M3-1	Monthly	Manufacturers' Shipments, Inventories, and Orders
M28A	Monthly	Inorganic Chemicals
M28B	Monthly	Inorganic Fertilizer Materials
<i>Foreign Trade Reports</i>		
FT-410	Monthly	U.S. Exports
FT-135	Monthly	U.S. General Imports

#### CONTACTS FOR DATA USERS

Subject Area	Contact	Phone Number
Current Industrial Report M28C	Geoff Embrey	(301) 763-7837
Foreign Trade publications	Juanita Noone	(301) 763-5140
Bureau of Domestic Business Development	David H. Blank	(202) 377-5496
To order a Census Bureau publication	Daisy Williams	(301) 763-7472
To order Census Bureau microfiche	Dorothy Dunham	(301) 763-5511



# COUNTY BUSINESS PATTERNS 1976

## Now Available 1976 Data on Employment, Payrolls, & Establishments

County Business Patterns presents intercensal data on employment, number and employment size of establishments, and payrolls by 2-, 3-, and 4-digit levels of the Standard Industrial Classification (SIC) for States and counties. This annual series

includes a separate paper-bound report for the United States, each State, and the District of Columbia.

The individual State reports present for the State, number of establishments, employment, and payroll data by employment-size class to the 4-digit SIC level. Also included, by major industry group, are data on the number of establishments with 1,000 or more employees, by employment-size class.

The U.S. Summary includes data by detailed industry (4-digit SIC) level for the United States and by major group (2-digit SIC) for each State. For the U.S., number

of establishments, employment, and payroll data are also provided by employment-size class to the 4-digit SIC level. Also included, by major industry group, are data on the number of establishments, employees, and payroll of administrative and auxiliary establishments.

CBP is a standard reference source of small-area data for businessmen, market researchers, and industrial and civic planners.

- CBP data are especially useful for:
- Analyzing market potentials
  - Determining location and size of sales territories
  - Establishing sales quotas and advertising budgets
  - Locating production, marketing, and service facilities.

CBP data are shown in detail for the following broad industry categories:  
Agricultural services, forestry, and fisheries  
Mining  
Contract construction  
Manufacturing

- Transportation and other public utilities
- Wholesale trade
- Retail trade
- Finance, insurance, and real estate
- Services

### Data in Other Formats

Published CBP data, by county and by industry, will be available at cost, on computer tapes. Inquiries should be addressed to Chief, Data User Services Division, Bureau of the Census, Washington, D.C. 20233.

The reports described in this announcement are also available on microfiche. For further information, contact: Census Library, Washington, D.C. 20233

For a descriptive order form, listing all available titles and prices, fill in the request below, and mail to the address shown.

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# Industrial Gases



U.S. Department of Commerce  
BUREAU OF THE CENSUS

SEPTEMBER 1978

M28C(78)-9  
Issued November 1978

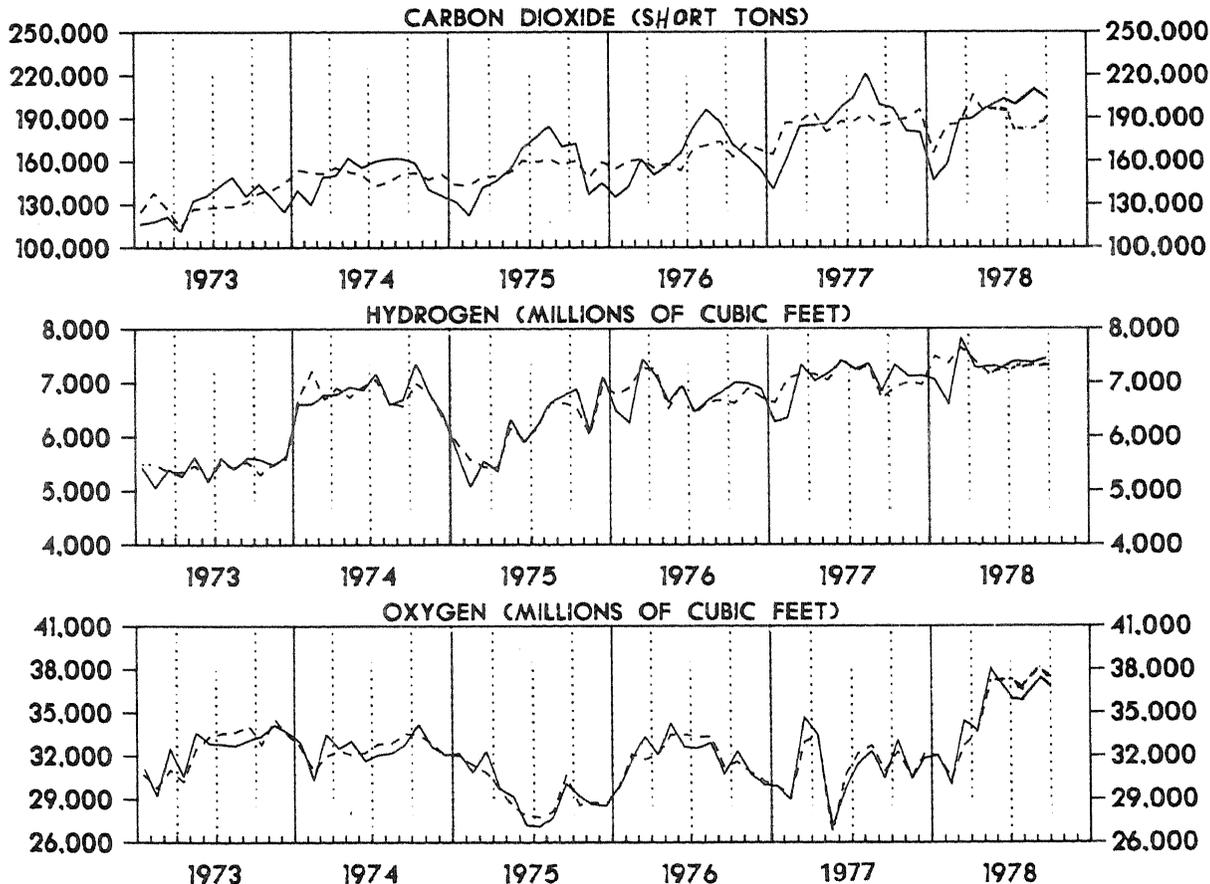
The statistics in this publication are based on a survey of manufacturers and represent total U.S. production of industrial gases. Estimates are included for companies whose reports were not received in time for tabulation. A more complete descrip-

tion of this survey appears on page 4. An annual Current Industrial Report is published in this series. The annual report includes all months for the current and previous years and incorporates all known revisions in the series.

THIS REPORT INCLUDES DATA COMPARING DOMESTIC OUTPUT, EXPORTS, AND IMPORTS

## PRODUCTION OF SELECTED INDUSTRIAL GASES 1973 TO 1978

----- Seasonally Adjusted  
———— Not Seasonally Adjusted



Address inquiries concerning these figures to U.S. Department of Commerce, Bureau of the Census, Industry Division, Washington, D.C. 20233, or call Geoff Embrey, (301) 763-7837.

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Table 2. PRIMARY PRODUCTION (QUANTITY) OF SPECIFIED INDUSTRIAL GASES

Product code	Chemical and basis	Unit of measure	September 1978	August 1978	September 1977
28132 00	Acetylene <sup>1</sup> .....	Mil. cu. ft....	414	448	467
	Produced for compression, including cylinder and pipeline.....	..do.....	101	106	109
	Produced for pipeline shipment (excluding that shipped to be compressed) and for consumption in this plant.....	..do.....	313	342	358
28134 15	Argon, high purity: Produced for cylinder and bulk delivery and pipeline shipments, and for consumption in this plant.....	..do.....	570	569	469
28133 11	Carbon dioxide: Liquid and gas <sup>2</sup> .....	S. tons.....	174,747	175,722	167,493
28133 31	Solid (dry ice).....	..do.....	30,677	34,546	31,499
28134 20	Hydrogen, total <sup>3</sup> .....	Mil. cu. ft....	7,752	7,510	6,831
	Liquid and gas: Produced for cylinder and bulk shipment, and liquid produced for conversion to gas.....	..do.....	994	612	695
	Produced for pipeline and government use.....	..do.....	1,999	2,106	2,332
	Produced for consumption in this plant.....	..do.....	4,759	4,792	3,804
28134 40	Nitrogen, total <sup>4</sup> .....	..do.....	32,744	34,001	29,191
	Gas: Produced for pipeline shipment.....	..do.....	19,735	20,265	18,296
	Liquid: Produced for bulk delivery shipment to pipeline or to air separation plants.....	..do.....	1,328	1,310	537
	Liquid and gas: Produced for cylinder and bulk delivery shipment.....	..do.....	7,686	7,896	68,089
	Produced for consumption in this plant.....	..do.....	3,995	4,530	2,269
28134 50	Oxygen, total.....	..do.....	36,904	37,554	30,446
	Gas: Produced for pipeline shipments.....	..do.....	25,157	26,203	20,909
	Liquid: Produced for bulk delivery shipment to pipelines or to other air separation plants.....	..do.....	1,601	1,467	603
	Liquid and gas: Produced for cylinder and bulk delivery shipment.....	..do.....	5,922	5,438	5,241
	Produced for consumption in this plant.....	..do.....	4,224	4,446	3,693

<sup>1</sup>Revised by 5 percent or more from previously published figures.

<sup>2</sup>Excludes quantities of acetylene produced and consumed by railroad shops, shipyards, and small establishments using portable generators.

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Table 3. PRODUCTION AND EXPORTS OF NITROGEN: JULY 1978

Product code	Product	Quantity produced (m.c.f.)	Exports of domestic merchandise (m.c.f.)	Percent of exports to production
28134 40	Nitrogen.....	34,001	1,956	5.6

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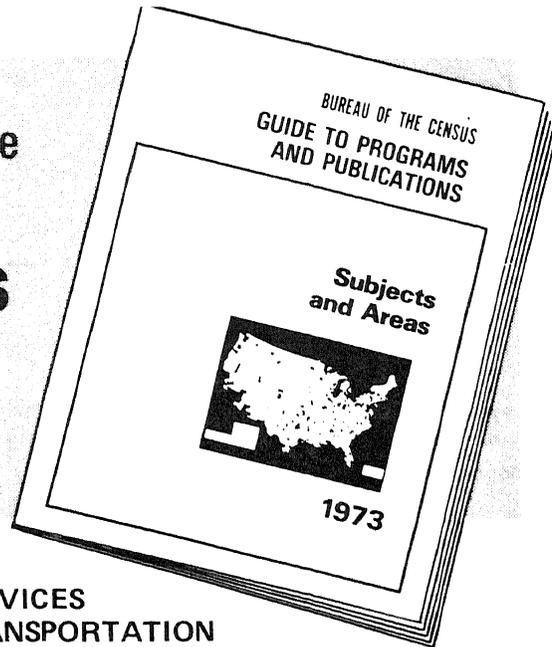
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# Industrial Gases

OCTOBER 1978

M28C(78)-10

Issued January 1979



U.S. Department of Commerce  
BUREAU OF THE CENSUS

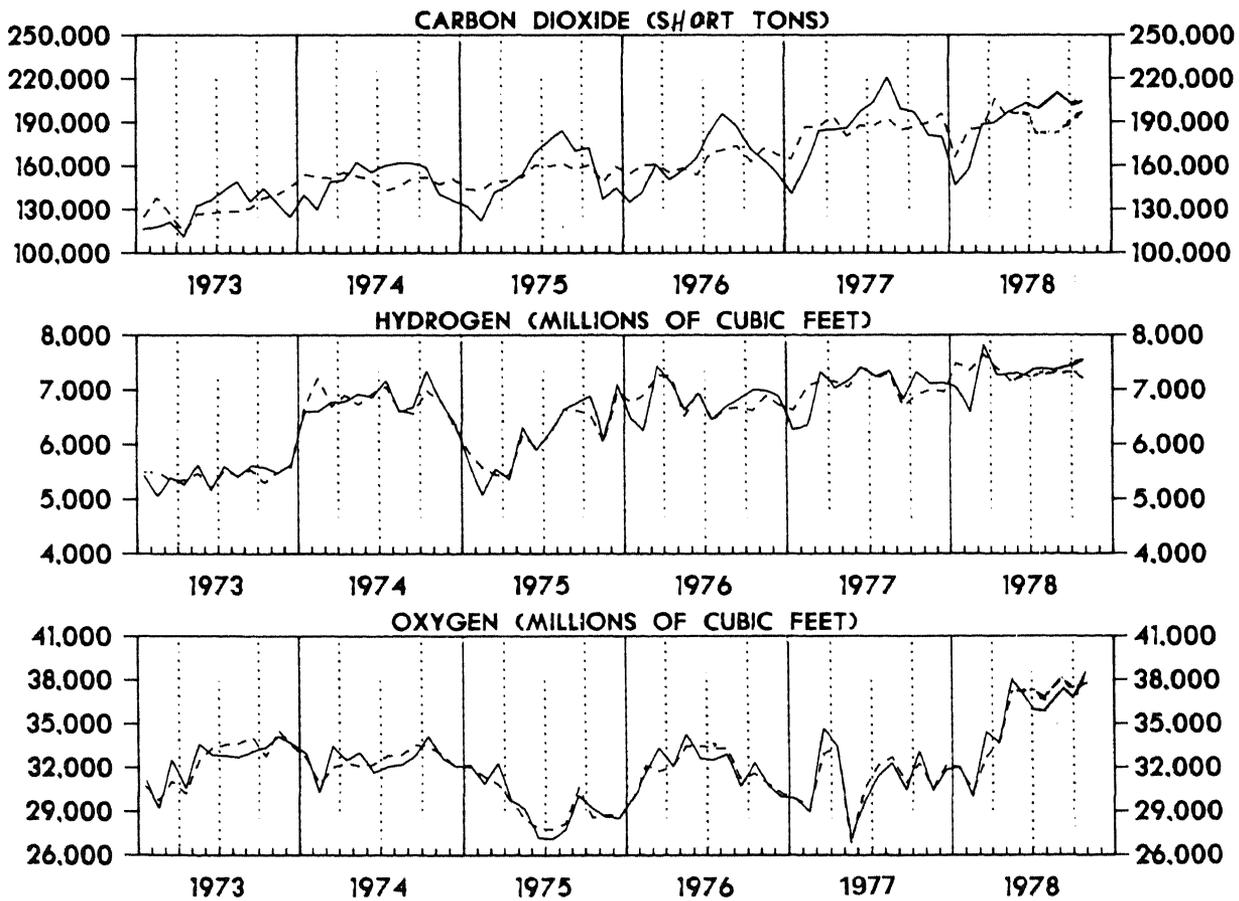
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----- Seasonally Adjusted  
———— Not Seasonally Adjusted



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Table 1A. SUMMARY OF PRODUCTION OF PRINCIPAL GASES: 1976 TO 1978

(Seasonally adjusted)

Month and year	Acetylene (28132 00)	Carbon dioxide (28133 11) and (28133 31)	Hydrogen, high and low purity (100%) (28134 20)	Nitrogen, high and low purity (100%) (28134 40)	Oxygen, high and low purity (100%) (28134 50)
	(mil. cu. ft.)	(short tons)	(mil. cu. ft.)	(mil. cu. ft.)	(mil. cu. ft.)
1978					
October.....	444	196,547	7,362	33,258	37,530
September.....	385	190,384	7,595	32,588	37,468
August.....	435	184,887	7,443	34,959	38,027
July.....	420	188,375	7,335	32,039	37,148
June.....	451	194,026	7,229	33,340	37,284
May.....	437	193,714	7,212	32,712	36,921
April.....	485	205,882	7,395	32,458	37,694
March.....	441	186,118	7,634	32,397	37,207
February.....	435	184,793	7,348	30,682	30,388
January.....	443	165,369	7,482	31,259	37,012
1977					
December.....	439	197,862	6,934	30,421	37,920
November.....	433	191,648	6,979	29,715	37,138
October.....	450	189,187	6,889	28,845	37,974
September.....	438	186,293	6,668	29,178	37,697
August.....	495	194,303	7,290	27,921	33,438
July.....	484	189,142	7,166	27,517	37,899
June.....	518	189,204	7,428	30,682	34,678
May.....	554	181,852	7,023	26,729	34,877
April.....	461	196,381	7,282	29,873	34,152
March.....	563	188,672	7,145	25,500	33,533
February.....	565	188,669	7,041	25,150	30,028
January.....	600	166,293	6,601	24,413	30,805
1976					
December.....	517	167,567	6,721	26,290	30,231
November.....	526	171,862	6,882	26,147	30,852
October.....	557	162,734	6,615	25,205	31,555
September.....	584	173,501	6,671	24,347	31,180

Table 1B. SUMMARY OF PRODUCTION OF PRINCIPAL GASES: 1976 TO 1978

(Not seasonally adjusted)

Month and year	Acetylene (28132 00)	Carbon dioxide, liquid and gas (28133 11)	Carbon dioxide, solid (28133 31)	Hydrogen, high and low purity (100%) (28134 20)	Nitrogen, high and low purity (100%) (28134 40)	Oxygen, high and low purity (100%) (28134 50)
	(mil. cu. ft.)	(short tons)	(short tons)	(mil. cu. ft.)	(mil. cu. ft.)	(mil. cu. ft.)
1978						
October.....	457	180,097	26,670	7,811	34,023	38,468
September.....	415	174,747	30,677	7,762	32,653	36,904
August.....	452	176,925	34,956	7,480	35,973	37,565
July.....	402	170,123	34,829	7,394	31,879	36,295
June.....	449	168,412	35,315	7,186	32,273	36,298
May.....	434	173,090	26,629	7,342	33,235	37,805
April.....	450	167,089	22,528	7,269	31,776	33,694
March.....	422	166,213	22,325	7,810	33,498	34,408
February.....	413	139,149	18,849	6,591	28,902	30,001
January.....	431	123,760	22,922	7,041	31,853	32,012
1977						
December.....	454	157,327	24,706	7,107	30,147	32,606
November.....	456	156,996	25,645	7,098	29,210	31,033
October.....	463	171,012	28,013	7,309	29,508	33,298
September.....	472	170,325	30,685	6,815	29,236	31,222
August.....	515	186,235	36,436	7,326	28,731	33,029
July.....	463	171,711	34,076	7,223	27,379	32,142
June.....	515	166,837	31,827	7,383	29,700	33,776
May.....	550	159,609	28,062	7,149	27,157	35,679
April.....	432	161,420	25,535	7,165	25,614	34,152
March.....	544	158,964	27,067	7,309	26,393	35,275
February.....	537	137,876	23,436	6,330	23,691	29,669
January.....	571	119,718	22,296	6,245	24,779	30,603
1976						
December.....	537	130,811	23,383	6,876	26,159	29,989
November.....	557	136,514	27,262	6,985	25,568	30,729
October.....	577	141,185	30,049	6,999	25,886	32,312
September.....	621	153,589	33,703	6,818	24,444	30,691

TABLE 2. PRIMARY PRODUCTION (QUANTITY) OF SPECIFIED INDUSTRIAL GASES

PRODUCT CODE	CHEMICAL AND BASIS	UNIT OF MEASURE	OCTOBER 1978	SEPTEMBER 1978	OCTOBER 1977	
2813200	ACETYLENE (1) . . . . .	MIL.CU.FT	457	415	455	
	PRODUCED FOR COMPRESSION, INCLUDING CYLINDER AND PIPELINE . . . . .	DO	120	101	119	
	PRODUCED FOR PIPELINE SHIPMENT (EXCLUDING THAT SHIPPED TO BE COMPRESSED) AND FOR CONSUMPTION IN THIS PLANT . . . . .	DO	337	314	336	
2813415	ARGON, HIGH PURITY: PRODUCED FOR CYLINDER AND BULK DELIVERY AND PIPELINE SHIPMENTS, AND FOR CONSUMPTION IN THIS PLANT . . . . .	DO	643	570	526	
2813311	CARBON DIOXIDE: LIQUID AND GAS (2) . . . . .	S.TONS	180,097	174,747	171,012	
		DO	26,670	30,677	28,013	
2813420	HYDROGEN, TOTAL (3) . . . . .	MIL.CU.FT	7,811	7,762	7,309	
	LIQUID AND GAS: PRODUCED FOR CYLINDER AND BULK SHIPMENT, AND LIQUID PRODUCED FOR CONVERSION TO GAS . . . . .	DO	1,009	994	806	
	PRODUCED FOR PIPELINE AND GOVERNMENT USE . . . . .	DO	2,218	2,008	2,289	
	PRODUCED FOR CONSUMPTION IN THIS PLANT . . . . .	DO	4,584	4,760	4,214	
2813440	NITROGEN, TOTAL (4) . . . . .	DO	34,023	32,653	29,508	
	GAS: PRODUCED FOR PIPELINE SHIPMENT . . . . .	DO	20,803	19,697	<sup>5</sup> 18,309	
	LIQUID: PRODUCED FOR BULK DELIVERY SHIPMENT TO PIPELINE OR TO AIR SEPARATION PLANTS . . . . .	DO	1,266	1,277	607	
	LIQUID AND GAS: PRODUCED FOR CYLINDER AND BULK DELIVERY SHIPMENT . . . . .	DO	7,848	7,686	<sup>6</sup> 8,079	
	PRODUCED FOR CONSUMPTION IN THIS PLANT . . . . .	DO	4,106	3,993	2,513	
	2813450	OXYGEN, TOTAL . . . . .	DO	38,468	36,904	33,798
		GAS: PRODUCED FOR PIPELINE SHIPMENTS . . . . .	DO	27,036	25,157	23,290
LIQUID: PRODUCED FOR BULK DELIVERY SHIPMENT TO PIPELINES OR TO OTHER AIR SEPARATION PLANTS . . . . .		DO	1,815	1,601	579	
	LIQUID AND GAS: PRODUCED FOR CYLINDER AND BULK DELIVERY SHIPMENT . . . . .	DO	5,451	5,922	5,566	
		DO	4,166	4,224	4,363	

<sup>1</sup>Excludes quantities of acetylene produced and consumed by railroad shops, shipyards, and small establishments using portable generators.

<sup>2</sup>Excludes production of liquid and gas CO<sub>2</sub> converted to and reported as dry ice and also amounts converted from pure CO<sub>2</sub> (liquid or solid) purchased or received from other plants. Also excludes quantities produced and consumed in plants manufacturing soda ash or urea.

<sup>3</sup>Excludes quantities produced and consumed in the manufacture of methanol and ammonia, but includes an unspecified amount of hydrogen produced for sale or interplant transfer to plants consuming this gas in the production of ammonia. Also excludes amounts of hydrogen produced in petroleum refineries for captive use. However, of the total shown for lower purity hydrogen prior to 1969, 70 to 75 percent was accounted for by petroleum refiners with captive hydrogen production. Not all such petroleum refineries were canvassed in this survey.

<sup>4</sup>Excludes amounts produced and used in the manufacture of ammonia and ammonia derivatives.

<sup>5</sup>1977 data for nitrogen (gas) produced for pipeline shipments, combined with nitrogen produced for cylinder and bulk delivery shipments.

<sup>6</sup>1977 data for nitrogen (liquid and gas) produced for cylinder and bulk delivery shipments excludes nitrogen (gas) produced for cylinder and bulk delivery shipments.

Table 3. PRODUCTION AND EXPORTS OF NITROGEN: SEPTEMBER 1978

Product code	Product	Quantity produced (m.c.f.)	Exports of domestic merchandise (m.c.f.)	Percent of exports to production
28134 40	Nitrogen.....	32,653	2,373	7.3

Note: Detailed export data for industrial gases, other than nitrogen, are not available separately. Import data for industrial gases are included in "Chemical Elements, not specially provided for," and are not separately identified.

Comparison of Standard Industrial Classification Codes and Schedule B Export Codes is as follows:

	Domestic output	Exports
28134 40		415,2600

## DESCRIPTION OF SURVEY

*Scope of Survey*—This survey covers firms engaged in the manufacture of industrial gases. Excluded from this survey are industrial gases vented or used for fuel by the producer.

*Survey Description*—The statistics in this publication were collected on Bureau of the Census monthly reporting Form M28A.2, Production of Industrial Gases. The mailing panel for this survey consisted of all known producers of industrial gases, approximately 670 producers of elemental gases, carbon dioxide, and acetylene.

*Survey Error*—Figures for the current month include estimates for respondents whose reports were not received in time for tabulation. Such missing figures are "imputed" from month-to-month movements shown by reporting firms and are generally limited to a maximum of 25 percent for any one item. Individual items with imputation greater than 25 percent are footnoted.

The imputation rate is not an explicit indicator of the potential error in published figures due to nonresponse, because the actual monthly movements for nonrespondents may or may not closely agree with the imputed movements. The probable range of difference between the actual and imputed figures is unknown. The degree of uncertainty regarding the accuracy of the data, however, increases as the percentage of imputation increases. Figures with imputation rates above 25 percent should be used with caution.

*Revision to Previous Period Data*—Statistics for previous months may be revised due to receipt of corrected data from respondents, including late reports for which imputations were previously made as described above, and other corrections. Figures which have been revised by more than 5 percent from previously published figures are indicated by footnotes.

*Reporting Period Adjustment*—Since January 1975, the data have been adjusted for number of working days in the reporting period in order to compensate for differences in individual company reporting patterns, i.e., calendar month, 4-week, 5-week periods. Since the calendar month accounting system prevails in this industry, adjustments have been made to those reporting on other than a calendar month basis.

*Seasonal Adjustment*—This report presents seasonally adjusted data in table 1A for selected series shown in table 1B. The data were seasonally adjusted using the X-11 variant of the Bureau of the Census Method II seasonal adjustment program. This program is a ratio-to-moving average method. It largely eliminates the effect of seasonal variations (intra-year variations repeated constantly from year to year) within the series. The seasonally adjusted data provide a better measure of the month-to-month variations which are due to factors other than seasonal pattern. Additional information concerning seasonal adjustment is available in the seasonal adjustment supplement issued in this series.

## EXPLANATION OF TERMS

*Production*—Data shown for production represent total quantity of each chemical produced, including quantity consumed in plants, and for sale or transfer to other plants or warehouses of the same company. The statistics presented in the tables provide an up-to-date measure of activity in the inorganic field, but do not necessarily indicate amounts entering the market. In some cases, figures are included for material produced "in process" as an intermediate to the end products.

## COMPARISON OF EXPORT, IMPORT, AND DOMESTIC OUTPUT DATA

The Standard Industrial Classification (SIC) system used for domestic output and the statistical export and import commodity classifications were developed independently and are based on somewhat differing systems of classification. This results in considerable difficulty in comparing the three types of data for many commodity areas. The domestic output classification is based on type of industry; whereas, the export and import classification system is more materials oriented. Aside from the differences in the basic commodity classifications, there are additional problems involving import data, since there are a substantial number of imported commodities, which are not produced in the United States or which are produced only in very small quantities and which, therefore, have no comparable domestic output classification. The relationships shown in this report should be considered only as approximations, since, in addition to those mentioned above, there are also the following problems affecting the comparability of the three sets of data:

(a) *Valuation*—There are different methods of valuation for the three types of data.

*Domestic Output*—Valued at the point of production. It includes the net sales price, f.o.b. plant, after discounts and allowances, exclusive of freight charges and excise taxes.

*Exports*—Valued at the point of exportation. It includes the selling price, or cost if not sold, and inland freight, insurance, and other charges to the export point.

*Imports*—Valued at the first port of entry in the United States. It includes c. i. f. (cost, insurance, and freight), duty, and other charges to the import point.

(b) *Duplication in Quantity and Value of Output*—Because producers' shipments of some commodities may be used as materials for incorporation into other commodities, combinations of data for such commodities may contain a certain amount of duplication. Thus, percentages of exports to output or imports to apparent consumption (output plus imports minus exports) at four-digit or broader levels may be understated. Where duplication is known to be substantial, the output data are appropriately noted in the table.

(c) *Low-Valued Export and Import Transactions*—Commodity information is not shown for individual imports valued under \$251. For exports, commodity information is not reported for shipments individually valued under \$251 effective October 1969 and for shipments valued under \$100 prior to October 1969. This is believed to have only negligible effect on the statistics for most commodities.

(d) *Manufacturers' Shipments, Not Specified by Kind*—The value of manufacturers' shipments at the four-digit industry level often includes a small amount which is not distributed among the individual five-digit product classes. Export and import percentages at the more detailed levels might, therefore, be slightly overstated.

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# Industrial Gases



U.S. Department of Commerce  
BUREAU OF THE CENSUS

NOVEMBER 1978

M28C(78)-11  
Issued January 1979

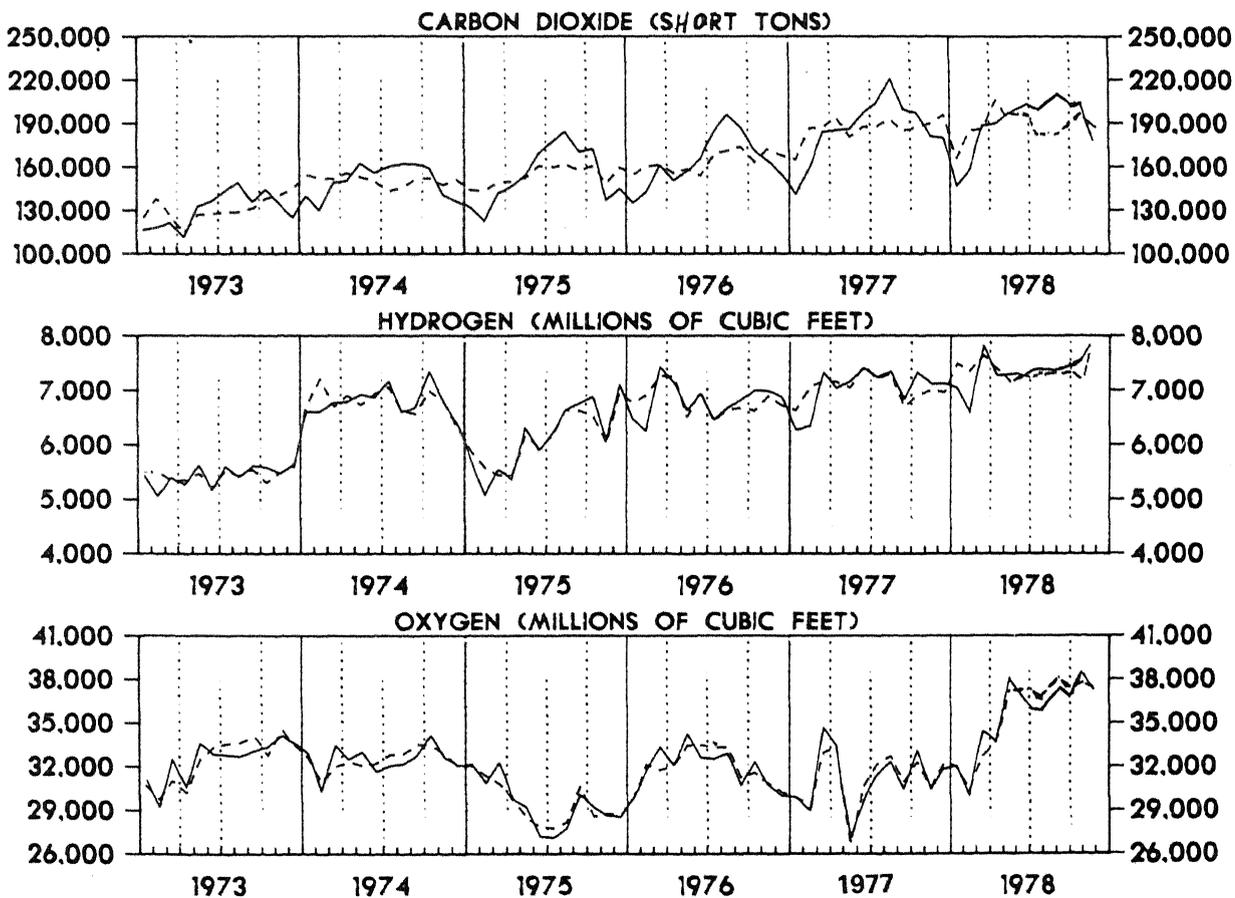
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Table IA. SUMMARY OF PRODUCTION OF PRINCIPAL GASES: 1976 TO 1978

Month and year	(Seasonally adjusted)				
	Acetylene (28132 00)	Carbon dioxide (28133 11) and (28133 31)	Hydrogen, high and low purity (100%) (28134 20)	Nitrogen, high and low purity (100%) (28134 40)	Oxygen, high and low purity (100%) (28134 50)
	(mil. cu. ft.)	(short tons)	(mil. cu. ft.)	(mil. cu. ft.)	(mil. cu. ft.)
1978					
November.....	453	188,504	7,804	34,736	37,758
October.....	454	195,757	7,451	33,848	37,089
September.....	385	190,384	7,595	32,588	37,466
August.....	435	184,887	7,443	34,959	38,021
July.....	420	188,375	7,335	32,039	37,149
June.....	451	194,026	7,229	33,340	37,267
May.....	437	193,714	7,212	32,712	36,955
April.....	485	205,882	7,395	32,358	33,694
March.....	441	186,118	7,634	32,397	32,707
February.....	435	184,793	7,348	30,682	30,365
January.....	443	165,369	7,482	31,259	32,012
1977					
December.....	439	197,862	6,934	30,421	32,935
November.....	433	191,648	6,979	29,715	31,158
October.....	450	189,187	6,889	28,845	32,974
September.....	438	186,293	6,668	29,178	31,697
August.....	495	194,303	7,290	27,921	33,430
July.....	484	189,142	7,166	27,517	32,899
June.....	518	189,204	7,428	30,682	34,678
May.....	554	181,852	7,023	26,729	34,877
April.....	461	196,381	7,282	25,873	34,152
March.....	563	188,672	7,145	25,500	33,531
February.....	565	188,669	7,041	25,150	30,029
January.....	600	166,293	6,601	24,413	30,603
1976					
December.....	517	167,567	6,721	26,290	30,231
November.....	526	171,862	6,882	26,147	30,852
October.....	557	162,734	6,615	25,205	31,555

Table IB. SUMMARY OF PRODUCTION OF PRINCIPAL GASES: 1976 TO 1978

Month and year	(Not seasonally adjusted)					
	Acetylene (28132 00)	Carbon dioxide, liquid and gas (28133 11)	Carbon dioxide, solid (28133 31)	Hydrogen, high and low purity (100%) (28134 20)	Nitrogen, high and low purity (100%) (28134 40)	Oxygen, high and low purity (100%) (28134 50)
	(mil. cu. ft.)	(short tons)	(short tons)	(mil. cu. ft.)	(mil. cu. ft.)	(mil. cu. ft.)
1978						
November.....	477	154,718	24,926	7,937	34,145	37,607
October.....	468	179,266	26,670	7,906	34,627	38,016
September.....	415	174,747	30,677	7,762	32,653	36,904
August.....	452	176,925	34,956	7,480	35,973	37,565
July.....	402	170,123	34,829	7,394	31,879	36,295
June.....	449	168,412	35,315	7,186	32,273	36,298
May.....	434	173,090	26,629	7,342	33,235	37,805
April.....	450	167,089	22,528	7,269	31,776	33,694
March.....	422	166,213	22,325	7,810	33,498	34,408
February.....	413	139,149	18,849	6,591	28,902	30,001
January.....	431	123,760	22,922	7,041	31,853	32,012
1977						
December.....	454	157,327	24,706	7,107	30,147	32,606
November.....	456	156,996	25,645	7,098	29,210	31,031
October.....	463	171,012	28,013	7,309	29,508	33,798
September.....	472	170,325	30,685	6,815	29,236	31,222
August.....	515	186,235	36,436	7,326	28,731	33,029
July.....	463	171,711	34,076	7,223	27,379	32,142
June.....	515	166,837	31,827	7,383	29,700	33,776
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March.....	544	158,964	27,067	7,309	26,393	35,275
February.....	537	137,876	23,436	6,330	23,691	29,669
January.....	571	119,718	22,296	6,245	24,779	30,603
1976						
December.....	537	130,811	23,383	6,876	26,159	29,989
November.....	557	136,514	27,262	6,985	25,568	30,729
October.....	577	141,185	30,049	6,999	25,886	32,312

Table 2. PRIMARY PRODUCTION (QUANTITY) OF SPECIFIED INDUSTRIAL GASES

Product code	Chemical and basis	Unit of measure	November 1978	October 1978	November 1977
28132 00	Acetylene <sup>1</sup> .....	Mil. cu. ft.....	477	468	456
	Produced for compression, including cylinder and pipeline.....	..do.....	120	120	120
	Produced for pipeline shipment (excluding that shipped to be compressed) and for consumption in this plant.....	..do.....	357	348	336
28134 15	Argon, high purity: Produced for cylinder and bulk delivery and pipeline shipments, and for consumption in this plant.....	..do.....	648	638	535
	Carbon dioxide:				
28133 11	Liquid and gas <sup>2</sup> .....	S. tons.....	154,718	179,266	156,996
28133 31	Solid (dry ice).....	..do.....	24,926	26,670	25,645
28134 20	Hydrogen, total <sup>3</sup> .....	Mil. cu. ft.....	7,937	7,906	7,098
	Liquid and gas:				
	Produced for cylinder and bulk shipment, and liquid produced for conversion to gas.....	..do.....	1,054	<sup>1</sup> 1,151	844
	Produced for pipeline and government use.....	..do.....	2,077	2,167	2,278
	Produced for consumption in this plant.....	..do.....	4,806	4,588	3,976
28134 40	Nitrogen, total <sup>4</sup> .....	..do.....	34,145	34,627	29,210
	Gas:				
	Produced for pipeline shipment.....	..do.....	20,590	21,436	<sup>5</sup> 18,373
	Liquid:				
	Produced for bulk delivery shipment to pipeline or to air separation plants.....	..do.....	814	1,242	496
	Liquid and gas:				
Produced for cylinder and bulk delivery shipment.....	..do.....	8,622	7,848	<sup>6</sup> 7,469	
	Produced for consumption in this plant.....	..do.....	4,119	4,101	2,872
28134 50	Oxygen, total.....	..do.....	37,607	38,016	31,033
	Gas:				
	Produced for pipeline shipments.....	..do.....	26,779	26,844	21,296
	Liquid:				
	Produced for bulk delivery shipment to pipelines or to other air separation plants.....	..do.....	1,125	1,840	522
	Liquid and gas:				
Produced for cylinder and bulk delivery shipment.....	..do.....	5,728	5,307	5,379	
	Produced for consumption in this plant.....	..do.....	3,975	4,025	3,836

<sup>1</sup>Revised by 5 percent or more from previously published figures.

<sup>2</sup>Excludes quantities of acetylene produced and consumed by railroad shops, shipyards, and small establishments using portable generators.

<sup>3</sup>Excludes production of liquid and gas CO<sub>2</sub> converted to and reported as dry ice and also amounts converted from pure CO<sub>2</sub> (liquid or solid) purchased or received from other plants. Also excludes quantities produced and consumed in plants manufacturing soda ash or urea.

<sup>4</sup>Excludes quantities produced and consumed in the manufacture of methanol and ammonia, but includes an unspecified amount of hydrogen produced for sale or interplant transfer to plants consuming this gas in the production of ammonia. Also excludes amounts of hydrogen produced in petroleum refineries for captive use. However, of the total shown for lower purity hydrogen prior to 1969, 70 to 75 percent was accounted for by petroleum refiners with captive hydrogen production. Not all such petroleum refineries were canvassed in this survey.

<sup>5</sup>Excludes amounts produced and used in the manufacture of ammonia and ammonia derivatives.

<sup>6</sup>1977 data for nitrogen (gas) produced for pipeline shipments, combined with nitrogen produced for cylinder and bulk delivery shipments.

<sup>7</sup>1977 data for nitrogen (liquid and gas) produced for cylinder and bulk delivery shipments excludes nitrogen (gas) produced for cylinder and bulk delivery shipments.

Table 3. PRODUCTION AND EXPORTS OF NITROGEN: OCTOBER 1978

Product code	Product	Quantity produced (m.c.f.)	Exports of domestic merchandise (m.c.f.)	Percent of exports to production
28134 40	Nitrogen.....	34,627	2,671	7.7

Note: Detailed export data for industrial gases, other than nitrogen, are not available separately. Import data for industrial gases are included in "Chemical Elements, not specially provided for," and are not separately identified.

Comparison of Standard Industrial Classification Codes and Schedule B Export Codes:

	Domestic output	Exports
28134 40		415,2600

## DESCRIPTION OF SURVEY

*Scope of Survey*—This survey covers firms engaged in the manufacture of industrial gases. Excluded from this survey are industrial gases vented or used for fuel by the producer.

*Survey Description*—The statistics in this publication were collected on Bureau of the Census monthly reporting Form M28A.2, Production of Industrial Gases. The mailing panel for this survey consisted of all known producers of industrial gases, approximately 670 producers of elemental gases, carbon dioxide, and acetylene.

*Survey Error*—Figures for the current month include estimates for respondents whose reports were not received in time for tabulation. Such missing figures are "imputed" from month-to-month movements shown by reporting firms and are generally limited to a maximum of 25 percent for any one item. Individual items with imputation greater than 25 percent are footnoted.

The imputation rate is not an explicit indicator of the potential error in published figures due to nonresponse, because the actual monthly movements for nonrespondents may or may not closely agree with the imputed movements. The probable range of difference between the actual and imputed figures is unknown. The degree of uncertainty regarding the accuracy of the data, however, increases as the percentage of imputation increases. Figures with imputation rates above 25 percent should be used with caution.

*Revision to Previous Period Data*—Statistics for previous months may be revised due to receipt of corrected data from respondents, including late reports for which imputations were previously made as described above, and other corrections. Figures which have been revised by more than 5 percent from previously published figures are indicated by footnotes.

*Reporting Period Adjustment*—Since January 1975, the data have been adjusted for number of working days in the reporting period in order to compensate for differences in individual company reporting patterns, i.e., calendar month, 4-week, 5-week periods. Since the calendar month accounting system prevails in this industry, adjustments have been made to those reporting on other than a calendar month basis.

*Seasonal Adjustment*—This report presents seasonally adjusted data in table 1A for selected series shown in table 1B. The data were seasonally adjusted using the X-11 variant of the Bureau of the Census Method II seasonal adjustment program. This program is a ratio-to-moving average method. It largely eliminates the effect of seasonal variations (intra-year variations repeated constantly from year to year) within the series. The seasonally adjusted data provide a better measure of the month-to-month variations which are due to factors other than seasonal pattern. Additional information concerning seasonal adjustment is available in the seasonal adjustment supplement issued in this series.

## EXPLANATION OF TERMS

*Production*—Data shown for production represent total quantity of each chemical produced, including quantity consumed in plants, and for sale or transfer to other plants or warehouses of the same company. The statistics presented in the tables provide an up-to-date measure of activity in the inorganic field, but do not necessarily indicate amounts entering the market. In some cases, figures are included for material produced "in process" as an intermediate to the end products.

## COMPARISON OF EXPORT, IMPORT, AND DOMESTIC OUTPUT DATA

The Standard Industrial Classification (SIC) system used for domestic output and the statistical export and import commodity classifications were developed independently and are based on somewhat differing systems of classification. This results in considerable difficulty in comparing the three types of data for many commodity areas. The domestic output classification is based on type of industry; whereas, the export and import classification system is more materials oriented. Aside from the differences in the basic commodity classifications, there are additional problems involving import data, since there are a substantial number of imported commodities, which are not produced in the United States or which are produced only in very small quantities and which, therefore, have no comparable domestic output classification. The relationships shown in this report should be considered only as approximations, since, in addition to those mentioned above, there are also the following problems affecting the comparability of the three sets of data:

(a) *Valuation*—There are different methods of valuation for the three types of data.

*Domestic Output*—Valued at the point of production. It includes the net sales price, f.o.b. plant, after discounts and allowances, exclusive of freight charges and excise taxes.

*Exports*—Valued at the point of exportation. It includes the selling price, or cost if not sold, and inland freight, insurance, and other charges to the export point.

*Imports*—Valued at the first port of entry in the United States. It includes c. i. f. (cost, insurance, and freight), duty, and other charges to the import point.

(b) *Duplication in Quantity and Value of Output*—Because producers' shipments of some commodities may be used as materials for incorporation into other commodities, combinations of data for such commodities may contain a certain amount of duplication. Thus, percentages of exports to output or imports to apparent consumption (output plus imports minus exports) at four-digit or broader levels may be understated. Where duplication is known to be substantial, the output data are appropriately noted in the table.

(c) *Low-Valued Export and Import Transactions*—Commodity information is not shown for individual imports valued under \$251. For exports, commodity information is not reported for shipments individually valued under \$251 effective October 1969 and for shipments valued under \$100 prior to October 1969. This is believed to have only negligible effect on the statistics for most commodities.

(d) *Manufacturers' Shipments, Not Specified by Kind*—The value of manufacturers' shipments at the four-digit industry level often includes a small amount which is not distributed among the individual five-digit product classes. Export and import percentages at the more detailed levels might, therefore, be slightly overstated.

(e) *Time Lag Between Output and Exports*—There will be a lag between the time a commodity is produced or shipped by the producer and the time it is actually exported, especially when intermediaries (wholesalers, exporters, etc.) are involved. Ordinarily, this type of discrepancy is insignificant in annual figures.

(f) *"Direct" vs "Total" Commodity Export and Imports*—Export and import data do not include materials which are incorporated into other more finished products and exported or imported in finished form. Thus, by showing only direct exports and imports, the relation of exports to output and imports to apparent consumption for intermediate products is considerably understated.

(g) *Used Commodities*—With a few exceptions, used or rebuilt commodities are classified in the same import or export codes as is new merchandise. Percentages are thus overstated to the extent that used or rebuilt products are significant in trade.

#### RELATIONSHIP BETWEEN M28C AND M28C-14 SERIES FOR INDUSTRIAL GASES

The data as shown in table 1 reflect levels of production as reported by establishments on monthly form M28A.2. These data are revised in the annual publication collected on Form MA-28E.2 and are shown in table 9 of the annual report M28C-14. The actual data reported by establishments canvassed on the annual differ by varying amounts from those collected monthly due to receipt of revised data from the respondent and establishments reporting on the annual and not on the monthly. For these reasons, the monthly and annual data comprise two separate series and should be used as such for analytical purposes. Specifically, the monthly data should be useful in describing month-to-month changes while the annual data provide a better indication of the level of production.

Revisions to the 1976 monthly series based on findings from the 1976 annual will be forthcoming as soon as research into the differences are resolved.

#### RELATED REPORTS

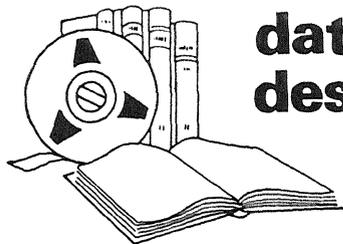
An annual Current Industrial Report is published in this series. The annual report summarizes monthly figures and incorporates all known revisions in the series for both current and previous year, thus providing a single reference copy to replace the monthly publications. This annual summary provides additional information on the history of this survey.

The Bureau of the Census also publishes reports on other related products as follows:

Series	Frequency	Title
<i>Current Industrial Reports</i>		
M3-1	Monthly	Manufacturers' Shipments, Inventories, and Orders
M28A	Monthly	Inorganic Chemicals
M28B	Monthly	Inorganic Fertilizer Materials
<i>Foreign Trade Reports</i>		
FT-410	Monthly	U.S. Exports
FT-135	Monthly	U.S. General Imports

#### CONTACTS FOR DATA USERS

Subject Area	Contact	Phone Number
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Foreign Trade publications	Juanita Noone	(301) 763-5140
Bureau of Domestic Business Development	David H. Blank	(202) 377-5496
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  - American Indian
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  - Chinese
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  - Hawaiian and Korean
  - Eskimo and Aleut
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## Industrial Gases



U.S. Department of Commerce  
BUREAU OF THE CENSUS

DECEMBER 1978

M28C(78)-12  
Issued March 1979

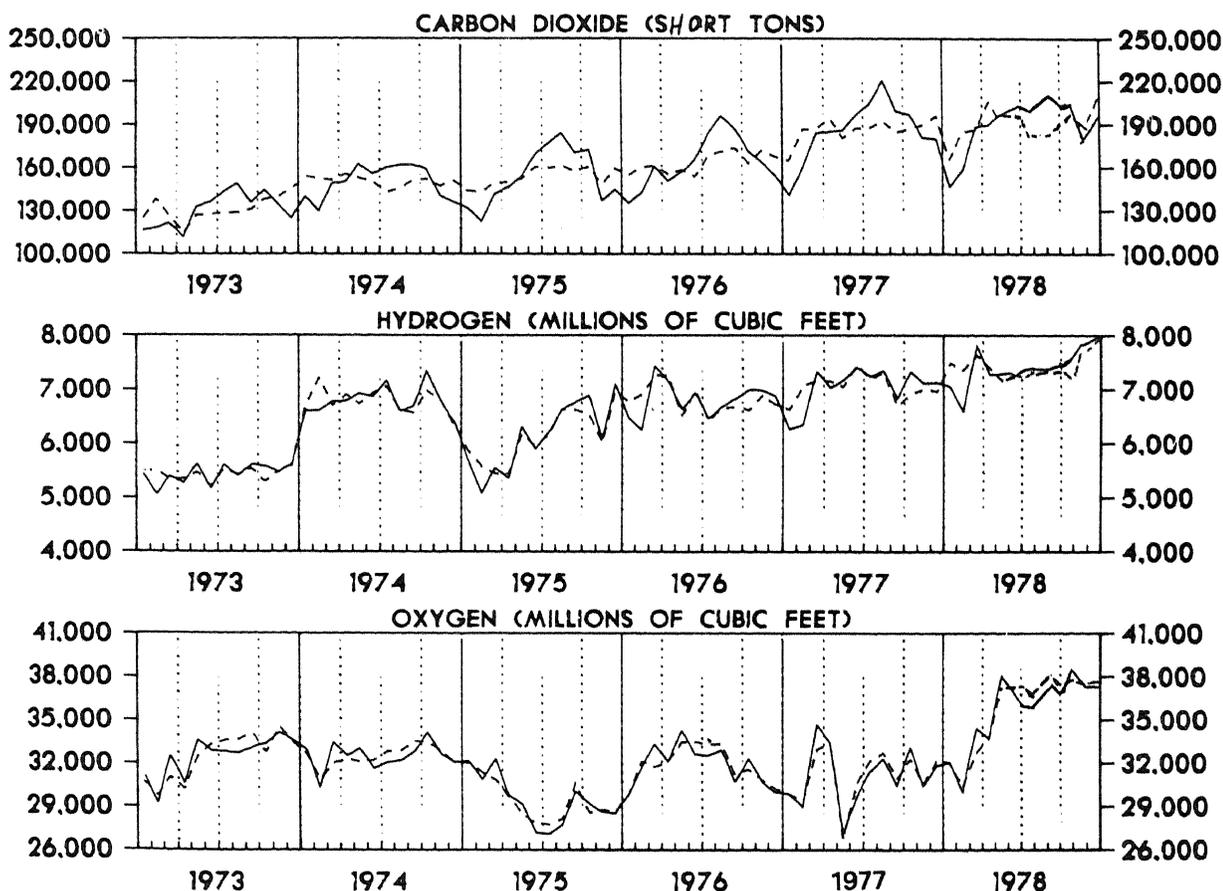
The statistics in this publication are based on a survey of manufacturers and represent total U.S. production of industrial gases. Estimates are included for companies whose reports were

not received in time for tabulation. A more complete description of this survey appears on page 4.

THIS REPORT INCLUDES DATA COMPARING DOMESTIC OUTPUT, EXPORTS, AND IMPORTS

PRODUCTION OF SELECTED INDUSTRIAL GASES  
1973 TO 1978

----- Seasonally Adjusted  
———— Not Seasonally Adjusted



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	(mil. cu. ft.)	(short tons)	(mil. cu. ft.)	(mil. cu. ft.)	(mil. cu. ft.)
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December.....	440	209,947	8,301	31,807	37,799
November.....	451	188,495	7,796	33,739	37,755
October.....	454	195,757	7,451	33,848	37,083
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	(mil. cu. ft.)	(short tons)	(short tons)	(mil. cu. ft.)	(mil. cu. ft.)	(mil. cu. ft.)
1978						
December.....	455	169,905	23,247	8,509	31,521	37,421
November.....	475	154,709	24,926	7,929	33,165	37,605
October.....	468	179,266	26,670	7,906	34,627	38,016
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November.....	557	136,514	27,262	6,985	25,568	30,729

TABLE 2. PRIMARY PRODUCTION (QUANTITY) OF SPECIFIED INDUSTRIAL GASES

PRODUCT CODE	CHEMICAL AND BASIS	UNIT OF MEASURE	DECEMBER 1978	NOVEMBER 1978	DECEMBER 1977
2813200	ACETYLENE (1) . . . . .	MIL.CU.FT	455	475	454
	PRODUCED FOR COMPRESSION, INCLUDING CYLINDER AND PIPELINE . . . . .	DO	120	119	115
	PRODUCED FOR PIPELINE SHIPMENT (EXCLUDING THAT SHIPPED TO BE COMPRESSED) AND FOR CONSUMPTION IN THIS PLANT . . . . .	DO	335	356	339
2813415	ARGON, HIGH PURITY: PRODUCED FOR CYLINDER AND BULK DELIVERY AND PIPELINE SHIPMENTS, AND FOR CONSUMPTION IN THIS PLANT . . . . .	DO	627	648	540
2813311	CARBON DIOXIDE: LIQUID AND GAS (2) . . . . .	S.TONS	169,905	154,709	157,327
2813331	SOLID (DRY ICE) . . . . .	DO	23,247	24,926	24,706
2813420	HYDROGEN, TOTAL (3) . . . . .	MIL.CU.FT	8,509	7,929	7,107
	LIQUID AND GAS: PRODUCED FOR CYLINDER AND BULK SHIPMENT, AND LIQUID PRODUCED FOR CONVERSION TO GAS . . . . .	DO	972	1,047	832
	PRODUCED FOR PIPELINE AND GOVERNMENT USE . . . . .	DO	2,552	2,075	2,265
	PRODUCED FOR CONSUMPTION IN THIS PLANT . . . . .	DO	4,985	4,807	4,010
2813440	NITROGEN, TOTAL (4) . . . . .	DO	31,521	33,165	30,147
	GAS: PRODUCED FOR PIPELINE SHIPMENT . . . . .	DO	19,063	20,241	<sup>5</sup> 18,810
	LIQUID: PRODUCED FOR BULK DELIVERY SHIPMENT TO PIPELINE OR TO AIR SEPARATION PLANTS . . . . .	DO	966	805	522
	LIQUID AND GAS: PRODUCED FOR CYLINDER AND BULK DELIVERY SHIPMENT . . . . .	DO	7,373	<sup>6</sup> 8,001	<sup>6</sup> 7,682
	PRODUCED FOR CONSUMPTION IN THIS PLANT . . . . .	DO	4,119	4,118	3,133
2813450	OXYGEN, TOTAL . . . . .	DO	37,421	37,605	32,606
	GAS: PRODUCED FOR PIPELINE SHIPMENTS . . . . .	DO	27,025	26,778	22,703
	LIQUID: PRODUCED FOR BULK DELIVERY SHIPMENT TO PIPELINES OR TO OTHER AIR SEPARATION PLANTS . . . . .	DO	1,312	1,125	651
	LIQUID AND GAS: PRODUCED FOR CYLINDER AND BULK DELIVERY SHIPMENT . . . . .	DO	4,789	5,728	5,245
	PRODUCED FOR CONSUMPTION IN THIS PLANT . . . . .	DO	4,295	3,974	4,007

<sup>1</sup>Revised by 5 percent or more from previously published figures.

<sup>1</sup>Excludes quantities of acetylene produced and consumed by railroad shops, shipyards, and small establishments using portable generators.

<sup>2</sup>Excludes production of liquid and gas CO<sub>2</sub> converted to and reported as dry ice and also amounts converted from pure CO<sub>2</sub> (liquid or solid) purchased or received from other plants. Also excludes quantities produced and consumed in plants manufacturing soda ash or urea.

<sup>3</sup>Excludes quantities produced and consumed in the manufacture of methanol and ammonia, but includes an unspecified amount of hydrogen produced for sale or interplant transfer to plants consuming this gas in the production of ammonia. Also excludes amounts of hydrogen produced in petroleum refineries for captive use. However, of the total shown for lower purity hydrogen prior to 1969, 70 to 75 percent was accounted for by petroleum refiners with captive hydrogen production. Not all such petroleum refineries were canvassed in this survey.

<sup>4</sup>Excludes amounts produced and used in the manufacture of ammonia and ammonia derivatives.

<sup>5</sup>1977 data for nitrogen (gas) produced for pipeline shipments, combined with nitrogen produced for cylinder and bulk delivery shipments.

<sup>6</sup>1977 data for nitrogen (liquid and gas) produced for cylinder and bulk delivery shipments excludes nitrogen (gas) produced for cylinder and bulk delivery shipments.

Table 3. PRODUCTION AND EXPORTS OF NITROGEN: SEPTEMBER 1978

Product code	Product	Quantity produced (m.c.f.)	Exports of domestic merchandise (m.c.f.)	Percent of exports to production
28134 40	Nitrogen.....	33,165	2,500	7.5

Note: Detailed export data for industrial gases, other than nitrogen, are not available separately. Import data for industrial gases are included in "Chemical Elements, not specially provided for," and are not separately identified.

Comparison of Standard Industrial Classification Codes and Schedule B Export Codes is as follows:

Domestic output	Exports
28134 40	415.2600

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**Industrial Gases**

U.S. Department of Commerce  
BUREAU OF THE CENSUS

1978 (Preliminary)

M28C(78)-13  
Issued June 1979

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**GENERAL**

Annual data for 1978, shown in this release, are a compilation of the monthly figures which have been appearing in this series. The figures for 1978 should be considered as preliminary and subject to revision based on information collected on Form MA-28C, and published as M28C(78)-14, Industrial Gases.

The statistics presented in the accompanying table are for primary production covering quantities produced for further processing in the same plant, for intracompany transfer, and for sale. They provide an up-to-date measure of activity in the inorganic field, but do not necessarily indicate amounts entering the market. In some cases, figures are included for material produced "in process" as an intermediate to the end products.

**ACKNOWLEDGMENTS**

This report was prepared in the Industry Division, Bureau of the Census, under the direction of Robert J. Nealon, Chief, Current Nondurables Branch, and John H. Ambler, Jr., Chief, Chemicals and Wood Products Section. Geoff B. Embrey was directly responsible for the review of the data and preparation of the report. Milton Eisen, Chief of the Division, and John R. Wikoff, Assistant Chief for Current Programs, provided overall direction and coordination to this project.

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Address inquiries concerning these figures to U.S. Department of Commerce, Bureau of the Census, Industry Division, Washington, D.C. 20233, or call Geoff B. Embrey, (301) 763-7837.

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PRIMARY PRODUCTION OF SPECIFIED INDUSTRIAL GASES, BY MONTHS: 1978

Product code	Chemical and basis	Unit of measure	Total	January	February	March	April	May	June	July	August	September	October	November	December
28132 00	Acetylene <sup>1</sup> Produced for compression, including cylinder and pipeline..... Produced for pipeline shipment (excluding that shipped to be compressed) and for consumption in this plant.....	Mill. cu. ft. ..do. ..do.	5,262 1,378 3,884	431 109 322	413 110 303	422 131 291	450 125 325	434 129 305	449 109 340	402 99 303	448 106 342	415 101 314	468 120 348	475 119 256	455 120 335
28134 15	Argon, high purity: Produced for cylinder and bulk delivery and pipeline shipments, and for consumption in this plant.....	..do.	7,010	515	514	605	562	612	590	560	569	570	638	648	627
28133 11	Carbon dioxide: Liquid and gas <sup>2</sup> .....	S. tons	1,962,185	123,760	139,149	166,213	167,089	173,090	168,412	170,123	175,722	174,747	179,266	154,709	169,905
28133 31	Solid (dry ice).....	..do.	325,463	22,922	18,849	22,325	22,528	26,629	35,315	34,629	34,546	30,677	26,670	24,926	23,247
28134 20	Hydrogen, total <sup>3</sup> Liquid and gas: Produced for cylinder and bulk shipment, and liquid produced for conversion to gas. Produced for pipeline and government use..... Produced for consumption in this plant.....	Mill. cu. ft. ..do. ..do. ..do.	90,248 10,464 25,432 54,352	7,041 834 1,922 4,285	6,591 554 1,972 4,065	7,809 962 2,270 4,577	7,269 856 2,222 4,191	7,342 901 2,103 4,338	7,186 823 2,043 4,320	7,394 758 1,992 4,644	7,510 612 2,106 4,792	7,762 994 2,008 4,760	7,906 1,151 2,167 4,588	7,929 1,047 2,075 4,807	8,509 972 2,552 4,985
28134 40	Nitrogen, total <sup>4</sup> Gas: Produced for pipeline shipment..... Liquid: Produced for bulk delivery shipment to pipeline or to air separation plants..... Liquid and gas: Produced for cylinder and bulk delivery shipment..... Produced for consumption in this plant.....	..do. ..do. ..do. ..do.	389,322 234,815 11,499 90,716 52,792	31,793 19,484 466 7,006 4,837	28,902 17,171 600 6,915 4,216	33,497 20,090 635 7,933 4,839	31,776 19,189 961 7,253 4,373	33,235 19,618 921 7,760 4,936	32,273 19,145 958 7,678 4,492	31,879 19,416 1,358 7,367 3,738	34,001 20,265 1,310 7,896 4,530	32,653 19,697 1,277 7,686 3,993	34,627 21,436 1,242 7,848 4,101	33,165 20,241 805 8,001 4,118	31,521 19,063 966 7,373 4,119
28134 50	Oxygen, total Gas: Produced for pipeline shipment..... Liquid: Produced for bulk delivery shipment to pipeline or to other air separation plants..... Liquid and gas: Produced for cylinder and bulk delivery shipment..... Produced for consumption in this plant.....	..do. ..do. ..do. ..do.	428,014 301,242 13,969 64,017 48,786	32,012 22,768 631 5,072 3,561	30,001 21,405 642 4,738 3,216	34,409 23,855 873 5,558 4,123	33,694 23,621 922 4,734 4,417	37,805 26,095 1,175 6,161 4,374	36,298 25,579 1,012 5,559 4,148	36,295 25,912 1,369 7,369 4,003	37,554 26,203 1,467 5,438 4,446	36,904 25,157 1,601 5,922 4,224	38,016 26,844 1,840 5,307 4,025	37,605 26,778 1,125 5,728 3,974	37,421 27,025 1,312 4,789 4,295

<sup>1</sup>Revised by 5 percent or more from previously published figures.

<sup>2</sup>Excludes quantities of acetylene produced and consumed by railroad shops, shipyards, and small establishments using portable generators.

<sup>3</sup>Excludes product of liquid and gas CO<sub>2</sub>, converted to and reported as dry ice and also amounts converted from pure CO<sub>2</sub> (liquid or solid) purchased or received from other plants. Also excludes quantities produced and consumed in plants manufacturing soda ash or urea.

<sup>4</sup>Excludes quantities produced and consumed in the manufacture of methanol and ammonia, but includes an unspecified amount of hydrogen produced for sale or interplant transfer to plants consuming this gas on the production of ammonia. Also excludes amounts of hydrogen produced in petroleum refineries for captive use. However, of the total shown for lower purity hydrogen prior to 1969, 70 to 75 percent was accounted for by petroleum refineries with captive hydrogen production. Not all such petroleum refineries were canvassed in this survey.

<sup>5</sup>Excludes amount produced and used in the manufacture of ammonia and ammonia derivatives.

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JOB AND EMPLOYMENT

Subject	Tabular Detail	Areas to Which Data Apply	Frequency	Sources (See Bibliography, pp. 329-339)
Employed People—Place of work and residence—workers by race—con.	Rank by proportion of Blacks in central city, 1970 Total employed Percent of races other than White in central city Outside central city	20 SMSA's	Annual	166. Current Population Reports: The Social and Economic Status of Negroes in the United States, 1970, p. 21 (table 8) (table 9) (Also later issues) Census Bureau.
Unemployed People—Last occupation	Experienced unemployed** 16 years old and over Total Black Spanish heritage By sex Occupation last worked in 8 categories	SMSA's central cities urban centers or tabular areas counties cities of 10,000 or more**	Years ending in ()	87. Population Census, V. 11, Parts 2 to 52, individual State reports, tables 88, 94, 100, 110, 121, Census Bureau.
Last year worked	Experienced workers not in labor force, 16 years old and over Year last worked in 3 time spans By sex In 84 to 166 occupation groups in 92 industry groups	SMSA's of 250,000 or more	Years ending in ()	88. Population Census, V. 10, Parts 2 to 52, individual State reports, table 128, Census Bureau.
Trends in Unemployment	Population 16 years old and over not in labor force Total Black Spanish heritage By sex In 3 age groups Total last worked 1960 to 1970 Percent not in labor force time spans Year last worked during 3 time spans Did not work 1960 to 1970 Total never worked worked before 1960 Year last worked must be stated	SMSA's of 250,000 or more those with at least 400 Blacks or 2000 of Spanish heritage	Years ending in ()	256. Area Trends in Employment and Unemployment, May 1970, p. 14. (Also later issues) Employment and Training Administration.
		150 major labor areas	Monthly	

\*\* Includes people who last worked more than 10 years ago.  
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# Industrial Gases



U.S. Department of Commerce  
BUREAU OF THE CENSUS

1978

MA-28C(78)-1  
Issued December 1979

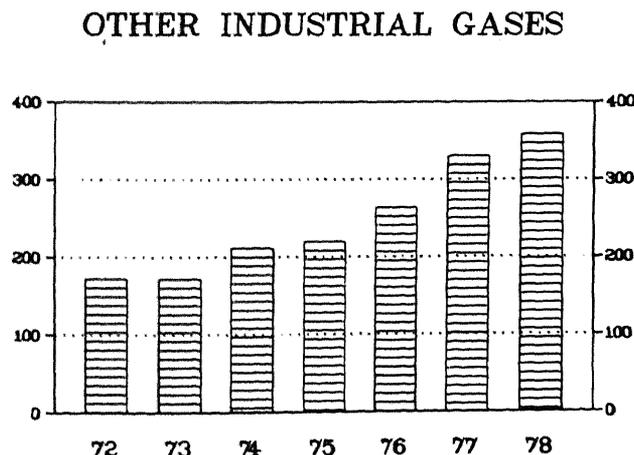
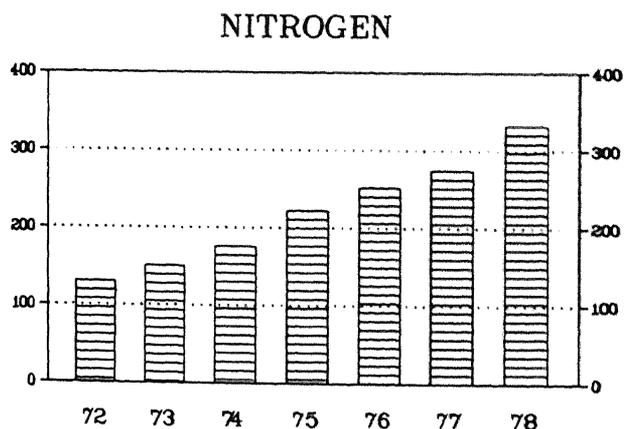
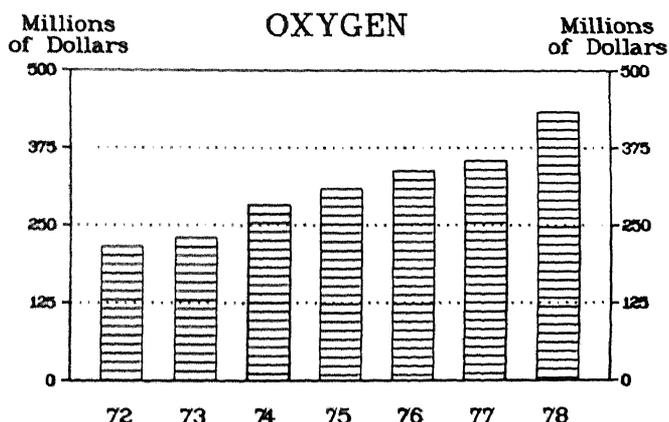
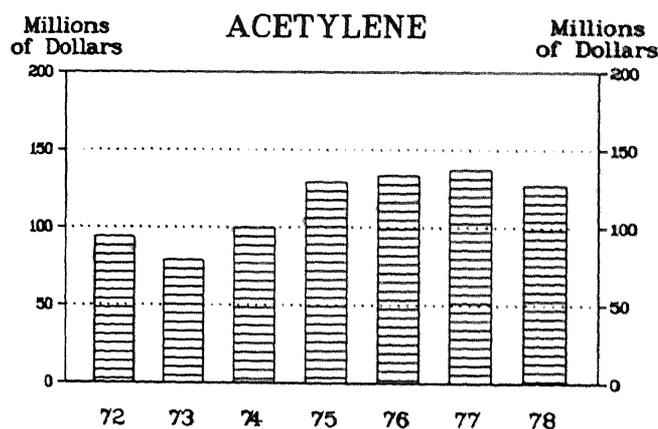
## SUMMARY OF FINDINGS

Shipments of industrial gases by primary manufactures in 1978 totaled \$1,250 million, or about 14 percent more than the 1977 figure of \$1,095 million. The 1978 total is composed of \$127 million for acetylene, \$113 million for carbon dioxide, and \$1,010 million for the product grouping elemental gases and other industrial gases, n.e.c. Compared with 1977, the 1978 totals showed a decrease of about 7 percent for acetylene, an

increase of 9 percent for carbon dioxide, and an increase of 18 percent for other elemental gases.

In addition to the annual production statistics shown in table 2, monthly statistics for specified gases are shown in table 9. These monthly statistics supersede those which were released earlier in the monthly Current Industrial Reports, Series M28C, *Industrial Gases, United States Production*.

## VALUE OF SHIPMENTS OF INDUSTRIAL GASES: 1972 TO 1978



Address inquiries concerning these figures to U.S. Department of Commerce, Bureau of the Census, Industry Division, Washington, D.C. 20233, or call Michael Kavros, (301) 763-7838.

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Table 1. VALUE OF SHIPMENTS OF SELECTED INDUSTRIAL GASES: 1978 AND 1977

Product class code	Product	1978	1977	
			M28C	Census of Manufactures <sup>P</sup>
28132 --	Acetylene.....	126.7	136.7	131.4
28133 --	Carbon dioxide.....	113.2	103.6	95.7
28135 --	Nitrogen.....	332.3	273.8	275.0
28136 --	Oxygen.....	433.1	354.1	373.0
28137 --	Other elemental compressed and liquified gases, n.e.c.....	245.0	226.8	245.5
28130 --	Industrial gases, n.s.k.....	44.4	38.9	38.9

N.e.c. Not elsewhere classified.

N.s.k. Not specified by kind.

<sup>P</sup>Preliminary.

Table 2. ANNUAL PRODUCTION AND SHIPMENTS OF INDUSTRIAL GASES: 1974 TO 1978

Code	Product	Unit of measure	Year	Production	Total shipments	
					Quantity	Value (\$1,000)
2813- --	Industrial gases.....		1978	(X)	(X)	<sup>1</sup> 1,294,769
			1977	(X)	(X)	<sup>1</sup> 1,134,001
			1976	(X)	(X)	<sup>2</sup> 986,289
			1975	(X)	(X)	<sup>3</sup> 879,590
			1974	(X)	(X)	<sup>4</sup> 769,395
28132 --	Acetylene <sup>2</sup> .....	Mil. cu. ft..	1978	5,386	3,471	126,721
			1977	6,003	3,830	136,721
			1976	7,111	4,415	133,417
			1975	6,704	4,138	129,100
			1974	7,808	4,799	99,844
28132 11	Produced for compression, including cylinder and pipeline.....	..do.....	1978	1,329	1,295	71,938
			1977	1,327	1,296	69,743
28132 21	Produced for pipeline shipment (excluding that shipped to be compressed) and for consumption in this plant.....	..do.....	1978	4,057	2,176	54,783
			1977	4,676	2,534	66,978
28133 --	Carbon dioxide.....	Short tons...	1978	3,180,718	2,933,202	113,224
			1977	2,816,538	2,583,506	103,647
			1976	2,063,665	1,917,579	74,084
			1975	1,850,318	1,728,256	65,883
			1974	1,804,251	1,674,116	59,966
28133 11	Liquid and gas.....	..do.....	1978	<sup>3</sup> 2,822,302	<sup>3</sup> 2,587,488	86,945
			1977	<sup>2</sup> 2,453,453	<sup>2</sup> 2,236,208	75,615
			1976	<sup>1</sup> 1,707,792	<sup>1</sup> 1,561,697	46,644
			1975	<sup>1</sup> 1,498,716	<sup>1</sup> 1,376,592	41,099
			1974	<sup>1</sup> 1,435,612	<sup>1</sup> 1,305,481	37,566
28133 31	Solid (dry ice).....	..do.....	1978	358,416	345,714	26,279
			1977	363,085	347,298	28,032
			1976	355,873	355,882	28,440
			1975	351,602	351,664	24,784
			1974	368,639	368,635	22,400
28135 --	Nitrogen, total <sup>4</sup> .....	..do.....	1978	383,395	333,997	332,311
			1977	327,661	300,003	273,793
			1976	288,868	265,473	252,006
			1975	252,368	228,266	222,157
			1974	243,316	219,271	173,661
28135 11	Gas, produced for pipeline shipment.....	..do.....	1978	230,654	230,821	114,212
			1977	204,958	204,029	83,303
28135 21	Liquid, produced for bulk delivery shipment to pipeline or to other air separation plants.....	..do.....	1978	9,171	9,171	11,626
28135 31			1977	6,459	6,511	8,653
28135 41	Liquid and gas: Produced for cylinder and bulk delivery shipment.....	Mil. cu. ft..	1978	94,601	94,005	206,473
			1977	89,280	89,463	181,837
28135 51	Produced for consumption in this plant.....	..do.....	1978	48,969	(X)	(X)
			1977	26,964	(X)	(X)
28136 --	Oxygen <sup>4</sup> .....	..do.....	1978	429,996	378,977	433,148
			1977	392,427	340,471	354,127
			1976	388,446	335,774	337,394
			1975	352,554	306,289	308,579
			1974	389,628	337,032	282,421
28136 11	Gas, produced for pipeline shipment.....	..do.....	1978	303,800	303,800	253,680
			1977	270,595	270,595	202,379
28136 21	Liquid, produced for bulk shipment to pipeline or to other air separation plants.....	..do.....	1978	11,507	11,507	17,359
			1977	7,443	7,443	11,590
28136 31	Liquid and gas: Produced for cylinder and bulk delivery shipment.....	..do.....	1978	63,697	63,670	162,109
			1977	62,408	62,433	140,158
28136 41	Produced for consumption in this plant.....	..do.....	1978	50,992	(X)	(X)
			1977	51,981	(X)	(X)

See footnotes at end of table.

Table 2. ANNUAL PRODUCTION AND SHIPMENTS OF INDUSTRIAL GASES: 1974 TO 1978--Continued

Code	Product	Unit of measure	Year	Production	Total shipments	
					Quantity	Value (\$1,000)
28137 --	Elemental gases and other industrial gases, n.e.c.....	.....	1978	(X)	(X)	244,970
			1977	(X)	(X)	226,813
			1976	(X)	(X)	189,388
			1975	(X)	(X)	153,871
			1974	(X)	(X)	151,503
28137 15	Argon, high purity.....	Mil. cu. ft..	1978	7,088	7,078	95,740 <sup>1</sup>
			1977	5,922	5,914	72,567
			1976	5,107	4,941	66,741
			1975	4,457	4,457	63,144
			1974	4,688	4,688	47,380
	Produced for cylinder and bulk delivery and pipeline shipments, and for consumption in this plant.....	..do.....	1978	7,088	7,078	95,740
			1977	5,922	5,914	72,567
	Helium <sup>5</sup> .....	..do.....	1978	1,604	865	(NA)
			1977	1,494	789	(NA)
			1976	1,339	578	(NA)
			1975	1,079	601	(NA)
			1974	883	570	(NA)
	Hydrogen, liquid and gas.....	..do.....	1978	<sup>6</sup> 90,777	40,385	99,677
			1977	<sup>6</sup> 84,759	35,165	94,677
			1976	<sup>6</sup> 82,100	32,357	80,794
1975			<sup>6</sup> 73,552	27,662	57,358	
1974			<sup>6</sup> 81,536	29,327	74,878	
28137 21	Produced for cylinder and bulk delivery shipment.....	..do.....	1978	10,680	10,676	59,525
			1977	9,206	9,206	57,759
28137 31	Produced for pipeline shipment and Government use.....	..do.....	1978	29,709	29,708	40,152
			1977	26,536	25,959	36,918
28137 41	Produced for consumption in this plant.....	..do.....	1978	50,388	(X)	(X)
			1977	49,017	(X)	(X)
28137 71	Nitrous oxide.....	1,000 gals... (STP)	1978	(D)	(D)	(?)
			1977	(D)	(D)	(?)
			1976	1,940,969	1,940,969	9,492
			1975	1,652,298	1,652,298	8,270
			1974	1,628,271	1,628,271	5,874
28137 98	Other industrial gases, n.e.c., including crude argon, carbon dioxide produced and transferred for further processing, and crude and high purity helium produced in privately owned plants <sup>8</sup> .	.....	1978	(X)	(X)	749,553
			1977	(X)	(X)	759,569
			1976	(X)	(X)	32,361
			1975	(X)	(X)	25,099
			1974	(X)	(X)	23,371
	Industrial gases, not specified by kind (see note) As reported in Census of Manufactures:					
28130 00	Typically for establishments with 5 or more employees.....	.....	1977	(X)	(X)	8,500
28130 02	Typically for establishments with less than 5 employees.....	.....	1977	(X)	(X)	30,400
28130 00	As estimated for Current Industrial Report series MA-28C.....	.....	1978	(X)	(X)	44,415
			1977	(X)	(X)	38,900

Note: N.s.k. represents the value of shipments for establishments which did not provide detailed information by type of product. These establishments, typically with less than 5 employees, are not included on the MA-28C mailing panel. The n.s.k. value has been estimated for series MA-28C based on the rate of change for the reporting establishments applied to the previous year's figure.

(D) Data withheld to avoid disclosing figures for individual companies. (NA) Not available. N.e.c. Not elsewhere classified. (X) Not applicable.

<sup>1</sup>Excludes value for helium produced in Government-owned plants.

<sup>2</sup>Excludes information from railroad ships, shipyards, welding shops, and small establishments using portable generators.

<sup>3</sup>Excludes production of liquid and gas carbon dioxide converted to and reported as dry ice and also amounts converted from pure carbon dioxide (liquid or solid) purchased or received from other plants. Also excludes quantities produced and consumed in plants manufacturing soda ash or urea, and quantities produced and transferred to other plants where it is further processed.

<sup>4</sup>Excludes amounts produced and consumed in the manufacture of synthetic ammonia or ammonia derivatives.

<sup>5</sup>Source: U.S. Department of Interior, Bureau of Mines.

<sup>6</sup>Excludes amounts vented, used as fuel, etc., and amounts produced and consumed in the manufacture of synthetic ammonia and methanol, but includes an unspecified amount produced for sale or interplant transfer to plants consuming this gas in the production of ammonia. Also excludes amounts produced by the ammonia dissociation process (cracking of ammonia). Also excludes amounts produced in petroleum refineries for captive use. However, of the total shown for lower purity hydrogen prior to 1969, 70 to 75 percent was accounted for by petroleum refiners with captive hydrogen production. Not all such petroleum refineries were canvassed in this survey.

<sup>7</sup>Data for nitrous oxide, total shipments including transfers value (\$1,000), combined with data for other industrial gases, n.e.c., to avoid disclosing figures for individual companies.

<sup>8</sup>Excludes hydrocarbon gases such as propane, butane, and propylene, or halogenated hydrocarbons and cyclopropane, which are reported to the U.S. Tariff Commission. Also excludes sulfur dioxide and chlorine data, which are shown in Current Industrial Reports Series M28A(76)-14, Inorganic Chemicals.

Table 3. PRODUCTION AND SHIPMENTS OF ACETYLENE, BY GEOGRAPHIC AREA: 1978

(Production and quantity in mil. cu. ft.; value in \$1,000)

Geographic Area	Production	Total shipments including interplant transfers	
		Quantity	Value
United States <sup>1</sup> .....	5,386	3,472	126,721
Northeast Region and North Central Region...	732	688	36,218
South Region.....	4,420	2,550	77,736
Mountain Division.....	92	92	4,721
Pacific Division.....	142	142	8,046

<sup>1</sup>See table 10 for the number of establishments reporting production by State.

Table 4. PRODUCTION AND SHIPMENTS OF CARBON DIOXIDE, BY DIVISIONS: 1978

(Production and quantity in short tons; value in \$1,000)

Division	Total liquid and solid			Liquid and gas			Solid (dry ice)		
	Production	Shipments		Production	Shipments		Production	Shipments	
		Quantity	Value		Quantity	Value		Quantity	Value
United States <sup>1</sup> .....	3,180,718	2,933,202	113,224	2,822,302	2,587,488	86,945	358,416	345,714	26,279
New England and Middle Atlantic.....	102,923	97,253	7,843	47,497	41,827	2,107	55,426	55,426	5,736
East North Central.....	797,339	785,249	33,802	708,977	696,887	25,282	88,362	88,362	8,520
West North Central.....	392,767	340,544	13,234	360,145	321,121	11,811	32,622	19,423	1,423
South Atlantic and East South Central....	881,058	803,458	27,892	843,389	765,789	25,089	37,669	37,669	2,803
West South Central.....	537,998	445,045	13,241	505,785	412,832	11,026	32,213	32,213	2,215
Mountain.....	177,421	177,421	6,175	136,212	136,212	4,499	41,209	41,209	1,676
Pacific.....	291,212	284,232	11,037	220,297	212,820	7,131	70,915	71,412	3,906

<sup>1</sup>See table 10 for the number of establishments reporting production by State.

Table 5. SHIPMENTS OF ARGON (HIGH PURITY) BY GEOGRAPHIC AREA: 1978

(Quantity in mil. cu. ft.; value in \$1,000)

Geographic area	Total shipments including interplant transfers	
	Quantity	Value
United States <sup>1</sup> .....	7,088	95,740
Northeast Region.....	1,197	20,497
North Central Region.....	2,846	31,916
Ohio.....	890	10,864
South Atlantic Division.....	839	13,639
East South Central Division.....	281	4,713
West South Central Division.....	1,027	13,332
West Region.....	898	11,643
California.....	578	6,986

<sup>1</sup>See table 10 for the number of establishments reporting production by State.

Table 6. PRODUCTION AND SHIPMENTS OF HYDROGEN (TOTAL) BY GEOGRAPHIC AREA: 1978  
(Production and quantity in mil. cu. ft.; value in \$1,000)

Geographic area	Production	Total shipments including interplant transfer	
		Quantity	Value
United States <sup>1</sup> .....	90,777	40,385	99,677
Northeast Region.....	8,226	5,982	15,975
North Central Region.....	7,348	2,963	9,173
South Region and West Region.....	75,203	31,440	74,529
East South Central Division.....	4,428	1,825	4,436
West South Central Division.....	55,220	20,852	48,373

<sup>1</sup>See table 10 for the number of establishments reporting production by State.

Table 7. PRODUCTION AND SHIPMENTS OF NITROGEN (TOTAL) BY GEOGRAPHIC AREA: 1978  
(Production and quantity in mil. cu. ft.; value in \$1,000)

Geographic area	Production	Total shipments including interplant transfers	
		Quantity	Value
United States <sup>1</sup> .....	383,395	333,997	332,311
New England Division.....	5,727	5,595	10,936
Middle Atlantic Division.....	39,468	37,570	57,557
New York.....	10,755	9,927	15,266
New Jersey.....	10,705	10,704	14,972
Pennsylvania.....	18,008	16,939	27,319
North Central Region.....	101,973	77,934	70,448
Ohio.....	16,322	15,720	17,077
Illinois.....	11,324	11,096	16,077
South Atlantic Division.....	45,733	38,530	36,464
West Virginia.....	18,469	11,330	7,600
East South Central Division.....	26,126	23,068	22,360
Tennessee.....	8,283	6,292	6,880
Alabama.....	14,135	14,068	14,132
West South Central Division.....	126,581	115,770	82,882
Texas.....	97,483	92,326	60,352
Mountain Division.....	6,493	5,880	9,430
Pacific Division.....	31,294	29,650	42,234
California.....	28,362	27,608	38,310

<sup>1</sup>See table 10 for the number of establishments reporting production by State.

Table 8. PRODUCTION AND SHIPMENTS OF OXYGEN (TOTAL) BY GEOGRAPHIC AREAS: 1978

(Production and quantity in mil. cu. ft.; value in \$1,000)

Geographic area	Production	Total shipments including interplant transfers	
		Quantity	Value
United States <sup>1</sup> .....	429,996	378,977	433,148
New England Division.....	1,846	1,822	4,882
Middle Atlantic Division.....	58,734	57,877	71,261
New York.....	13,797	13,806	16,354
New Jersey.....	2,575	2,579	6,075
Pennsylvania.....	42,362	41,492	48,832
North Central Region.....	172,713	152,477	164,322
Ohio.....	41,622	41,610	42,928
Michigan.....	25,033	15,187	17,664
South Atlantic Division.....	46,164	45,158	47,291
East South Central Division.....	32,784	32,550	36,668
West South Central Division.....	88,167	59,959	69,138
Texas.....	62,094	48,331	52,431
Mountain Division.....	12,279	11,879	13,713
Pacific Division.....	17,309	17,255	25,873
California.....	15,238	15,186	20,101

<sup>1</sup>See table 10 for the number of establishments reporting production by State.

Table 9. PRODUCTION OF SPECIFIED INDUSTRIAL GASES, BY MONTHS: 1978 AND 1977

Code	Product	Unit of measure	Year	Total	January	February	March	April	May	June	July	August	September	October	November	December
28132 --	Acetylene.....	mil. cu. ft.	1978 1977	5,386 6,003	442 574	421 540	431 547	460 435	443 553	461 517	410 465	460 518	425 475	480 465	487 458	466 456
28132 21	Produced for pipeline shipment, (excluding that produced to be compressed) and for consumption in this plant.....	..do.....	1978 1977	4,057 4,676	337 462	315 429	305 422	339 330	319 447	356 410	315 384	358 408	328 365	364 344	372 336	349 339
28132 11	Produced for compression, including cylinder and pipeline.....	..do.....	1978 1977	1,329 1,327	105 112	106 111	126 125	121 105	124 106	105 107	95 81	102 110	97 110	116 121	115 122	117 117
28133 --	Carbon dioxide.....	Short tons.	1978 1977	3,180,718 2,816,538	203,472 177,041	220,970 201,584	263,753 232,456	265,379 234,014	278,399 234,282	281,267 247,634	283,269 256,202	291,130 277,391	285,419 250,817	287,501 248,930	250,005 228,479	270,154 227,708
28133 11	Liquid and gas.....	..do.....	1978 1977	2,822,302 2,433,453	178,063 153,075	200,077 176,383	239,025 203,570	240,436 206,561	248,904 204,107	242,131 213,429	244,671 219,564	252,854 238,210	251,444 217,846	257,935 218,828	222,374 200,918	244,388 201,162
28133 31	Solid (dry ice).....	..do.....	1978 1977	358,416 363,085	25,409 23,966	20,893 23,201	24,728 29,086	24,943 27,453	29,495 30,175	39,136 34,205	38,598 36,638	38,276 39,181	33,975 32,971	29,566 30,102	27,631 27,561	25,766 26,546
28135 00	Nitrogen.....	..do.....	1978 1977	383,395 327,661	31,342 27,070	28,491 24,405	33,110 33,326	31,256 26,657	32,703 27,850	31,766 27,080	31,338 26,810	33,412 28,348	32,121 27,325	34,069 29,135	32,715 28,133	31,072 26,522
28135 11	Gas produced for pipeline shipment.....	..do.....	1978 1977	230,654 204,958	19,145 17,012	16,861 14,983	19,744 17,545	18,844 16,744	19,261 17,115	18,798 16,704	19,075 16,950	19,905 17,688	19,352 17,196	21,058 18,712	19,882 17,667	18,779 16,642
28135 21	Liquid produced for bulk shipment to pipeline or to other air separation plants.....	..do.....	1978 1977	9,171 6,459	366 674	477 447	504 423	761 527	733 558	761 510	1,082 684	1,036 558	1,017 508	990 587	641 477	803 506
28135 41	Liquid and gas: Produced for cylinder and bulk delivery.....	mil. cu. ft.	1978 1977	94,601 89,280	7,301 6,890	7,207 6,802	8,332 7,864	7,557 7,132	8,086 7,632	8,001 7,550	7,680 7,248	8,230 7,767	8,011 7,560	8,182 7,722	8,333 7,865	7,681 7,249
28135 51	Produced for consumption in this plant.....	..do.....	1978 1977	48,969 26,964	4,530 2,494	3,946 2,173	4,530 2,494	4,094 2,254	4,623 2,545	4,206 2,316	3,501 1,928	4,241 2,335	3,741 2,061	3,839 2,114	3,859 2,125	3,859 2,125
28136 00	Oxygen.....	..do.....	1978 1977	429,996 392,497	32,238 30,574	30,198 29,611	34,618 35,445	33,905 34,096	37,983 35,651	36,433 33,716	36,433 32,079	37,698 33,002	36,992 31,100	38,068 33,783	37,791 30,864	37,582 32,506
28136 11	Gas, produced for pipeline shipment.....	..do.....	1978 1977	303,800 270,595	22,967 20,463	21,600 19,787	24,061 23,826	23,818 23,762	26,309 25,250	25,793 23,582	26,127 22,664	26,431 23,004	25,367 21,141	27,068 23,250	27,008 21,216	27,251 22,650
28136 21	Liquid produced for bulk shipment to pipelines or to other air separation plants.....	..do.....	1978 1977	11,507 7,443	522 425	523 408	718 626	764 840	971 705	833 657	1,132 691	1,213 735	1,316 616	1,512 575	925 518	1,078 647
28136 31	Liquid and gas: Produced for cylinder and bulk delivery shipment.....	..do.....	1978 1977	63,697 62,408	5,046 4,833	4,715 4,881	5,530 5,575	4,708 5,371	6,139 5,567	5,530 5,354	4,888 4,539	5,409 4,896	5,893 5,299	5,281 5,533	5,702 5,346	4,766 5,214
28136 41	Produced for consumption in this plant.....	..do.....	1978 1977	50,992 51,981	3,703 4,853	3,360 4,535	4,309 5,418	4,615 4,123	4,574 4,129	4,334 4,123	4,186 4,185	4,645 4,367	4,416 4,044	4,207 4,425	4,156 3,784	4,487 3,995
28137 15	Argon, high purity.....	..do.....	1978 1977	7,088 5,922	521 380	520 450	612 502	568 535	619 482	597 483	566 497	576 520	576 468	645 526	655 537	633 542
28137 20	Produced for cylinder and bulk delivery and pipeline shipments and for consumption in this plant.....	..do.....	1978 1977	7,088 5,922	521 380	520 450	612 502	568 535	619 482	597 483	566 497	576 520	576 468	645 526	655 537	633 542
28137 21	Hydrogen.....	mil. cu. ft.	1978 1977	90,777 84,759	7,073 6,270	6,635 6,356	7,881 7,334	7,361 7,189	7,401 7,173	7,229 7,408	7,406 7,248	7,529 7,352	7,750 6,840	7,963 7,333	7,951 7,124	8,598 7,132
28137 21	Produced for cylinder and bulk delivery shipment.....	..do.....	1978 1977	10,680 9,206	851 751	565 738	981 678	874 909	920 707	840 702	773 749	625 829	1,015 679	1,175 800	1,069 838	992 826
28137 31	Produced for pipeline shipment and Government use.....	..do.....	1978 1977	29,709 26,536	2,247 1,801	2,302 1,918	2,623 2,150	2,597 2,244	2,457 2,129	2,384 2,258	2,326 2,258	2,460 2,192	2,347 2,391	2,531 2,335	2,424 2,328	2,881 2,311
28137 41	Produced for consumption in this plant.....	..do.....	1978 1977	50,389 49,017	3,975 3,718	3,766 3,700	4,247 4,506	3,890 4,036	4,024 4,537	4,005 4,427	4,307 4,241	4,444 4,131	4,388 3,770	4,237 4,198	4,458 3,958	4,625 3,995

Table 10. NUMBER OF ESTABLISHMENTS REPORTING THE PRODUCTION OF SELECTED INDUSTRIAL GASES, BY STATE: 1978

State	Acetylene	Carbon dioxide			Nitrogen	Oxygen	Argon (refined)	Hydrogen	Nitrous oxide
		Total <sup>1</sup>	Liquid or gas <sup>2</sup>	Solid					
United States.....	189	90	74	45	286	192	89	118	8
New England.....	5	1	-	1	14	4	3	3	-
Maine.....	-	-	-	-	1	-	-	-	-
New Hampshire.....	-	-	-	-	-	-	-	-	-
Vermont.....	-	-	-	-	1	-	-	-	-
Massachusetts.....	3	1	-	1	6	3	2	1	-
Rhode Island.....	1	-	-	-	1	-	-	-	-
Connecticut.....	1	-	-	-	5	1	1	2	-
Middle Atlantic.....	19	4	3	1	43	29	13	7	-
New York.....	5	2	2	-	12	6	2	2	-
New Jersey.....	4	1	-	1	9	3	2	2	-
Pennsylvania.....	10	1	1	-	22	20	9	3	-
East North Central.....	33	15	13	6	45	46	19	28	1
Ohio.....	13	4	4	2	13	22	8	7	1
Indiana.....	5	3	3	-	5	6	5	3	-
Illinois.....	6	7	5	4	17	12	3	12	-
Michigan.....	6	-	-	-	8	5	3	6	-
Wisconsin.....	3	1	1	-	2	1	-	-	-
West North Central.....	16	12	10	7	14	5	1	5	1
Minnesota.....	3	2	1	1	1	2	-	-	-
Iowa.....	4	5	4	4	4	-	-	-	-
Missouri.....	1	1	1	-	7	3	1	3	-
North Dakota.....	-	-	-	-	-	-	-	-	-
South Dakota.....	3	-	-	-	-	-	-	-	-
Nebraska.....	1	-	-	-	1	-	-	1	-
Kansas.....	4	4	4	2	1	-	-	1	1
South Atlantic.....	26	12	9	6	50	21	9	14	1
Delaware.....	-	1	1	-	2	2	-	4	-
Maryland.....	2	-	-	-	6	3	1	-	-
District of Columbia.....	-	-	-	-	-	-	-	-	-
Virginia.....	3	2	2	1	3	3	1	2	-
West Virginia.....	4	1	1	-	13	6	2	4	-
North Carolina.....	3	1	1	-	9	1	1	1	-
South Carolina.....	-	-	-	-	6	1	1	-	-
Georgia.....	5	2	1	2	5	2	2	3	1
Florida.....	9	5	3	3	6	3	1	-	-
East South Central.....	15	6	6	1	27	18	6	16	2
Kentucky.....	3	2	2	-	5	4	-	3	-
Tennessee.....	7	3	3	1	15	6	3	8	1
Alabama.....	3	-	-	-	6	7	3	4	-
Mississippi.....	2	1	1	-	1	1	-	1	1
West South Central.....	37	19	16	6	48	36	18	24	-
Arkansas.....	1	1	1	-	1	2	1	-	-
Louisiana.....	6	3	2	1	13	8	3	7	-
Oklahoma.....	3	1	1	1	2	1	1	-	-
Texas.....	27	4	12	4	32	25	13	17	-
Mountain.....	17	8	8	7	10	9	4	2	-
Montana.....	3	-	-	-	-	1	-	-	-
Idaho.....	2	-	-	-	1	-	-	-	-
Wyoming.....	-	1	1	-	-	-	-	-	-
Colorado.....	3	1	1	1	3	3	1	1	-
New Mexico.....	2	2	2	2	1	1	1	-	-
Arizona.....	1	2	2	2	3	1	-	-	-
Utah.....	4	2	2	2	2	3	2	1	-
Nevada.....	2	-	-	-	-	-	-	-	-
Pacific.....	21	13	9	10	35	24	16	19	3
Washington.....	4	2	1	2	5	4	3	2	-
Oregon.....	4	-	-	-	2	-	1	1	-
California.....	10	8	5	7	25	17	12	13	3
Alaska.....	1	1	1	-	1	1	-	-	-
Hawaii.....	2	2	2	1	2	2	-	3	-

- Represents zero.

<sup>1</sup>Unduplicated.<sup>2</sup>Excludes plants converting entire production to solid.

## DESCRIPTION OF SURVEY

**Scope of Survey**—This survey includes firms engaged in the manufacture of industrial gases. Excluded from this survey are data for liquefied petroleum gases and organic gases, which are reported to the United States Tariff Commission, and sulfur dioxide and chlorine, which are shown in the Current Industrial Report M28A(78)-14, **Inorganic Chemicals**.

**Survey Description**—The statistics in this publication were collected on Bureau of the Census annual reporting Form M28C, **Production of Industrial Gases**. The mailing panel for this survey consisted of all known producers of industrial gases.

**Survey Error**—The current annual figures may include estimates for respondents whose reports were not received in time for tabulation. Such missing figures are imputed from year-to-year movements shown by reporting firms and are generally limited to a maximum of 25 percent for any one item. Individual items with higher than 25 percent imputation rate are footnoted.

The imputation rate is not an explicit indicator of the potential error in published figures due to nonresponse because the actual yearly movements for nonrespondents may or may not closely agree with the imputed movements. The probable range of difference between the actual and imputed figures is unknown. The degree of uncertainty regarding the accuracy of the data, however, increases as the percentage of imputation increases. Figures with imputation rates above 25 percent should be used with caution. The overall imputation rate for this survey is less than 2 percent.

**Revision to Previous Period Data**—Statistics for the previous year may be revised due to receipt of corrected data from respondents, including late reports for which estimates were made, and other corrections. Figures which have been revised by more than 5 percent from previously published figures are indicated by footnotes.

**Reconciliation with the 1977 Census of Manufactures**—Data from the 1977 Census of Manufactures and series MA-28C have been reconciled to correct differences in reported data between the two reports and to verify new establishments classified in the industrial gas industry. Table 1 presents a comparison by census product class of data for the two series. Table 2 includes the not specified by kind (n.s.k.) shipments as shown in the census. These data represent establishments, typically with five or less employees, which are not included on the MA-28C mailing panel, and were not required to provide detailed product information.

## EXPLANATION OF TERMS

**Production**—Data shown for production represent total quantity of each chemical produced, including quantity consumed in plants, and for sale or transfer to other plants or warehouses of the same company. The statistics presented in the tables provide an up-to-date measure of activity in the inorganic field, but do not necessarily indicate amounts entering the market. In some cases, figures are included for material produced "in process" as an intermediate to the end of products.

**Quantity and Value of Shipments Including Interplant Transfers**—The quantity and net selling value, f.o.b. plant (after discounts and allowances and excluding freight charges which may be absorbed by the company), of all products made in this establishment and physically shipped from it. Included are products shipped on consignment, whether or not sold at the end of the year, and products transferred to other establishments of a company (such as other manufacturing plants, separate sales branches or retail stores). Their "value" is the nearest approximation to the commercial selling value, f.o.b. plant, and not the cost of production.

The shipments value of some of the gases, particularly oxygen, reported by companies vary widely not only because of the conditions of sales, including delivery by pipeline or cylinder, but also because plant operations differ. The manufacturing and selling activities of some companies are centralized at the primary production site, while other companies sell or ship liquefied gases to other sites (filling stations or conversion units) where the products are changed in form, "packaged," and sold. The values reported for some sites thus include marketing activities and for other sites do not.

**Unit of Measure**—All figures included in this report are collected in thousand cubic feet, 70° F, at 1 atmosphere pressure, unless otherwise specified.

## HISTORICAL NOTES

Monthly and annual statistics for series M28C, **Industrial Gases**, have been issued beginning with January 1941.

Past copies of this report (called Facts for Industry before 1959) can be found in the Federal Depository Library in your area. These libraries keep Current Industrial Reports permanently available. A list of depository libraries may be obtained from the Bureau of the Census regional office in your area:

Office	Telephone
Atlanta, Georgia	(404) 526-2271
Boston, Massachusetts	(617) 223-2327
Charlotte, N.C.	(704) 372-0711
Chicago, Illinois	(312) 353-6251
Dallas, Texas	(214) 749-2814
Denver, Colorado	(303) 234-3924
Detroit, Michigan	(313) 226-7742
Kansas City, Kansas	(816) 374-4601
Los Angeles, California	(213) 824-7317
New York, New York	(212) 264-3860
Philadelphia, Pa.	(215) 597-4920
Seattle, Washington	(206) 442-7800

## RELATED REPORTS

### Relationship Between M28C and M28C-14 Series for Industrial Gases

The data as shown in table 2 reflect levels of production as reported by establishments on annual Form M28E.2. The actual data reported by establishments canvassed on the annual differ by varying amounts from those collected monthly due to receipt of revised data from the respondent and establishments reporting on the annual and not on the monthly. For these

reasons, the monthly and annual data comprise two separate series and should be used as such for analytical purposes. Specifically, the monthly data should be useful in describing month-to-month changes while the annual data provide a better indication of the level of production. Revisions to the 1978 monthly series are based on findings from the 1978 annual. These revisions are shown in table 9 of the annual report MA-28C.

The Bureau of the Census also publishes reports on other related products as follows:

Series	Frequency	Title
<i>Current Industrial Reports</i>		
M3-1	Monthly	Manufacturers' Shipments, Inventories, and Orders
M28A	Monthly	Inorganic Chemicals
M28B	Monthly	Inorganic Fertilizer Materials
M28C	Monthly	Industrial Gases
<i>Foreign Trade Reports</i>		
FT-410	Monthly	U.S. Exports
FT-135	Monthly	U.S. General Imports

## CONTACTS FOR DATA USERS

Subject Area	Contact	Phone Number
Current Industrial Report M28C	Michael Kavros	(301) 763-7837
Foreign Trade publications	Juanita Noone	(301) 763-5140
Bureau of Domestic Business Development	Chemical Program	(202) 377-5496
To order Census Bureau publication	Daisy Williams	(301) 763-7472
To order Census Bureau microfiche	Maria Brown	(301) 763-5511

## ACKNOWLEDGMENTS

This report was prepared in the Industry Division, Bureau of the Census, under the direction of Robert J. Nealon, Chief, Current Nondurables Branch, and John H. Ambler, Chief, Chemical and Wood Products Section. Michael Kavros was directly responsible for the review of the data and preparation of the report. Milton Eisen, Chief of the Division, and John R. Wikoff, Assistant Chief for Current Programs, provided overall direction and coordination to this project.

## Industrial Gases



U.S. Department of Commerce  
BUREAU OF THE CENSUS

JANUARY 1979

M28C(79)-1  
Issued March 1979

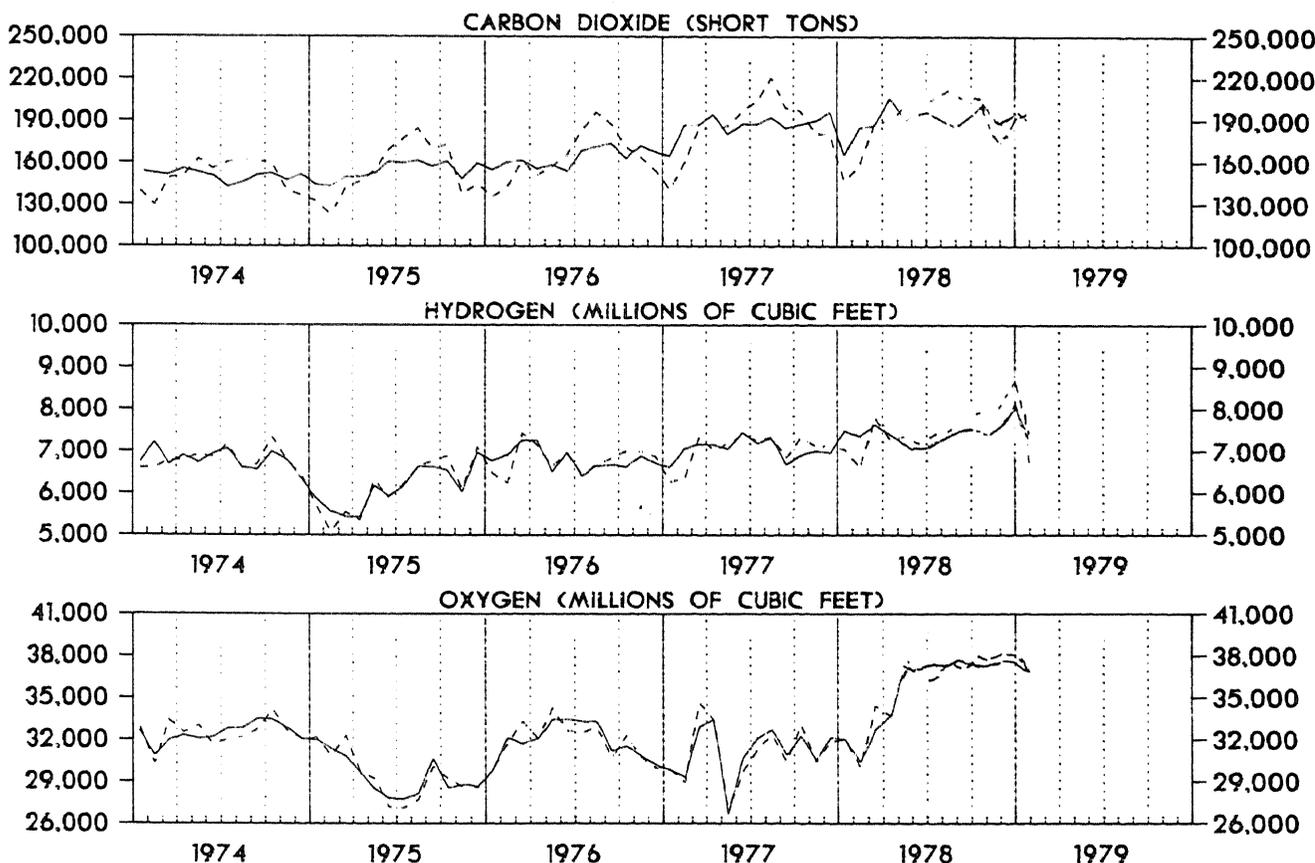
The statistics in this publication are based on a survey of manufacturers and represent total U.S. production of industrial gases. Estimates are included for companies whose reports were not received in time for tabulation. A more complete descrip-

tion of this survey appears on page 4. An annual Current Industrial Report is published in this series. The annual report includes all months for the current and previous years and incorporates all known revisions in the series.

THIS REPORT INCLUDES DATA COMPARING DOMESTIC OUTPUT, EXPORTS, AND IMPORTS

PRODUCTION OF SELECTED INDUSTRIAL GASES  
1974 TO 1979

— Seasonally Adjusted  
- - - Not Seasonally Adjusted



Address inquiries concerning these figures to U.S. Department of Commerce, Bureau of the Census, Industry Division, Washington, D.C. 20233, or call Geoff Embrey, (301) 763-7837.

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Table 1A. SUMMARY OF PRODUCTION OF PRINCIPAL GASES, SEASONALLY ADJUSTED: 1976 TO 1979

Month and year	Acetylene (28132 00)	Carbon dioxide (28133 11) and (28133 31)	Hydrogen, high and low purity (100%) (28134 20)	Nitrogen, high and low purity (100%) (28134 40)	Oxygen, high and low purity (100%) (28134 50)
	(mil. cu. ft.)	(short tons)	(mil. cu. ft.)	(mil. cu. ft.)	(mil. cu. ft.)
1979					
January.....	439	189,647	7,091	34,414	34,501
1978					
December.....	440	209,947	8,301	31,807	37,799
November.....	451	188,495	7,796	33,739	37,756
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February.....	565	188,669	7,041	25,150	30,029
January.....	600	166,293	6,601	24,413	30,603
1976					
December.....	517	167,567	6,721	26,290	30,231

Table 1B. SUMMARY OF PRODUCTION OF PRINCIPAL GASES, NOT SEASONALLY ADJUSTED: 1976 TO 1979

Month and year	Acetylene (28132 00)	Carbon dioxide, liquid and gas (28133 11)	Carbon dioxide, solid (28133 31)	Hydrogen, high and low purity (100%) (28134 20)	Nitrogen, high and low purity (100%) (28134 40)	Oxygen, high and low purity (100%) (28134 50)
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December.....	455	169,905	23,247	8,509	31,521	37,421
November.....	475	154,709	24,926	7,929	33,165	37,605
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June.....	449	168,412	35,315	7,186	32,273	36,298
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July.....	463	171,711	34,076	7,223	27,379	32,142
June.....	515	166,837	31,827	7,383	29,700	33,776
May.....	550	159,609	28,062	7,149	27,157	35,679
April.....	432	161,420	25,535	7,165	25,614	34,152
March.....	544	158,964	27,067	7,309	26,393	35,275
February.....	537	137,876	23,436	6,330	23,691	29,669
January.....	571	119,718	22,296	6,245	24,779	30,603
1976						
December.....	537	130,811	23,383	6,876	26,159	29,989

Table 2. PRIMARY PRODUCTION (QUANTITY) OF SPECIFIED INDUSTRIAL GASES

Product code	Chemical and basis	Unit of measure	January 1979	December 1978	January 1978
28132 00	Acetylene <sup>1</sup> .....	Mil. cu. ft....	428	455	431
	Produced for compression, including cylinder and pipeline.....	..do.....	125	120	109
	Produced for pipeline shipment (excluding that shipped to be compressed) and for consumption in this plant.....	..do.....	303	335	322
28134 15	Argon, high purity: Produced for cylinder and bulk delivery and pipeline shipments, and for consumption in this plant.....	..do.....	555	627	515
	Carbon dioxide:				
28133 11	Liquid and gas <sup>2</sup> .....	S. tons.....	148,522	169,905	123,760
28133 31	Solid (dry ice).....	..do.....	19,695	23,247	22,922
28134 20	Hydrogen, total <sup>3</sup> .....	Mil. cu. ft....	6,673	8,509	7,041
	Liquid and gas:				
	Produced for cylinder and bulk shipment, and liquid produced for conversion to gas.....	..do.....	842	972	834
	Produced for pipeline and government use.....	..do.....	1,594	2,552	1,922
	Produced for consumption in this plant.....	..do.....	4,236	4,985	4,285
28134 40	Nitrogen, total <sup>4</sup> .....	..do.....	35,068	31,521	31,853
	Gas:				
	Produced for pipeline shipment.....	..do.....	21,555	19,063	19,484
	Liquid:				
	Produced for bulk delivery shipment to pipeline or to air separation plants.....	..do.....	834	966	466
	Liquid and gas:				
	Produced for cylinder and bulk delivery shipment.....	..do.....	7,551	7,373	7,006
	Produced for consumption in this plant.....	..do.....	5,128	4,119	4,837
28134 50	Oxygen, total.....	..do.....	34,501	37,421	32,012
	Gas:				
	Produced for pipeline shipments.....	..do.....	24,594	27,025	22,768
	Liquid:				
	Produced for bulk delivery shipment to pipelines or to other air separation plants.....	..do.....	1,044	1,312	631
	Liquid and gas:				
	Produced for cylinder and bulk delivery shipment.....	..do.....	4,849	4,789	5,072
	Produced for consumption in this plant.....	..do.....	4,014	4,295	3,541

<sup>1</sup>Excludes quantities of acetylene produced and consumed by railroad shops, shipyards, and small establishments using portable generators.

<sup>2</sup>Excludes production of liquid and gas CO<sub>2</sub> converted to and reported as dry ice and also amounts converted from pure CO<sub>2</sub> (liquid or solid) purchased or received from other plants. Also excludes quantities produced and consumed in plants manufacturing soda ash or urea.

<sup>3</sup>Excludes quantities produced and consumed in the manufacture of methanol and ammonia, but includes an unspecified amount of hydrogen produced for sale or interplant transfer to plants consuming this gas in the production of ammonia. Also excludes amounts of hydrogen produced in petroleum refineries for captive use. However, of the total shown for lower purity hydrogen prior to 1969, 70 to 75 percent was accounted for by petroleum refineries with captive hydrogen production. Not all such petroleum refineries were canvassed in this survey.

<sup>4</sup>Excludes amounts produced and used in the manufacture of ammonia and ammonia derivatives.

Table 3. PRODUCTION AND EXPORTS OF NITROGEN: DECEMBER 1978

Product code	Product	Quantity produced (m.c.f.)	Exports of domestic merchandise (m.c.f.)	Percent of exports to production
28134 40	Nitrogen.....	35,068	722	2.05

Note: Detailed export data for industrial gases, other than nitrogen, are not available separately. Import data for industrial gases are included in "Chemical Elements, not specially provided for," and are not separately identified.

Comparison of Standard Industrial Classification Codes and Schedule B Export Codes:

Domestic output	Exports
28134 40	415.2600

## DESCRIPTION OF SURVEY

*Scope of Survey*—This survey covers firms engaged in the manufacture of industrial gases. Excluded from this survey are industrial gases vented or used for fuel by the producer.

*Survey Description*—The statistics in this publication were collected on Bureau of the Census monthly reporting Form M28A.2, **Production of Industrial Gases**. The mailing panel for this survey consisted of all known producers of industrial gases, approximately 670 producers of elemental gases, carbon dioxide, and acetylene.

*Survey Error*—Figures for the current month include estimates for respondents whose reports were not received in time for tabulation. Such missing figures are "imputed" from month-to-month movements shown by reporting firms and are generally limited to a maximum of 25 percent for any one item. Individual items with imputation greater than 25 percent are footnoted.

The imputation rate is not an explicit indicator of the potential error in published figures due to nonresponse, because the actual monthly movements for nonrespondents may or may not closely agree with the imputed movements. The probable range of difference between the actual and imputed figures is unknown. The degree of uncertainty regarding the accuracy of the data, however, increases as the percentage of imputation increases. Figures with imputation rates above 25 percent should be used with caution.

*Revision to Previous Period Data*—Statistics for previous months may be revised due to receipt of corrected data from respondents, including late reports for which imputations were previously made as described above, and other corrections. Figures which have been revised by more than 5 percent from previously published figures are indicated by footnotes.

*Reporting Period Adjustment*—Since January 1975, the data have been adjusted for number of working days in the reporting period in order to compensate for differences in individual company reporting patterns, i.e., calendar month, 4-week, 5-week periods. Since the calendar month accounting system prevails in this industry, adjustments have been made to those reporting on other than a calendar month basis.

*Seasonal Adjustment*—This report presents seasonally adjusted data in table 1A for selected series shown in table 1B. The data were seasonally adjusted using the X-11 variant of the Bureau of the Census Method II seasonal adjustment program. This program is a ratio-to-moving average method. It largely eliminates the effect of seasonal variations (intra-year variations repeated constantly from year to year) within the series. The seasonally adjusted data provide a better measure of the month-to-month variations which are due to factors other than seasonal pattern. Additional information concerning seasonal adjustment is available in the seasonal adjustment supplement issued in this series.

## EXPLANATION OF TERMS

*Production*—Data shown for production represent total quantity of each chemical produced, including quantity consumed in plants, and for sale or transfer to other plants or warehouses of the same company. The statistics presented in the tables provide an up-to-date measure of activity in the inorganic field but do not necessarily indicate amounts entering the market. In some cases, figures are included for material produced "in process" as an intermediate to the end products.

## COMPARISON OF EXPORT, IMPORT, AND DOMESTIC OUTPUT DATA

The Standard Industrial Classification (SIC) system used for domestic output and the statistical export and import commodity classifications were developed independently and are based on somewhat differing systems of classification. This results in considerable difficulty in comparing the three types of data for many commodity areas. The domestic output classification is based on type of industry; whereas, the export and import classification system is more materials oriented. Aside from the differences in the basic commodity classifications, there are additional problems involving import data, since there are a substantial number of imported commodities, which are not produced in the United States or which are produced only in very small quantities and which, therefore, have no comparable domestic output classification. The relationships shown in this report should be considered only as approximations, since, in addition to those mentioned above, there are also the following problems affecting the comparability of the three sets of data:

(a) *Valuation*—There are different methods of valuation for the three types of data.

*Domestic Output*—Valued at the point of production. It includes the net sales price, f.o.b. plant, after discounts and allowances, exclusive of freight charges and excise taxes.

*Exports*—Valued at the point of exportation. It includes the selling price, or cost if not sold, and inland freight, insurance, and other charges to the export point.

*Imports*—Valued at the first port of entry in the United States. It includes c. i. f. (cost, insurance, and freight), duty, and other charges to the import point.

(b) *Duplication in Quantity and Value of Output*—Because producers' shipments of some commodities may be used as materials for incorporation into other commodities, combinations of data for such commodities may contain a certain amount of duplication. Thus, percentages of exports to output or imports to apparent consumption (output plus imports minus exports) at four-digit or broader levels may be understated. Where duplication is known to be substantial, the output data are appropriately noted in the table.

(c) *Low-Valued Export and Import Transactions*—Commodity information is not shown for individual imports valued under \$251. For exports, commodity information is not reported for shipments individually valued under \$251 effective October 1969 and for shipments valued under \$100 prior to October 1969. This is believed to have only negligible effect on the statistics for most commodities.

(d) *Manufacturers' Shipments, Not Specified by Kind*—The value of manufacturers' shipments at the four-digit industry level often includes a small amount which is not distributed among the individual five-digit product classes. Export and import percentages at the more detailed levels might, therefore, be slightly overstated.

(e) *Time Lag Between Output and Exports*—There will be a lag between the time a commodity is produced or shipped by the producer and the time it is actually exported, especially when intermediaries (wholesalers, exporters, etc.) are involved. Ordinarily, this type of discrepancy is insignificant in annual figures.

(f) *"Direct" vs "Total" Commodity Export and Imports*—Export and import data do not include materials which are incorporated into other more finished products and exported or imported in finished form. Thus, by showing only direct exports and imports, the relation of exports to output and imports to apparent consumption for intermediate products is considerably understated.

(g) *Used Commodities*—With a few exceptions, used or rebuilt commodities are classified in the same import or export codes as is new merchandise. Percentages are thus overstated to the extent that used or rebuilt products are significant in trade.

#### RELATIONSHIP BETWEEN M28C AND M28C-14 SERIES FOR INDUSTRIAL GASES

The data as shown in table 1 reflect levels of production as reported by establishments on monthly Form M28A.2. These data are revised in the annual publication collected on Form MA-28E.2 and are shown in table 9 of the annual report M28C-14. The actual data reported by establishments canvassed on the annual differ by varying amounts from those collected monthly due to receipt of revised data from the respondent and establishments reporting on the annual and not on the monthly. For these reasons, the monthly and annual data comprise two separate series and should be used as such for analytical purposes. Specifically, the monthly data should be useful in describing month-to-month changes while the annual data provide a better indication of the level of production.

Revisions to the 1976 monthly series based on findings from the 1976 annual will be forthcoming as soon as research into the differences are resolved.

#### RELATED REPORTS

An annual Current Industrial Report is published in this series. The annual report summarizes monthly figures and incorporates all known revisions in the series for both current and previous year, thus providing a single reference copy to replace the monthly publications. This annual summary provides additional information on the history of this survey.

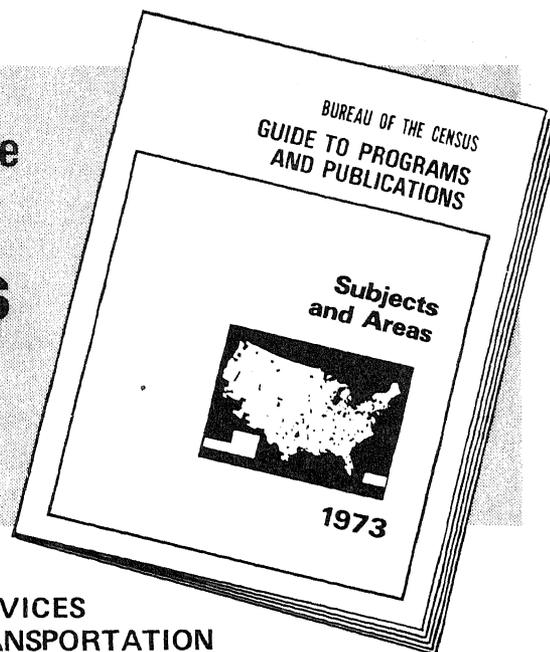
The Bureau of the Census also publishes reports on other related products as follows:

Series	Frequency	Title
<i>Current Industrial Reports</i>		
M3-1	Monthly	Manufacturers' Shipments, Inventories, and Orders
M28A	Monthly	Inorganic Chemicals
M28B	Monthly	Inorganic Fertilizer Materials
<i>Foreign Trade Reports</i>		
FT-410	Monthly	U.S. Exports
FT-135	Monthly	U.S. General Imports

#### CONTACTS FOR DATA USERS

Subject Area	Contact	Phone Number
Current Industrial Report M28C	Geoff Embrey	(301) 763-7837
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# Industrial Gases



U.S. Department of Commerce  
BUREAU OF THE CENSUS

FEBRUARY 1979

M28C(79)-2  
Issued April 1979

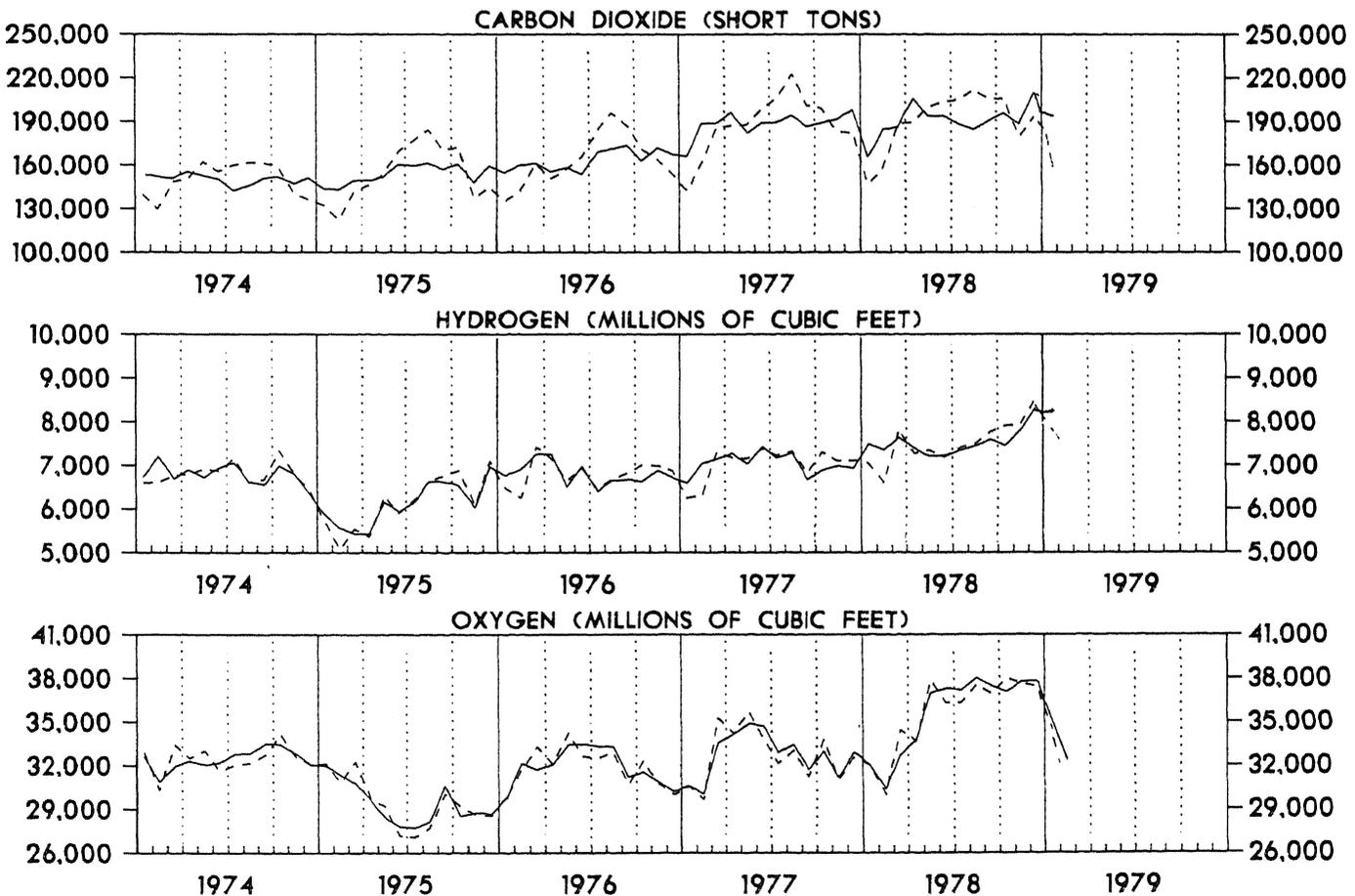
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May.....	550	159,609	28,062	7,149	27,157	35,679
April.....	432	161,420	25,535	7,165	25,614	34,152
March.....	544	158,964	27,067	7,309	26,393	35,275
February.....	537	137,876	23,436	6,330	23,691	29,669
January.....	571	119,718	22,296	6,245	24,779	30,603

Table 2. PRIMARY PRODUCTION (QUANTITY) OF SPECIFIED INDUSTRIAL GASES

Product code	Chemical and basis	Unit of measure	February 1979	January 1979	February 1978
28132 00	Acetylene <sup>1</sup> .....	Mil. cu. ft....	412	428	413
	Produced for compression, including cylinder and pipeline.....	..do.....	113	125	110
	Produced for pipeline shipment (excluding that shipped to be compressed) and for consumption in this plant.....	..do.....	299	303	303
28134 15	Argon, high purity: Produced for cylinder and bulk delivery and pipeline shipments, and for consumption in this plant.....	..do.....	609	552	514
28133 11	Carbon dioxide: Liquid and gas <sup>2</sup> .....	S. tons.....	133,473	147,223	139,149
28133 31	Solid (dry ice).....	..do.....	20,028	19,724	18,849
28134 20	Hydrogen, total <sup>3</sup> .....	Mil. cu. ft....	7,163	7,395	6,591
	Liquid and gas: Produced for cylinder and bulk shipment, and liquid produced for conversion to gas.....	..do.....	825	842	554
	Produced for pipeline and government use.....	..do.....	2,376	2,155	1,972
	Produced for consumption in this plant.....	..do.....	3,962	4,398	4,065
28134 40	Nitrogen, total <sup>4</sup> .....	..do.....	30,369	35,509	28,902
	Gas: Produced for pipeline shipment.....	..do.....	18,101	22,024	17,171
	Liquid: Produced for bulk delivery shipment to pipeline or to air separation plants.....	..do.....	950	849	600
	Liquid and gas: Produced for cylinder and bulk delivery shipment.....	..do.....	7,223	7,512	6,915
	Produced for consumption in this plant.....	..do.....	4,095	5,124	4,216
28134 50	Oxygen, total.....	..do.....	31,449	34,291	30,001
	Gas: Produced for pipeline shipments.....	..do.....	21,656	24,283	21,405
	Liquid: Produced for bulk delivery shipment to pipelines or to other air separation plants.....	..do.....	1,148	1,087	642
	Liquid and gas: Produced for cylinder and bulk delivery shipment.....	..do.....	4,920	4,905	4,738
	Produced for consumption in this plant.....	..do.....	3,725	4,016	3,216

<sup>1</sup>Excludes quantities of acetylene produced and consumed by railroad shops, shipyards, and small establishments using portable generators.

<sup>2</sup>Excludes production of liquid and gas CO<sub>2</sub> converted to and reported as dry ice and also amounts converted from pure CO<sub>2</sub> (liquid or solid) purchased or received from other plants. Also excludes quantities produced and consumed in plants manufacturing soda ash or urea.

<sup>3</sup>Excludes quantities produced and consumed in the manufacture of methanol and ammonia, but includes an unspecified amount of hydrogen produced for sale or interplant transfer to plants consuming this gas in the production of ammonia. Also excludes amounts of hydrogen produced in petroleum refineries for captive use. However, of the total shown for lower purity hydrogen prior to 1969, 70 to 75 percent was accounted for by petroleum refiners with captive hydrogen production. Not all such petroleum refineries were canvassed in this survey.

<sup>4</sup>Excludes amounts produced and used in the manufacture of ammonia and ammonia derivatives. Revised.

Table 3. PRODUCTION AND EXPORTS OF NITROGEN: JANUARY 1979

Product code	Product	Quantity produced (m.c.f.)	Exports of domestic merchandise (m.c.f.)	Percent of exports to production
28134 40	Nitrogen.....	35,509	722	2.0

Note: Detailed export data for industrial gases, other than nitrogen, are not available separately. Import data for industrial gases are included in "Chemical Elements, not specially provided for," and are not separately identified.

Comparison of Standard Industrial Classification Codes and Schedule B Export Codes:

Domestic output	Exports
28134 40	415.2600

## DESCRIPTION OF SURVEY

*Scope of Survey*—This survey covers firms engaged in the manufacture of industrial gases. Excluded from this survey are industrial gases vented or used for fuel by the producer.

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## COMPARISON OF EXPORT, IMPORT, AND DOMESTIC OUTPUT DATA

The Standard Industrial Classification (SIC) system used for domestic output and the statistical export and import commodity classifications were developed independently and are based on somewhat differing systems of classification. This results in considerable difficulty in comparing the three types of data for many commodity areas. The domestic output classification is based on type of industry; whereas, the export and import classification system is more materials oriented. Aside from the differences in the basic commodity classifications, there are additional problems involving import data, since there are a substantial number of imported commodities, which are not produced in the United States or which are produced only in very small quantities and which, therefore, have no comparable domestic output classification. The relationships shown in this report should be considered only as approximations, since, in addition to those mentioned above, there are also the following problems affecting the comparability of the three sets of data:

(a) *Valuation*—There are different methods of valuation for the three types of data.

*Domestic Output*—Valued at the point of production. It includes the net sales price, f.o.b. plant, after discounts and allowances, exclusive of freight charges and excise taxes.

*Exports*—Valued at the point of exportation. It includes the selling price, or cost if not sold, and inland freight, insurance, and other charges to the export point.

*Imports*—Valued at the first port of entry in the United States. It includes c. i. f. (cost, insurance, and freight), duty, and other charges to the import point.

(b) *Duplication in Quantity and Value of Output*—Because producers' shipments of some commodities may be used as materials for incorporation into other commodities, combinations of data for such commodities may contain a certain amount of duplication. Thus, percentages of exports to output or imports to apparent consumption (output plus imports minus exports) at four-digit or broader levels may be understated. Where duplication is known to be substantial, the output data are appropriately noted in the table.

(c) *Low-Valued Export and Import Transactions*—Commodity information is not shown for individual imports valued under \$251. For exports, commodity information is not reported for shipments individually valued under \$251 effective October 1969 and for shipments valued under \$100 prior to October 1969. This is believed to have only negligible effect on the statistics for most commodities.

(d) *Manufacturers' Shipments, Not Specified by Kind*—The value of manufacturers' shipments at the four-digit industry level often includes a small amount which is not distributed among the individual five-digit product classes. Export and import percentages at the more detailed levels might, therefore, be slightly overstated.

(e) *Time Lag Between Output and Exports*—There will be a lag between the time a commodity is produced or shipped by the producer and the time it is actually exported, especially when intermediaries (wholesalers, exporters, etc.) are involved. Ordinarily, this type of discrepancy is insignificant in annual figures.

(f) *"Direct" vs "Total" Commodity Export and Imports*—Export and import data do not include materials which are incorporated into other more finished products and exported or imported in finished form. Thus, by showing only direct exports and imports, the relation of exports to output and imports to apparent consumption for intermediate products is considerably understated.

(g) *Used Commodities*—With a few exceptions, used or rebuilt commodities are classified in the same import or export codes as is new merchandise. Percentages are thus overstated to the extent that used or rebuilt products are significant in trade.

#### RELATIONSHIP BETWEEN M28C AND M28C-14 SERIES FOR INDUSTRIAL GASES

The data as shown in table 1 reflect levels of production as reported by establishments on monthly Form M28A.2. These data are revised in the annual publication collected on Form MA-28E.2 and are shown in table 9 of the annual report M28C-14. The actual data reported by establishments canvassed on the annual differ by varying amounts from those collected monthly due to receipt of revised data from the respondent and establishments reporting on the annual and not on the monthly. For these reasons, the monthly and annual data comprise two separate series and should be used as such for analytical purposes. Specifically, the monthly data should be useful in describing month-to-month changes while the annual data provide a better indication of the level of production.

Revisions to the 1976 monthly series based on findings from the 1976 annual will be forthcoming as soon as research into the differences are resolved.

#### RELATED REPORTS

An annual Current Industrial Report is published in this series. The annual report summarizes monthly figures and incorporates all known revisions in the series for both current and previous year, thus providing a single reference copy to replace the monthly publications. This annual summary provides additional information on the history of this survey.

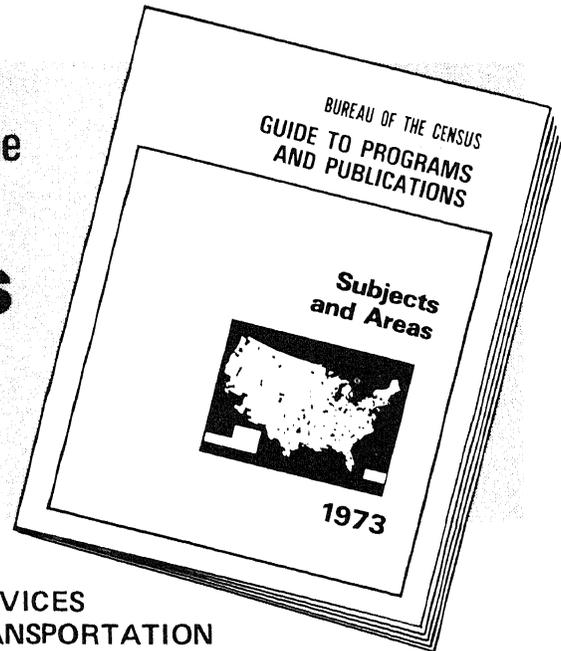
The Bureau of the Census also publishes reports on other related products as follows:

Series	Frequency	Title
<i>Current Industrial Reports</i>		
M3-1	Monthly	Manufacturers' Shipments, Inventories, and Orders
M28A	Monthly	Inorganic Chemicals
M28B	Monthly	Inorganic Fertilizer Materials
<i>Foreign Trade Reports</i>		
FT-410	Monthly	U.S. Exports
FT-135	Monthly	U.S. General Imports

#### CONTACTS FOR DATA USERS

Subject Area	Contact	Phone Number
Current Industrial Report M28C	Geoff Embrey	(301) 763-7837
Foreign Trade publications	Juanita Noone	(301) 763-5140
Bureau of Domestic Business Development	David H. Blank	(202) 377-5496
To order a Census Bureau publication	Daisy Williams	(301) 763-7472
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# Industrial Gases



U.S. Department of Commerce  
BUREAU OF THE CENSUS

MARCH 1979

M28C(79)-3  
Issued May 1979

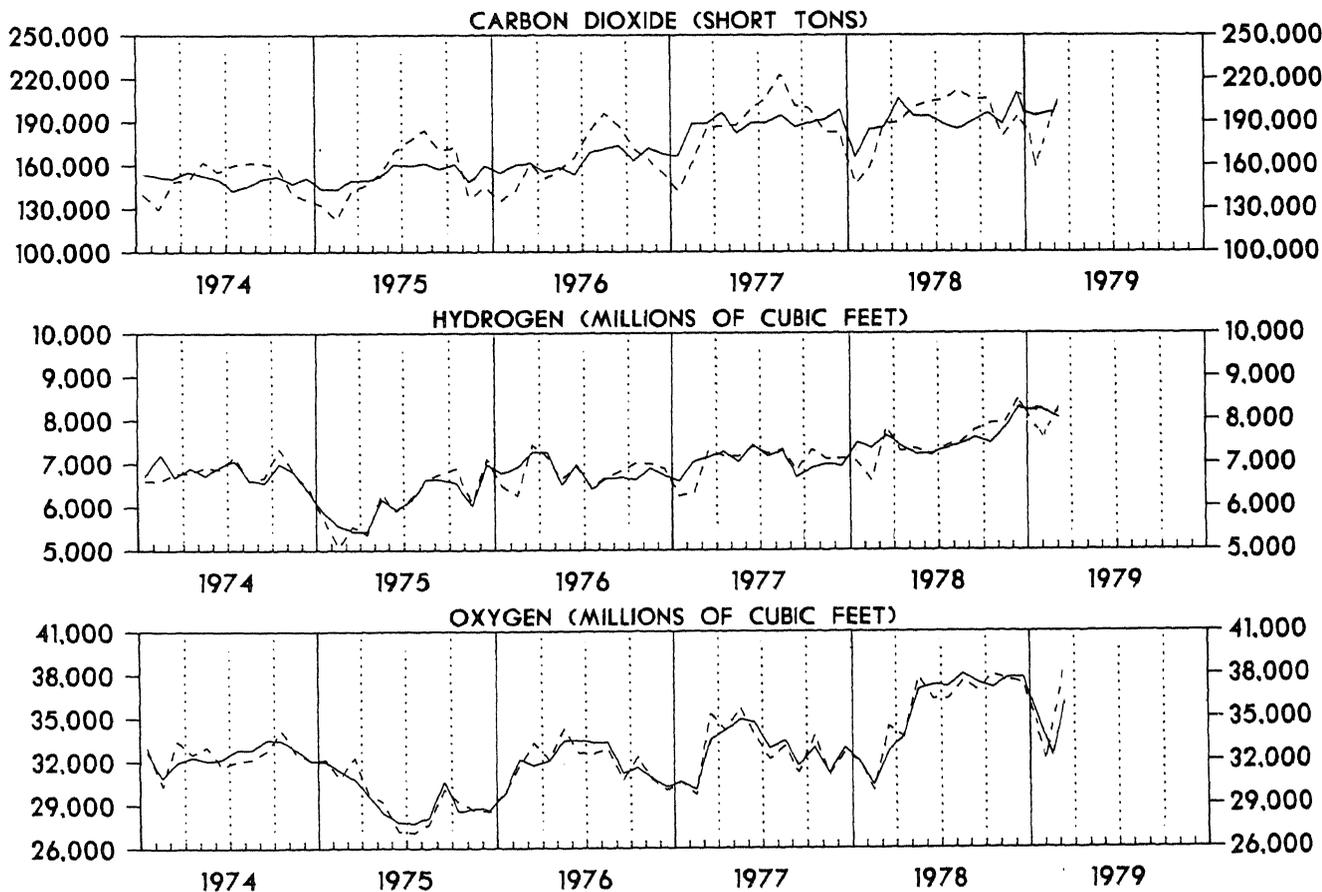
The statistics in this publication are based on a survey of manufacturers and represent total U.S. production of industrial gases. Estimates are included for companies whose reports were

not received in time for tabulation. A more complete description of this survey appears on page 4.

THIS REPORT INCLUDES DATA COMPARING DOMESTIC OUTPUT, EXPORTS, AND IMPORTS

## PRODUCTION OF SELECTED INDUSTRIAL GASES 1974 TO 1979

———— Seasonally Adjusted  
- - - - - Not Seasonally Adjusted



Address inquiries concerning these figures to U.S. Department of Commerce, Bureau of the Census, Industry Division, Washington, D.C. 20233, or call Geoff Embrey, (301) 763-7837.

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Table 1A. SUMMARY OF PRODUCTION OF PRINCIPAL GASES, SEASONALLY ADJUSTED: 1977 TO 1979

Month and year	Acetylene (28132 00) (mil. cu. ft.)	Carbon dioxide (28133 11) and (28133 31) (short tons)	Hydrogen, high and low purity (100%) (28134 20) (mil. cu. ft.)	Nitrogen, high and low purity (100%) (28134 40) (mil. cu. ft.)	Oxygen, high and low purity (100%) (28134 50) (mil. cu. ft.)
1979					
March.....	416	196,013	7,956	33,470	36,388
February.....	384	183,119	8,000	32,408	31,945
January.....	439	188,215	7,859	34,847	34,291
1978					
December.....	440	209,947	8,301	31,807	37,799
November.....	451	188,495	7,796	33,739	37,756
October.....	454	195,757	7,451	33,848	37,089
September.....	385	190,384	7,595	32,588	37,466
August.....	435	184,887	7,443	34,959	38,021
July.....	420	188,375	7,335	32,039	37,149
June.....	451	194,026	7,229	33,340	37,267
May.....	437	193,714	7,212	32,712	36,955
April.....	485	205,882	7,395	32,358	33,694
March.....	441	186,118	7,634	32,397	32,707
February.....	435	184,793	7,348	30,682	30,365
January.....	443	165,369	7,482	31,259	32,012
1977					
December.....	439	197,862	6,934	30,421	32,935
November.....	433	191,648	6,979	29,715	31,158
October.....	450	189,187	6,889	28,845	32,974
September.....	438	186,293	6,668	29,178	31,697
August.....	495	194,303	7,290	27,921	33,430
July.....	484	189,142	7,166	27,517	32,899
June.....	518	189,204	7,428	30,682	34,678
May.....	554	181,852	7,023	26,729	34,877
April.....	461	196,381	7,282	25,873	34,152
March.....	563	188,672	7,145	25,500	33,531
February.....	565	188,669	7,041	25,150	30,029
January.....	600	166,293	6,601	24,413	30,603

Table 1B. SUMMARY OF PRODUCTION OF PRINCIPAL GASES, NOT SEASONALLY ADJUSTED: 1977 TO 1979

Month and year	Acetylene (28132 00) (mil. cu. ft.)	Carbon dioxide, liquid and gas (28133 11) (short tons)	Carbon dioxide, solid (28134 31) (short tons)	Hydrogen, high and low purity (100%) (28134 20) (mil. cu. ft.)	Nitrogen, high and low purity (100%) (28134 40) (mil. cu. ft.)	Oxygen, high and low purity (100%) (28134 50) (mil. cu. ft.)
1979						
March.....	398	174,907	23,654	8,139	34,608	38,280
February.....	364	136,340	20,227	7,176	30,528	31,562
January.....	428	147,223	19,724	7,395	35,509	34,291
1978						
December.....	455	169,905	23,247	8,509	31,521	37,421
November.....	475	154,709	24,926	7,929	33,165	37,605
October.....	468	179,266	26,670	7,906	34,627	38,016
September.....	415	174,747	30,677	7,762	32,653	36,904
August.....	452	176,925	34,956	7,480	35,973	37,565
July.....	402	170,123	34,829	7,394	31,879	36,295
June.....	449	168,412	35,315	7,186	32,273	36,298
May.....	434	173,090	26,629	7,342	33,235	37,805
April.....	450	167,089	22,528	7,269	31,776	33,694
March.....	422	166,213	22,325	7,810	33,498	34,408
February.....	413	139,149	18,849	6,591	28,902	30,001
January.....	431	123,760	22,922	7,041	31,853	32,012
1977						
December.....	454	157,327	24,706	7,107	30,147	32,606
November.....	456	156,996	25,645	7,098	29,210	31,033
October.....	463	171,012	28,013	7,309	29,508	33,798
September.....	472	170,325	30,685	6,815	29,236	31,222
August.....	515	186,235	36,436	7,326	28,731	33,029
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Table 2. PRIMARY PRODUCTION (QUANTITY) OF SPECIFIED INDUSTRIAL GASES

Product code	Chemical and basis	Unit of measure	March 1979	February 1979	March 1978
28132 00	Acetylene <sup>1</sup> .....	Mil. cu. ft....	398	364	422
	Produced for compression, including cylinder and pipeline.....	..do.....	135	112	131
	Produced for pipeline shipment (excluding that shipped to be compressed) and for consumption in this plant.....	..do.....	263	252	291
28134 15	Argon, high purity: Produced for cylinder and bulk delivery and pipeline shipments, and for consumption in this plant.....	..do.....	709	609	605
	Carbon dioxide:				
28133 11	Liquid and gas <sup>2</sup> .....	S. tons.....	174,907	136,340	166,213
28133 31	Solid (dry ice).....	..do.....	23,654	20,227	22,325
28134 20	Hydrogen, total <sup>3</sup> .....	Mil. cu. ft....	8,139	7,176	7,809
	Liquid and gas:				
	Produced for cylinder and bulk shipment, and liquid produced for conversion to gas.....	..do.....	1,055	825	962
	Produced for pipeline and government use.....	..do.....	2,579	2,381	2,270
	Produced for consumption in this plant.....	..do.....	4,505	3,970	4,577
28134 40	Nitrogen, total <sup>4</sup> .....	..do.....	34,608	30,528	33,497
	Gas:				
	Produced for pipeline shipment.....	..do.....	20,455	18,210	20,090
	Liquid:				
	Produced for bulk delivery shipment to pipeline or to air separation plants.....	..do.....	976	978	635
	Liquid and gas:				
	Produced for cylinder and bulk delivery shipment.....	..do.....	8,714	7,223	7,933
	Produced for consumption in this plant.....	..do.....	4,463	4,117	4,839
28134 50	Oxygen, total.....	..do.....	38,280	31,562	34,409
	Gas:				
	Produced for pipeline shipments.....	..do.....	26,781	21,656	23,855
	Liquid:				
	Produced for bulk delivery shipment to pipelines or to other air separation plants.....	..do.....	1,656	1,148	873
	Liquid and gas:				
	Produced for cylinder and bulk delivery shipment.....	..do.....	5,600	5,015	5,558
	Produced for consumption in this plant.....	..do.....	4,243	3,743	4,123

<sup>†</sup>Revised by 5 percent or more from previously published figures.

<sup>1</sup>Excludes quantities of acetylene produced and consumed by railroad shops, shipyards, and small establishments using portable generators.

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Product code	Product	Quantity produced (m.c.f.)	Exports of domestic merchandise (m.c.f.)	Percent of exports to production
28134 40	Nitrogen.....	30,528	3,487	11.4

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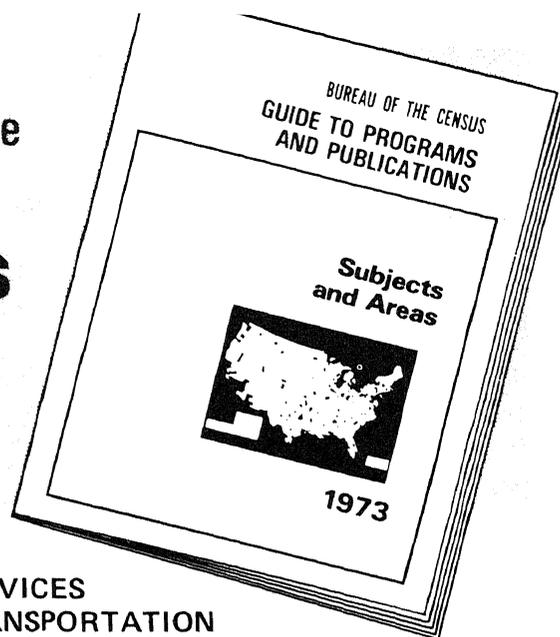
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# Industrial Gases



U.S. Department of Commerce  
BUREAU OF THE CENSUS

APRIL 1979

M28C(79)-4  
Issued July 1979

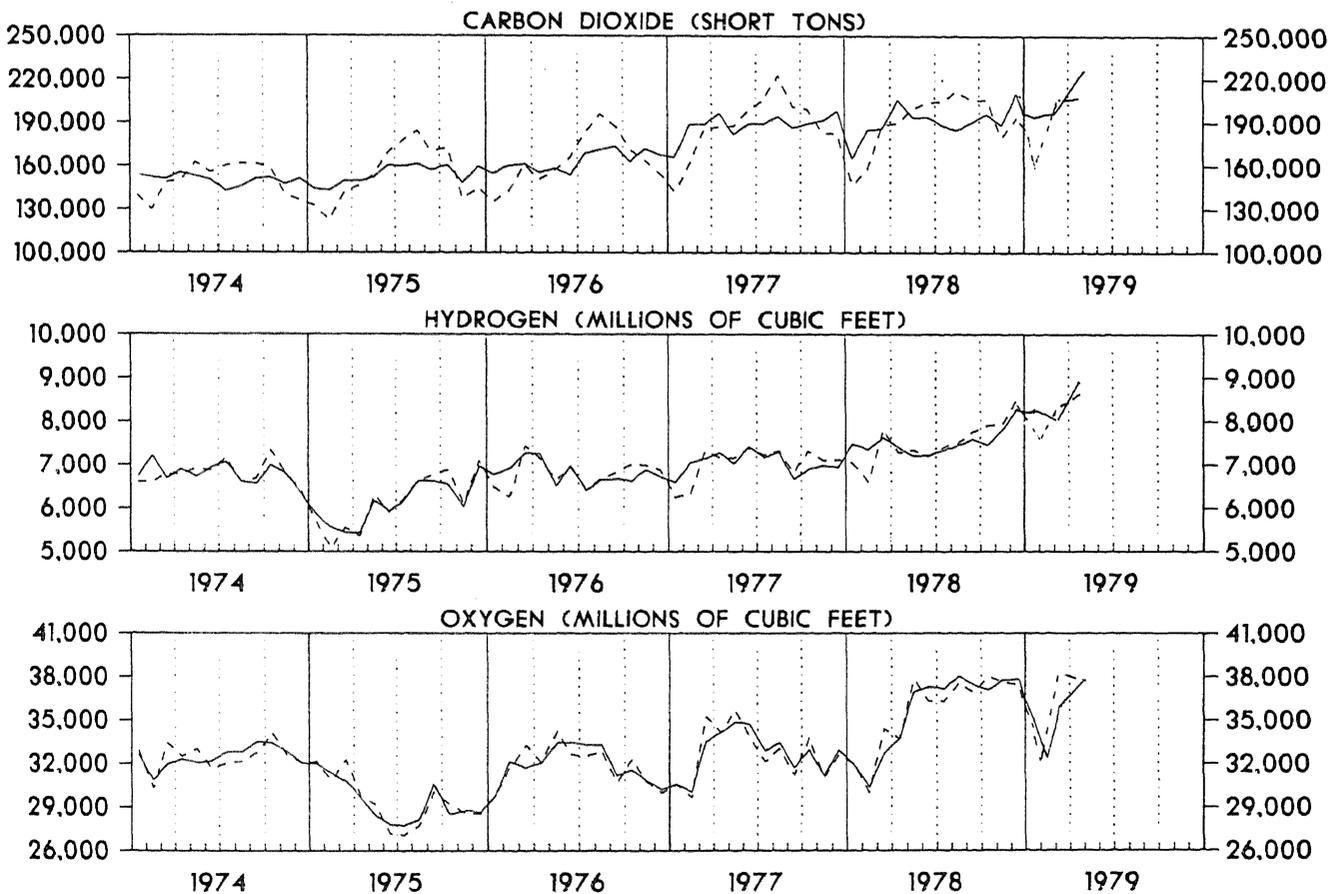
The statistics in this publication are based on a survey of manufacturers and represent total U.S. production of industrial gases. Estimates are included for companies whose reports were

not received in time for tabulation. A more complete description of this survey appears on page 4.

THIS REPORT INCLUDES DATA COMPARING DOMESTIC OUTPUT, EXPORTS, AND IMPORTS

## PRODUCTION OF SELECTED INDUSTRIAL GASES 1974 TO 1979

— Seasonally Adjusted  
- - - Not Seasonally Adjusted



Address inquiries concerning these figures to U.S. Department of Commerce, Bureau of the Census, Industry Division, Washington, D.C. 20233, or call Geoff Embrey, (301) 763-7837.

For sale by the Subscriber Services Section (Publications), Bureau of the Census, Washington, D.C. 20233, or any U.S. Department of Commerce district office. Postage stamps not acceptable; currency submitted at sender's risk. Remittances from foreign countries must be by international money order or by a draft on a U.S. bank. Price 25 cents per copy, \$3.50 per year.

Table 1A. SUMMARY OF PRODUCTION OF PRINCIPAL GASES, SEASONALLY ADJUSTED: 1977 TO 1979

Month and year	Acetylene (28132 00) (mil. cu. ft.)	Carbon dioxide (28133 11) and (28133 31) (short tons)	Hydrogen, high and low purity (100%) (28134 20) (mil. cu. ft.)	Nitrogen, high and low purity (100%) (28134 40) (mil. cu. ft.)	Oxygen, high and low purity (100%) (28134 50) (mil. cu. ft.)
1979					
April.....	416	233,447	8,825	33,501	37,594
March.....	418	221,932	8,093	34,157	36,532
February.....	384	183,119	8,000	32,408	31,945
January.....	439	188,215	7,859	34,847	34,291
1978					
December.....	440	209,947	8,301	31,807	37,799
November.....	451	188,495	7,796	33,739	37,756
October.....	454	195,757	7,451	33,848	37,089
September.....	385	190,384	7,595	32,588	37,466
August.....	435	184,887	7,443	34,959	38,021
July.....	420	188,375	7,335	32,039	37,149
June.....	451	194,026	7,229	33,340	37,267
May.....	437	193,714	7,212	32,712	36,955
April.....	485	205,882	7,395	32,358	33,694
March.....	441	186,118	7,634	32,397	32,707
February.....	435	184,793	7,348	30,682	30,365
January.....	443	165,369	7,482	31,259	32,012
1977					
December.....	439	197,862	6,934	30,421	32,935
November.....	433	191,648	6,979	29,715	31,158
October.....	450	189,187	6,889	28,845	32,974
September.....	438	186,293	6,668	29,178	31,697
August.....	495	194,303	7,290	27,921	33,430
July.....	484	189,142	7,166	27,517	32,899
June.....	518	189,204	7,428	30,682	34,678
May.....	554	181,852	7,023	26,729	34,877
April.....	461	196,381	7,282	25,873	34,152
March.....	563	188,672	7,145	25,500	33,531
February.....	565	188,669	7,041	25,150	30,029
January.....	600	166,293	6,601	24,413	30,603

Table 1B. SUMMARY OF PRODUCTION OF PRINCIPAL GASES, NOT SEASONALLY ADJUSTED: 1977 TO 1979

Month and year	Acetylene (28132 00) (mil. cu. ft.)	Carbon dioxide, liquid and gas (28133 11) (short tons)	Carbon dioxide, solid (28134 31) (short tons)	Hydrogen, high and low purity (100%) (28134 20) (mil. cu. ft.)	Nitrogen, high and low purity (100%) (28134 40) (mil. cu. ft.)	Oxygen, high and low purity (100%) (28134 50) (mil. cu. ft.)
1979						
April.....	386	190,958	24,047	8,675	32,898	37,594
March.....	400	198,840	25,977	8,279	35,318	38,432
February.....	364	136,340	20,227	7,176	30,528	31,562
January.....	428	147,223	19,724	7,395	35,509	34,291
1978						
December.....	455	169,905	23,247	8,509	31,521	37,421
November.....	475	154,709	24,926	7,929	33,165	37,605
October.....	468	179,266	26,670	7,906	34,627	38,016
September.....	415	174,747	30,677	7,762	32,653	36,904
August.....	452	176,925	34,956	7,480	35,973	37,565
July.....	402	170,123	34,829	7,394	31,879	36,295
June.....	449	168,412	35,315	7,186	32,273	36,298
May.....	434	173,090	26,629	7,342	33,235	37,805
April.....	450	167,089	22,528	7,269	31,776	33,694
March.....	422	166,213	22,325	7,810	33,498	34,408
February.....	413	139,149	18,849	6,591	28,902	30,001
January.....	431	123,760	22,922	7,041	31,853	32,012
1977						
December.....	454	157,327	24,706	7,107	30,147	32,606
November.....	456	156,996	25,645	7,098	29,210	31,033
October.....	463	171,012	28,013	7,309	29,508	33,798
September.....	472	170,325	30,685	6,815	29,236	31,222
August.....	515	186,235	36,436	7,326	28,731	33,029
July.....	463	171,711	34,076	7,223	27,379	32,142
June.....	515	166,837	31,827	7,383	29,700	33,776
May.....	550	159,609	28,062	7,149	27,157	35,679
April.....	432	161,420	25,535	7,165	25,614	34,152
March.....	544	158,964	27,067	7,309	26,393	35,275
February.....	537	137,876	23,436	6,330	23,691	29,669
January.....	571	119,718	22,296	6,245	24,779	30,603

Table 2. PRIMARY PRODUCTION (QUANTITY) OF SPECIFIED INDUSTRIAL GASES

Product code	Chemical and basis	Unit of measure	April 1979	March 1979	April 1978
28132 00	Acetylene <sup>1</sup> .....	Mil. cu. ft....	386	400	450
	Produced for compression, including cylinder and pipeline.....	..do.....	111	136	125
	Produced for pipeline shipment (excluding that shipped to be compressed) and for consumption in this plant.....	..do.....	275	264	325
28134 15	Argon, high purity: Produced for cylinder and bulk delivery and pipeline shipments, and for consumption in this plant.....	..do.....	697	709	562
	Carbon dioxide:				
28133 11	Liquid and gas <sup>2</sup> .....	S. tons.....	190,958	198,840	167,089
28133 31	Solid (dry ice).....	..do.....	24,047	25,977	22,528
28134 20	Hydrogen, total <sup>3</sup> .....	Mil. cu. ft....	8,675	8,279	7,269
	Liquid and gas:				
	Produced for cylinder and bulk shipment, and liquid produced for conversion to gas.....	..do.....	1,097	1,064	856
	Produced for pipeline and government use.....	..do.....	2,728	2,572	2,222
	Produced for consumption in this plant.....	..do.....	4,850	4,643	4,191
28134 40	Nitrogen, total <sup>4</sup> .....	..do.....	32,898	35,318	31,776
	Gas:				
	Produced for pipeline shipment.....	..do.....	19,599	21,146	19,189
	Liquid:				
	Produced for bulk delivery shipment to pipeline or to air separation plants.....	..do.....	1,019	995	961
	Liquid and gas:				
	Produced for cylinder and bulk delivery shipment.....	..do.....	7,617	8,714	7,253
	Produced for consumption in this plant.....	..do.....	4,663	4,463	4,373
28134 50	Oxygen, total.....	..do.....	37,594	38,432	33,694
	Gas:				
	Produced for pipeline shipments.....	..do.....	26,611	26,780	23,621
	Liquid:				
	Produced for bulk delivery shipment to pipelines or to other air separation plants.....	..do.....	1,131	1,656	922
	Liquid and gas:				
	Produced for cylinder and bulk delivery shipment.....	..do.....	5,389	5,600	4,734
	Produced for consumption in this plant.....	..do.....	4,463	4,396	4,417

<sup>1</sup>Revised by 5 percent or more from previously published figures.

<sup>2</sup>Excludes quantities of acetylene produced and consumed by railroad shops, shipyards, and small establishments using portable generators.

<sup>3</sup>Excludes production of liquid and gas CO<sub>2</sub> converted to and reported as dry ice and also amounts converted from pure CO<sub>2</sub> (liquid or solid) purchased or received from other plants. Also excludes quantities produced and consumed in plants manufacturing soda ash or urea.

<sup>4</sup>Excludes quantities produced and consumed in the manufacture of methanol and ammonia, but includes an unspecified amount of hydrogen produced for sale or interplant transfer to plants consuming this gas in the production of ammonia. Also excludes amounts of hydrogen produced in petroleum refineries for captive use. However, of the total shown for lower purity hydrogen prior to 1969, 70 to 75 percent was accounted for by petroleum refineries with captive hydrogen production. Not all such petroleum refineries were canvassed in this survey.

<sup>5</sup>Excludes amounts produced and used in the manufacture of ammonia and ammonia derivatives.

Table 3. PRODUCTION AND EXPORTS OF NITROGEN; MARCH 1979

Product code	Product	Quantity produced (m.c.f.)	Exports of domestic merchandise (m.c.f.)	Percent of exports to production
28134 40	Nitrogen.....	35,318	976	2.7

Note: Detailed export data for industrial gases, other than nitrogen are not available separately. Import data for industrial gases are included in "Chemical Elements, not specially provided for," and are not separately identified.

Comparison of Standard Industrial Classification Codes and Schedule B Export Codes:

Domestic output	Exports
28134 40	415.2600

## DESCRIPTION OF SURVEY

*Scope of Survey*—This survey covers firms engaged in the manufacture of industrial gases. Excluded from this survey are industrial gases vented or used for fuel by the producer.

*Survey Description*—The statistics in this publication were collected on Bureau of the Census monthly reporting Form M28A.2, **Production of Industrial Gases**. The mailing panel for this survey consisted of all known producers of industrial gases, approximately 670 producers of elemental gases, carbon dioxide, and acetylene.

*Survey Error*—Figures for the current month include estimates for respondents whose reports were not received in time for tabulation. Such missing figures are "imputed" from month-to-month movements shown by reporting firms and are generally limited to a maximum of 25 percent for any one item. Individual items with imputation greater than 25 percent are footnoted.

The imputation rate is not an explicit indicator of the potential error in published figures due to nonresponse, because the actual monthly movements for nonrespondents may or may not closely agree with the imputed movements. The probable range of difference between the actual and imputed figures is unknown. The degree of uncertainty regarding the accuracy of the data, however, increases as the percentage of imputation increases. Figures with imputation rates above 25 percent should be used with caution.

*Revision to Previous Period Data*—Statistics for previous months may be revised due to receipt of corrected data from respondents, including late reports for which imputations were previously made as described above, and other corrections. Figures which have been revised by more than 5 percent from previously published figures are indicated by footnotes.

*Reporting Period Adjustment*—Since January 1975, the data have been adjusted for number of working days in the reporting period in order to compensate for differences in individual company reporting patterns, i.e., calendar month, 4-week, 5-week periods. Since the calendar month accounting system prevails in this industry, adjustments have been made to those reporting on other than a calendar month basis.

*Seasonal Adjustment*—This report presents seasonally adjusted data in table 1A for selected series shown in table 1B. The data were seasonally adjusted using the X-11 variant of the Bureau of the Census Method II seasonal adjustment program. This program is a ratio-to-moving average method. It largely eliminates the effect of seasonal variations (intra-year variations repeated constantly from year to year) within the series. The seasonally adjusted data provide a better measure of the month-to-month variations which are due to factors other than seasonal pattern. Additional information concerning seasonal adjustment is available in the seasonal adjustment supplement issued in this series.

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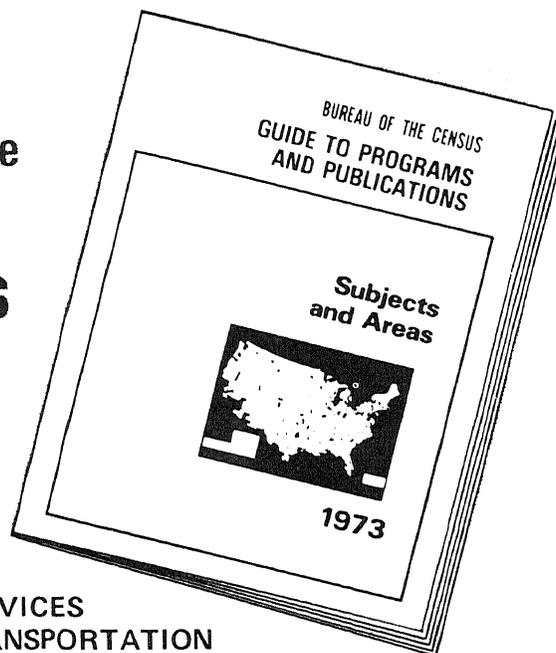
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# Industrial Gases



U.S. Department of Commerce  
BUREAU OF THE CENSUS

MAY 1979

M28C(79)-5  
Issued July 1979

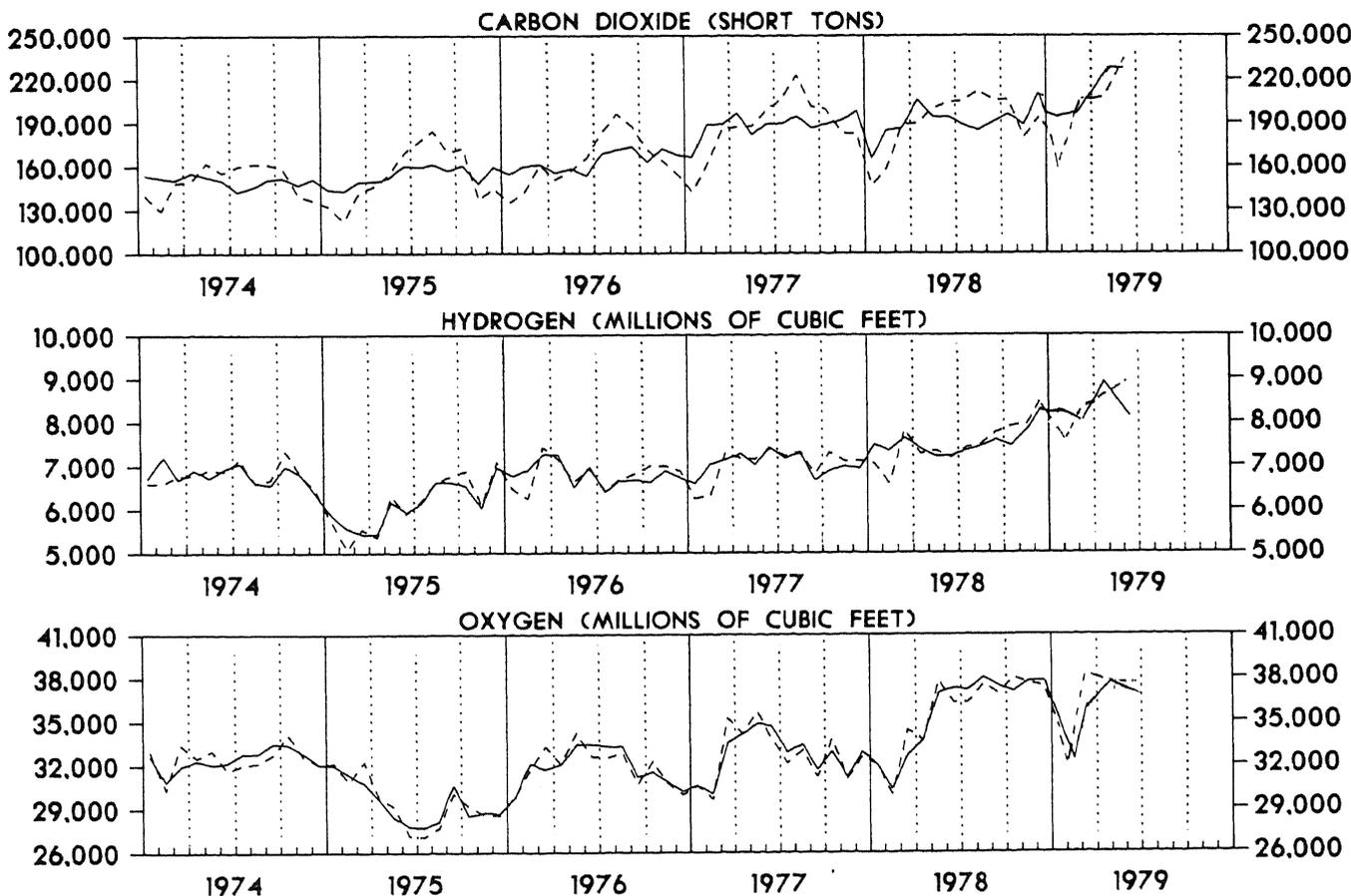
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not received in time for tabulation. A more complete description of this survey appears on page 4.

THIS REPORT INCLUDES DATA COMPARING DOMESTIC OUTPUT, EXPORTS, AND IMPORTS

## PRODUCTION OF SELECTED INDUSTRIAL GASES 1974 TO 1979

———— Seasonally Adjusted  
- - - - - Not Seasonally Adjusted



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Table 1A. SUMMARY OF PRODUCTION OF PRINCIPAL GASES, SEASONALLY ADJUSTED: 1977 TO 1979

Month and year	Acetylene (28132 00) (mil. cu. ft.)	Carbon dioxide (28133 11) and (28133 31) (short tons)	Hydrogen, high and low purity (100%) (28134 20) (mil. cu. ft.)	Nitrogen, high and low purity (100%) (28134 40) (mil. cu. ft.)	Oxygen, high and low purity (100%) (28134 50) (mil. cu. ft.)
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April.....	453	223,535	8,782	32,587	36,206
March.....	418	221,932	8,093	34,157	36,532
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April.....	461	196,381	7,282	25,873	34,152
March.....	563	188,672	7,145	25,500	33,531
February.....	565	188,669	7,041	25,150	30,029
January.....	600	166,293	6,601	24,413	30,603

Table 1B. SUMMARY OF PRODUCTION OF PRINCIPAL GASES, NOT SEASONALLY ADJUSTED: 1977 TO 1979

Month and year	Acetylene (28132 00) (mil. cu. ft.)	Carbon dioxide, liquid and gas (28133 11) (short tons)	Carbon dioxide, solid (28134 31) (short tons)	Hydrogen, high and low purity (100%) (28134 20) (mil. cu. ft.)	Nitrogen, high and low purity (100%) (28134 40) (mil. cu. ft.)	Oxygen, high and low purity (100%) (28134 50) (mil. cu. ft.)
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March.....	400	198,840	25,977	8,279	35,318	38,432
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August.....	452	176,925	34,956	7,480	35,973	37,565
July.....	402	170,123	34,829	7,394	31,879	36,295
June.....	449	168,412	35,315	7,186	32,273	36,298
May.....	434	173,090	26,629	7,342	33,235	37,805
April.....	450	167,089	22,528	7,269	31,776	33,694
March.....	422	166,213	22,325	7,810	33,498	34,408
February.....	413	139,149	18,849	6,591	28,902	30,001
January.....	431	123,760	22,922	7,041	31,853	32,012
1977						
December.....	454	157,327	24,706	7,107	30,147	32,606
November.....	456	156,996	25,645	7,098	29,210	31,033
October.....	463	171,012	28,013	7,309	29,508	33,798
September.....	472	170,325	30,685	6,815	29,236	31,222
August.....	515	186,235	36,436	7,326	28,731	33,029
July.....	463	171,711	34,076	7,223	27,379	32,142
June.....	515	166,837	31,827	7,383	29,700	33,776
May.....	550	159,609	28,062	7,149	27,157	35,679
April.....	432	161,420	25,535	7,165	25,614	34,152
March.....	544	158,964	27,067	7,309	26,393	35,275
February.....	537	137,876	23,436	6,330	23,691	29,669
January.....	571	119,718	22,296	6,245	24,779	30,603

Table 2. PRIMARY PRODUCTION (QUANTITY) OF SPECIFIED INDUSTRIAL GASES

Product code	Chemical and basis	Unit of measure	May 1979	April 1979	May 1978
28132 00	Acetylene <sup>1</sup> .....	Mil. cu. ft....	443	<sup>r</sup> 421	434
	Produced for compression, including cylinder and pipeline.....	..do.....	141	<sup>r</sup> 129	129
	Produced for pipeline shipment (excluding that shipped to be compressed) and for consumption in this plant.....	..do.....	302	292	305
28134 15	Argon, high purity: Produced for cylinder and bulk delivery and pipeline shipments, and for consumption in this plant.....	..do.....	725	687	612
28133 11	Carbon dioxide: Liquid and gas <sup>2</sup> .....	S. tons.....	202,397	184,688	173,090
28133 31	Solid (dry ice).....	..do.....	29,938	21,188	26,629
28134 20	Hydrogen, total <sup>3</sup> .....	Mil. cu. ft....	8,087	8,633	7,342
	Liquid and gas: Produced for cylinder and bulk shipment, and liquid produced for conversion to gas.....	..do.....	1,076	1,089	901
	Produced for pipeline and government use.....	..do.....	2,509	2,728	2,103
	Produced for consumption in this plant.....	..do.....	4,502	4,816	4,338
28134 40	Nitrogen, total <sup>4</sup> .....	..do.....	33,980	32,000	33,235
	Gas: Produced for pipeline shipment.....	..do.....	20,087	18,973	19,618
	Liquid: Produced for bulk delivery shipment to pipeline or to air separation plants.....	..do.....	1,010	<sup>r</sup> 922	921
	Liquid and gas: Produced for cylinder and bulk delivery shipment.....	..do.....	8,502	7,720	7,760
	Produced for consumption in this plant.....	..do.....	4,381	<sup>r</sup> 4,385	4,936
28134 50	Oxygen, total.....	..do.....	37,476	36,206	37,805
	Gas: Produced for pipeline shipments.....	..do.....	26,053	25,250	26,095
	Liquid: Produced for bulk delivery shipment to pipelines or to other air separation plants.....	..do.....	1,154	<sup>r</sup> 941	1,175
	Liquid and gas: Produced for cylinder and bulk delivery shipment.....	..do.....	5,418	5,554	6,161
	Produced for consumption in this plant.....	..do.....	4,851	4,461	4,374

<sup>r</sup>Revised by 5 percent or more from previously published figures.

<sup>1</sup>Excludes quantities of acetylene produced and consumed by railroad shops, shipyards, and small establishments using portable generators.

<sup>2</sup>Excludes production of liquid and gas CO<sub>2</sub> converted to and reported as dry ice and also amounts converted from pure CO<sub>2</sub> (liquid or solid) purchased or received from other plants. Also excludes quantities produced and consumed in plants manufacturing soda ash or urea.

<sup>3</sup>Excludes quantities produced and consumed in the manufacture of methanol and ammonia, but includes an unspecified amount of hydrogen produced for sale or interplant transfer to plants consuming this gas in the production of ammonia. Also excludes amounts of hydrogen produced in petroleum refineries for captive use. However, of the total shown for lower purity hydrogen prior to 1969, 70 to 75 percent was accounted for by petroleum refineries with captive hydrogen production. Not all such petroleum refineries were canvassed in this survey.

<sup>4</sup>Excludes amounts produced and used in the manufacture of ammonia and ammonia derivatives.

Table 3. PRODUCTION AND EXPORTS OF NITROGEN: APRIL 1979

Product code	Product	Quantity produced (m.c.f.)	Exports of domestic merchandise (m.c.f.)	Percent of exports to production
28134 40	Nitrogen.....	32,000	975	3.0

Note: Detailed export data for industrial gases, other than nitrogen are not available separately. Import data for industrial gases are included in "Chemical Elements, not specially provided for," and are not separately identified.

Comparison of Standard Industrial Classification Codes and Schedule B Export Codes:

Domestic output	Exports
28134 40	415.2600

## DESCRIPTION OF SURVEY

*Scope of Survey*—This survey covers firms engaged in the manufacture of industrial gases. Excluded from this survey are industrial gases vented or used for fuel by the producer.

*Survey Description*—The statistics in this publication were collected on Bureau of the Census monthly reporting Form M28A.2, **Production of Industrial Gases**. The mailing panel for this survey consisted of all known producers of industrial gases, approximately 670 producers of elemental gases, carbon dioxide, and acetylene.

*Survey Error*—Figures for the current month include estimates for respondents whose reports were not received in time for tabulation. Such missing figures are "imputed" from month-to-month movements shown by reporting firms and are generally limited to a maximum of 25 percent for any one item. Individual items with imputation greater than 25 percent are footnoted.

The imputation rate is not an explicit indicator of the potential error in published figures due to nonresponse, because the actual monthly movements for nonrespondents may or may not closely agree with the imputed movements. The probable range of difference between the actual and imputed figures is unknown. The degree of uncertainty regarding the accuracy of the data, however, increases as the percentage of imputation increases. Figures with imputation rates above 25 percent should be used with caution.

*Revision to Previous Period Data*—Statistics for previous months may be revised due to receipt of corrected data from respondents, including late reports for which imputations were previously made as described above, and other corrections. Figures which have been revised by more than 5 percent from previously published figures are indicated by footnotes.

*Reporting Period Adjustment*—Since January 1975, the data have been adjusted for number of working days in the reporting period in order to compensate for differences in individual company reporting patterns, i.e., calendar month, 4-week, 5-week periods. Since the calendar month accounting system prevails in this industry, adjustments have been made to those reporting on other than a calendar month basis.

*Seasonal Adjustment*—This report presents seasonally adjusted data in table 1A for selected series shown in table 1B. The data were seasonally adjusted using the X-11 variant of the Bureau of the Census Method II seasonal adjustment program. This program is a ratio-to-moving average method. It largely eliminates the effect of seasonal variations (intra-year variations repeated constantly from year to year) within the series. The seasonally adjusted data provide a better measure of the month-to-month variations which are due to factors other than seasonal pattern. Additional information concerning seasonal adjustment is available in the seasonal adjustment supplement issued in this series.

## EXPLANATION OF TERMS

*Production*—Data shown for production represent total quantity of each chemical produced, including quantity consumed in plants, and for sale or transfer to other plants or warehouses of the same company. The statistics presented in the tables provide an up-to-date measure of activity in the inorganic field, but do not necessarily indicate amounts entering the market. In some cases, figures are included for material produced "in process" as an intermediate to the end products.

## COMPARISON OF EXPORT, IMPORT, AND DOMESTIC OUTPUT DATA

The Standard Industrial Classification (SIC) system used for domestic output and the statistical export and import commodity classifications were developed independently and are based on somewhat differing systems of classification. This results in considerable difficulty in comparing the three types of data for many commodity areas. The domestic output classification is based on type of industry; whereas, the export and import classification system is more materials oriented. Aside from the differences in the basic commodity classifications, there are additional problems involving import data, since there are a substantial number of imported commodities, which are not produced in the United States or which are produced only in very small quantities and which, therefore, have no comparable domestic output classification. The relationships shown in this report should be considered only as approximations, since, in addition to those mentioned above, there are also the following problems affecting the comparability of the three sets of data:

(a) *Valuation*—There are different methods of valuation for the three types of data.

*Domestic Output*—Valued at the point of production. It includes the net sales price, f.o.b. plant, after discounts and allowances, exclusive of freight charges and excise taxes.

*Exports*—Valued at the point of exportation. It includes the selling price, or cost if not sold, and inland freight, insurance, and other charges to the export point.

*Imports*—Valued at the first port of entry in the United States. It includes c. i. f. (cost, insurance, and freight), duty, and other charges to the import point.

(b) *Duplication in Quantity and Value of Output*—Because producers' shipments of some commodities may be used as materials for incorporation into other commodities, combinations of data for such commodities may contain a certain amount of duplication. Thus, percentages of exports to output or imports to apparent consumption (output plus imports minus exports) at four-digit or broader levels may be understated. Where duplication is known to be substantial, the output data are appropriately noted in the table.

(c) *Low-Valued Export and Import Transactions*—Commodity information is not shown for individual imports valued under \$251. For exports, commodity information is not reported for shipments individually valued under \$251 effective October 1969 and for shipments valued under \$100 prior to October 1969. This is believed to have only negligible effect on the statistics for most commodities.

(d) *Manufacturers' Shipments, Not Specified by Kind*—The value of manufacturers' shipments at the four-digit industry level often includes a small amount which is not distributed among the individual five-digit product classes. Export and import percentages at the more detailed levels might, therefore, be slightly overstated.

(e) *Time Lag Between Output and Exports*—There will be a lag between the time a commodity is produced or shipped by the producer and the time it is actually exported, especially when intermediaries (wholesalers, exporters, etc.) are involved. Ordinarily, this type of discrepancy is insignificant in annual figures.

(f) *"Direct" vs "Total" Commodity Export and Imports*—Export and import data do not include materials which are incorporated into other more finished products and exported or imported in finished form. Thus, by showing only direct exports and imports, the relation of exports to output and imports to apparent consumption for intermediate products is considerably understated.

(g) *Used Commodities*—With a few exceptions, used or rebuilt commodities are classified in the same import or export codes as is new merchandise. Percentages are thus overstated to the extent that used or rebuilt products are significant in trade.

#### RELATIONSHIP BETWEEN M28C AND M28C-14 SERIES FOR INDUSTRIAL GASES

The data as shown in table 1 reflect levels of production as reported by establishments on monthly Form M28A.2. These data are revised in the annual publication collected on Form MA-28E.2 and are shown in table 9 of the annual report M28C-14. The actual data reported by establishments canvassed on the annual differ by varying amounts from those collected monthly due to receipt of revised data from the respondent and establishments reporting on the annual and not on the monthly. For these reasons, the monthly and annual data comprise two separate series and should be used as such for analytical purposes. Specifically, the monthly data should be useful in describing month-to-month changes while the annual data provide a better indication of the level of production.

Revisions to the 1976 monthly series based on findings from the 1976 annual will be forthcoming as soon as research into the differences are resolved.

#### RELATED REPORTS

An annual Current Industrial Report is published in this series. The annual report summarizes monthly figures and incorporates all known revisions in the series for both current and previous year, thus providing a single reference copy to replace the monthly publications. This annual summary provides additional information on the history of this survey.

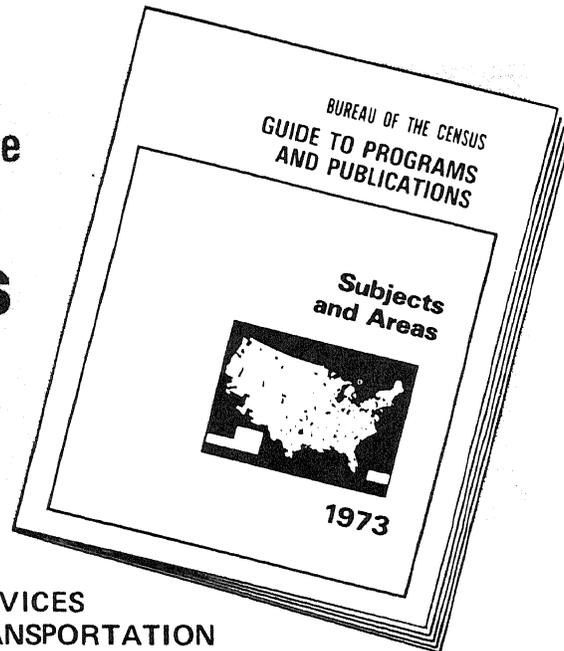
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M28A	Monthly	Inorganic Chemicals
M28B	Monthly	Inorganic Fertilizer Materials
<i>Foreign Trade Reports</i>		
FT-410	Monthly	U.S. Exports
FT-135	Monthly	U.S. General Imports

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Foreign Trade publications	Juanita Noone	(301) 763-5140
Bureau of Domestic Business Development	David H. Blank	(202) 377-5496
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U.S. Department of Commerce  
BUREAU OF THE CENSUS

JUNE 1979

M28C(79)-6  
Issued August 1979

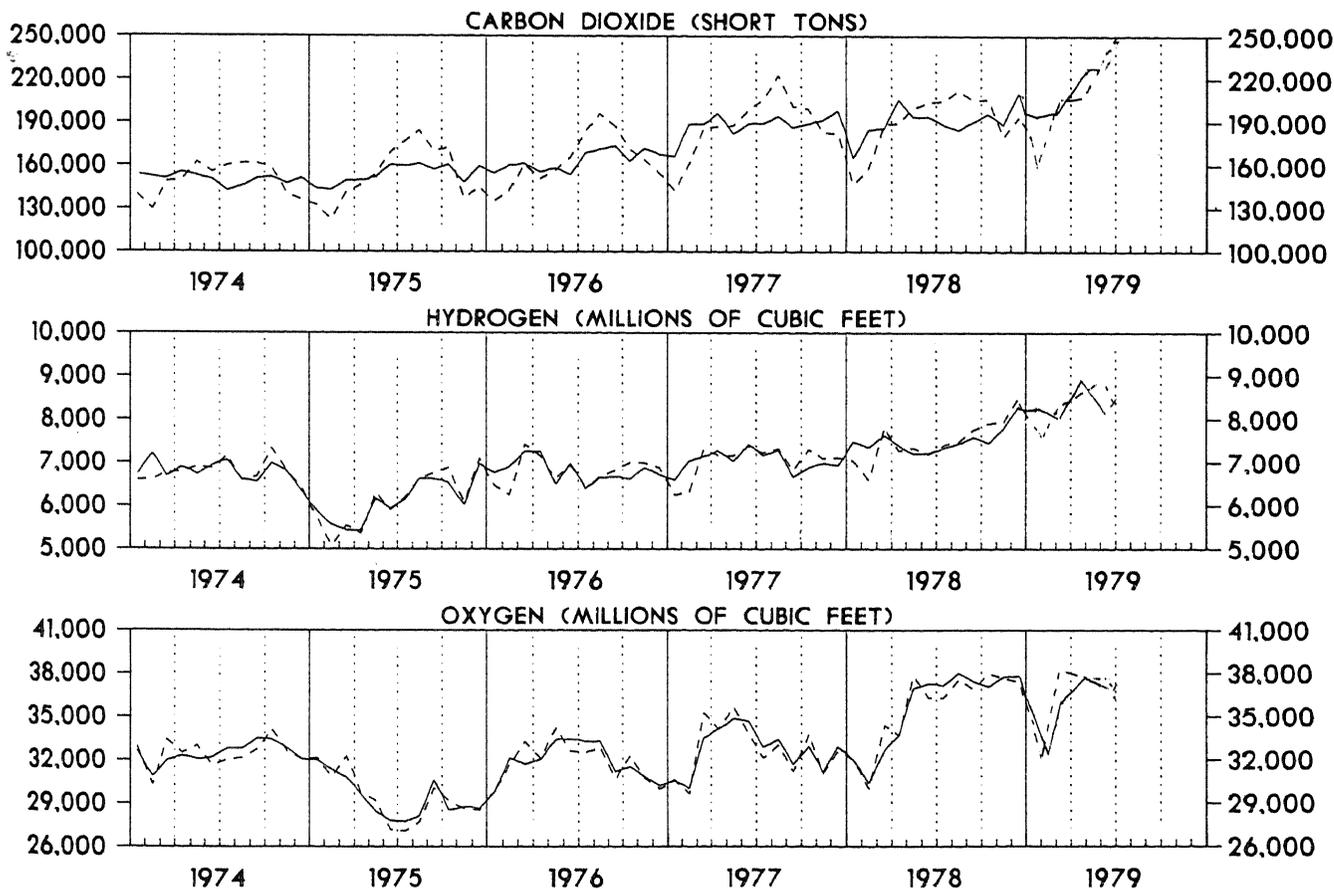
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May.....	434	173,090	26,629	7,342	33,235	37,805
April.....	450	167,089	22,528	7,269	31,776	33,694
March.....	422	166,213	22,325	7,810	33,498	34,408
February.....	413	139,149	18,849	6,591	28,902	30,001
January.....	431	123,760	22,922	7,041	31,853	32,012
1977						
December.....	454	157,327	24,706	7,107	30,147	32,606
November.....	456	156,996	25,645	7,098	29,210	31,033
October.....	463	171,012	28,013	7,309	29,508	33,798
September.....	472	170,325	30,685	6,815	29,236	31,222
August.....	515	186,235	36,436	7,326	28,731	33,029
July.....	463	171,711	34,076	7,223	27,379	32,142
June.....	515	166,837	31,827	7,383	29,700	33,776
May.....	550	159,609	28,062	7,149	27,157	35,679
April.....	432	161,420	25,535	7,165	25,614	34,152
March.....	544	148,964	27,067	7,309	26,393	35,275
February.....	537	137,876	23,436	6,330	23,691	29,669

Table 2. PRIMARY PRODUCTION (QUANTITY) OF SPECIFIED INDUSTRIAL GASES

Product code	Chemical and basis	Unit of measure	June 1979	May 1979	June 1978
28132 00	Acetylene <sup>1</sup> .....	Mil. cu. ft....	431	444	449
	Produced for compression, including cylinder and pipeline.....	..do.....	126	142	109
	Produced for pipeline shipment (excluding that shipped to be compressed) and for consumption in this plant.....	..do.....	305	302	340
28134 15	Argon, high purity: Produced for cylinder and bulk delivery and pipeline shipments, and for consumption in this plant.....	..do.....	667	736	590
28133 11	Carbon dioxide: Liquid and gas <sup>2</sup> .....	S. tons.....	250,269	199,691	168,412
28133 31	Solid (dry ice).....	..do.....	32,617	29,999	35,315
28134 20	Hydrogen, total <sup>3</sup> .....	Mil. cu. ft....	8,100	8,087	7,186
	Liquid and gas: Produced for cylinder and bulk shipment, and liquid produced for conversion to gas.....	..do.....	1,105	1,074	823
	Produced for pipeline and government use.....	..do.....	2,687	2,511	2,043
	Produced for consumption in this plant.....	..do.....	4,308	4,502	4,320
28134 40	Nitrogen, total <sup>4</sup> .....	..do.....	32,446	34,166	32,273
	Gas: Produced for pipeline shipment.....	..do.....	19,619	20,216	19,145
	Liquid: Produced for bulk delivery shipment to pipeline or to air separation plants.....	..do.....	920	1,054	958
	Liquid and gas: Produced for cylinder and bulk delivery shipments.....	..do.....	7,953	8,516	7,678
	Produced for consumption in this plant.....	..do.....	3,954	4,380	4,492
28134 50	Oxygen, total.....	..do.....	35,660	37,565	36,298
	Gas: Produced for pipeline shipments.....	..do.....	24,827	26,270	25,579
	Liquid: Produced for bulk delivery shipment to pipeline or to other air separation plants.....	..do.....	1,135	1,170	1,012
	Liquid and gas: Produced for cylinder and bulk delivery shipment.....	..do.....	5,280	5,416	5,559
	Produced for consumption in this plant.....	..do.....	4,418	4,709	4,148

<sup>1</sup>Excludes quantities of acetylene produced and consumed by railroad shops, shipyards, and small establishments using portable generators.

<sup>2</sup>Excludes production of liquid and gas CO<sub>2</sub> converted to and reported as dry ice and also amounts converted from pure CO<sub>2</sub> (liquid or solid) purchased or received from other plants. Also excludes quantities produced and consumed in plants manufacturing soda ash or urea.

<sup>3</sup>Excludes quantities produced and consumed in the manufacture of methanol and ammonia, but includes an unspecified amount of hydrogen produced for sale or interplant transfer to plants consuming this gas in the production of ammonia. Also excludes amounts of hydrogen produced in petroleum refineries for captive use. However, of the total shown for lower purity hydrogen prior to 1969, 70 to 75 percent was accounted for by petroleum refineries with captive hydrogen production. Not all such petroleum refineries were canvassed in this survey.

<sup>4</sup>Excludes amounts produced and used in the manufacture of ammonia and ammonia derivatives.

Table 3. PRODUCTION AND EXPORTS OF NITROGEN: MAY 1979

Product code	Product	Quantity produced (m.c.f.)	Exports of domestic merchandise (m.c.f.)	Percent of exports to production
28134 40	Nitrogen.....	34,166	706	2.1

Note: Detailed export data for industrial gases, other than nitrogen are not available separately. Import data for industrial gases are included in "Chemical Elements, not specially provided for," and are not separately identified.

Comparison of Standard Industrial Classification Codes and Schedule B Export Codes:

Domestic output	Exports
28134 40	415.2600

## DESCRIPTION OF SURVEY

*Scope of Survey*—This survey covers firms engaged in the manufacture of industrial gases. Excluded from this survey are industrial gases vented or used for fuel by the producer.

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*Seasonal Adjustment*—This report presents seasonally adjusted data in table 1A for selected series shown in table 1B. The data were seasonally adjusted using the X-11 variant of the Bureau of the Census Method II seasonal adjustment program. This program is a ratio-to-moving average method. It largely eliminates the effect of seasonal variations (intra-year variations repeated constantly from year to year) within the series. The seasonally adjusted data provide a better measure of the month-to-month variations which are due to factors other than seasonal pattern. Additional information concerning seasonal adjustment is available in the seasonal adjustment supplement issued in this series.

## EXPLANATION OF TERMS

*Production*—Data shown for production represent total quantity of each chemical produced, including quantity consumed in plants, and for sale or transfer to other plants or warehouses of the same company. The statistics presented in the tables provide an up-to-date measure of activity in the inorganic field, but do not necessarily indicate amounts entering the market. In some cases, figures are included for material produced "in process" as an intermediate to the end products.

## COMPARISON OF EXPORT, IMPORT, AND DOMESTIC OUTPUT DATA

The Standard Industrial Classification (SIC) system used for domestic output and the statistical export and import commodity classifications were developed independently and are based on somewhat differing systems of classification. This results in considerable difficulty in comparing the three types of data for many commodity areas. The domestic output classification is based on type of industry; whereas, the export and import classification system is more materials oriented. Aside from the differences in the basic commodity classifications, there are additional problems involving import data, since there are a substantial number of imported commodities, which are not produced in the United States or which are produced only in very small quantities and which, therefore, have no comparable domestic output classification. The relationships shown in this report should be considered only as approximations, since, in addition to those mentioned above, there are also the following problems affecting the comparability of the three sets of data:

(a) *Valuation*—There are different methods of valuation for the three types of data.

*Domestic Output*—Valued at the point of production. It includes the net sales price, f.o.b. plant, after discounts and allowances, exclusive of freight charges and excise taxes.

*Exports*—Valued at the point of exportation. It includes the selling price, or cost if not sold, and inland freight, insurance, and other charges to the export point.

*Imports*—Valued at the first port of entry in the United States. It includes c. i. f. (cost, insurance, and freight), duty, and other charges to the import point.

(b) *Duplication in Quantity and Value of Output*—Because producers' shipments of some commodities may be used as materials for incorporation into other commodities, combinations of data for such commodities may contain a certain amount of duplication. Thus, percentages of exports to output or imports to apparent consumption (output plus imports minus exports) at four-digit or broader levels may be understated. Where duplication is known to be substantial, the output data are appropriately noted in the table.

(c) *Low-Valued Export and Import Transactions*—Commodity information is not shown for individual imports valued under \$251. For exports, commodity information is not reported for shipments individually valued under \$251 effective October 1969 and for shipments valued under \$100 prior to October 1969. This is believed to have only negligible effect on the statistics for most commodities.

(d) *Manufacturers' Shipments, Not Specified by Kind*—The value of manufacturers' shipments at the four-digit industry level often includes a small amount which is not distributed among the individual five-digit product classes. Export and import percentages at the more detailed levels might, therefore, be slightly overstated.

(e) *Time Lag Between Output and Exports*—There will be a lag between the time a commodity is produced or shipped by the producer and the time it is actually exported, especially when intermediaries (wholesalers, exporters, etc.) are involved. Ordinarily, this type of discrepancy is insignificant in annual figures.

(f) *"Direct" vs "Total" Commodity Export and Imports*—Export and import data do not include materials which are incorporated into other more finished products and exported or imported in finished form. Thus, by showing only direct exports and imports, the relation of exports to output and imports to apparent consumption for intermediate products is considerably understated.

(g) *Used Commodities*—With a few exceptions, used or rebuilt commodities are classified in the same import or export codes as is new merchandise. Percentages are thus overstated to the extent that used or rebuilt products are significant in trade.

#### RELATIONSHIP BETWEEN M28C AND M28C-14 SERIES FOR INDUSTRIAL GASES

The data as shown in table 1 reflect levels of production as reported by establishments on monthly Form M28A.2. These data are revised in the annual publication collected on Form MA-28E.2 and are shown in table 9 of the annual report M28C-14. The actual data reported by establishments canvassed on the annual differ by varying amounts from those collected monthly due to receipt of revised data from the respondent and establishments reporting on the annual and not on the monthly. For these reasons, the monthly and annual data comprise two separate series and should be used as such for analytical purposes. Specifically, the monthly data should be useful in describing month-to-month changes while the annual data provide a better indication of the level of production.

Revisions to the 1976 monthly series based on findings from the 1976 annual will be forthcoming as soon as research into the differences are resolved.

#### RELATED REPORTS

An annual Current Industrial Report is published in this series. The annual report summarizes monthly figures and incorporates all known revisions in the series for both current and previous year, thus providing a single reference copy to replace the monthly publications. This annual summary provides additional information on the history of this survey.

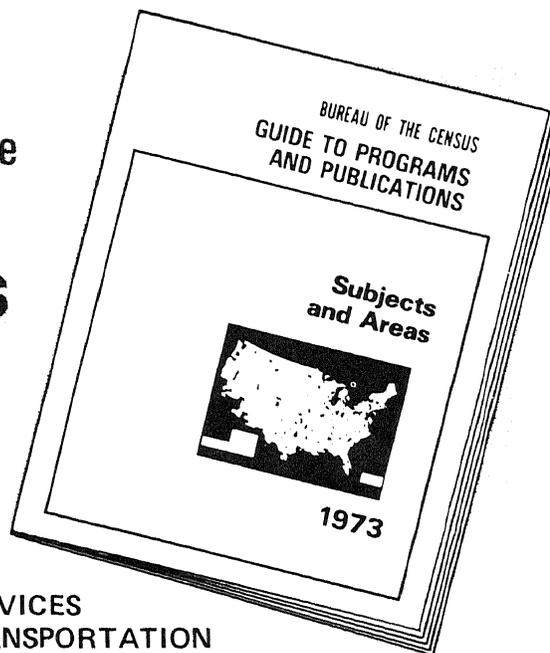
The Bureau of the Census also publishes reports on other related products as follows:

Series	Frequency	Title
<i>Current Industrial Reports</i>		
M3-1	Monthly	Manufacturers' Shipments, Inventories, and Orders
M28A	Monthly	Inorganic Chemicals
M28B	Monthly	Inorganic Fertilizer Materials
<i>Foreign Trade Reports</i>		
FT-410	Monthly	U.S. Exports
FT-135	Monthly	U.S. General Imports

#### CONTACTS FOR DATA USERS

Subject Area	Contact	Phone Number
Current Industrial Report M28C	Geoff Embrey	(301) 763-7837
Foreign Trade publications	Juanita Noone	(301) 763-5140
Bureau of Domestic Business Development	David H. Blank	(202) 377-5496
To order a Census Bureau publication	Daisy Williams	(301) 763-7472
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# Industrial Gases



U.S. Department of Commerce  
BUREAU OF THE CENSUS

JULY 1979

M28C(79)-7  
Issued September 1979

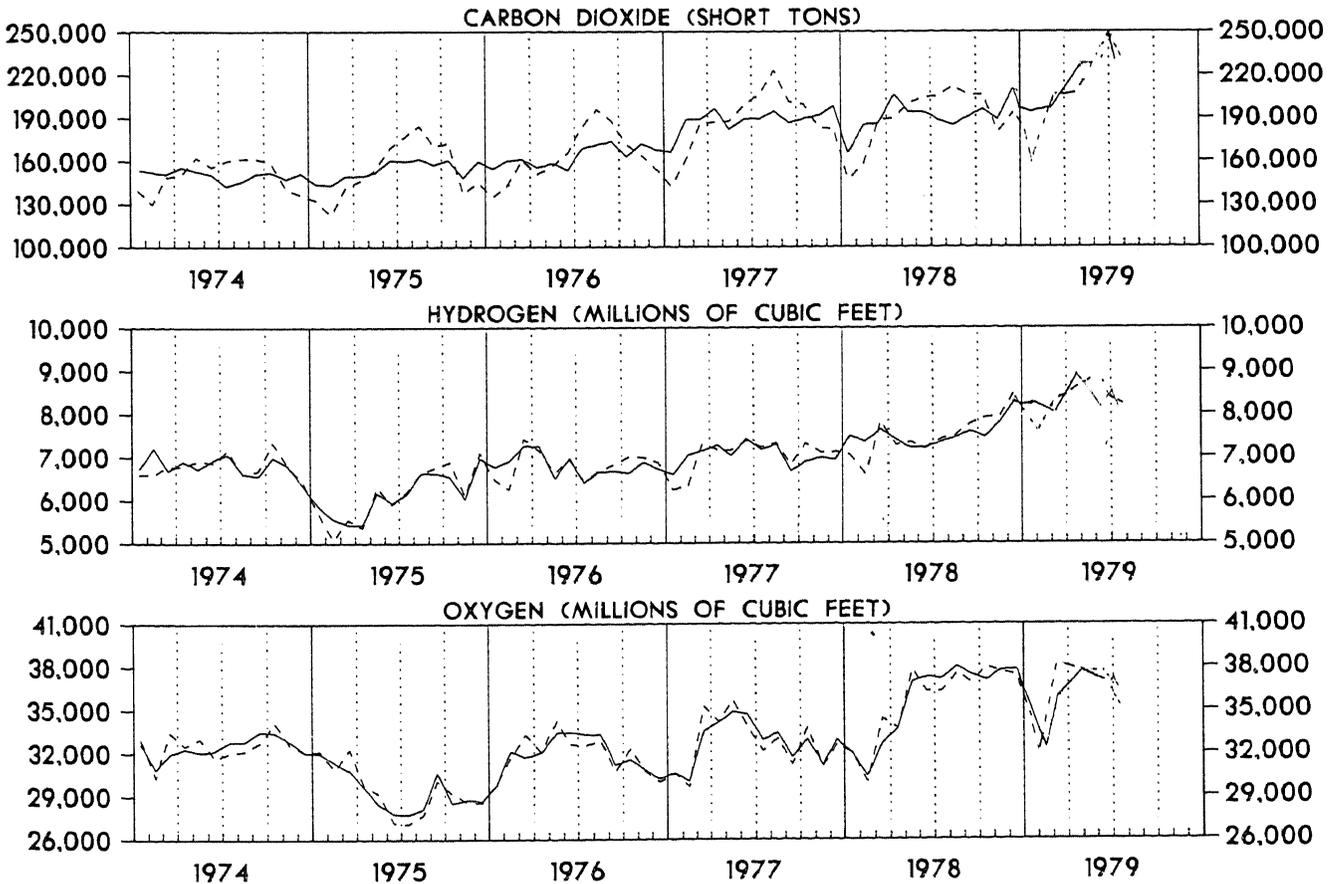
The statistics in this publication are based on a survey of manufacturers and represent total U.S. production of industrial gases. Estimates are included for companies whose reports were

not received in time for tabulation. A more complete description of this survey appears on page 4.

THIS REPORT INCLUDES DATA COMPARING DOMESTIC OUTPUT, EXPORTS, AND IMPORTS

## PRODUCTION OF SELECTED INDUSTRIAL GASES 1974 TO 1979

— Seasonally Adjusted  
- - - Not Seasonally Adjusted



Address inquiries concerning these figures to U.S. Department of Commerce, Bureau of the Census, Industry Division, Washington, D.C. 20233, or call Geoff Embrey, (301) 763-7837.

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Table 1A. SUMMARY OF PRODUCTION OF PRINCIPAL GASES, SEASONALLY ADJUSTED: 1977 TO 1979

Month and year	Acetylene (28132 00) (mil. cu. ft.)	Carbon dioxide (28133 11) and (28133 31) (short tons)	Hydrogen, high and low purity (100%) (28134 20) (mil. cu. ft.)	Nitrogen, high and low purity (100%) (28134 40) (mil. cu. ft.)	Oxygen, high and low purity (100%) (28134 50) (mil. cu. ft.)
1979					
July.....	435	229,267	8,095	33,303	36,151
June.....	433	269,474	7,970	34,170	37,136
May.....	447	222,784	7,944	33,628	33,628
April.....	453	223,535	8,782	32,587	36,206
March.....	418	221,932	8,093	34,157	36,532
February.....	384	183,119	8,000	32,408	31,945
January.....	439	188,215	7,859	34,847	34,291
1978					
December.....	440	209,947	8,301	31,807	37,799
November.....	451	188,495	7,796	33,739	37,756
October.....	454	195,757	7,451	33,848	37,089
September.....	385	190,384	7,595	32,588	37,466
August.....	435	184,887	7,443	34,959	38,021
July.....	420	188,375	7,335	32,039	37,149
June.....	451	194,026	7,229	33,340	37,267
May.....	437	193,714	7,212	32,712	36,955
April.....	485	205,882	7,395	32,358	33,694
March.....	441	186,118	7,634	32,397	32,707
February.....	435	184,793	7,348	30,682	30,365
January.....	443	165,369	7,482	31,259	32,012
1977					
December.....	439	197,862	6,934	30,421	32,935
November.....	433	191,648	6,979	29,715	31,158
October.....	450	189,187	6,889	28,845	32,974
September.....	438	186,293	6,668	29,178	31,697
August.....	495	194,303	7,290	27,921	33,430
July.....	484	189,142	7,166	27,517	32,899
June.....	518	189,204	7,428	30,682	34,678
May.....	554	181,852	7,023	26,729	34,877
April.....	461	196,381	7,282	25,873	34,152
March.....	563	188,672	7,145	25,500	33,531

Table 1B. SUMMARY OF PRODUCTION OF PRINCIPAL GASES, NOT SEASONALLY ADJUSTED: 1977 TO 1979

Month and year	Acetylene (28132 00) (mil. cu. ft.)	Carbon dioxide, liquid and gas (28133 11) (short tons)	Carbon dioxide, solid (28134 31) (short tons)	Hydrogen, high and low purity (100%) (28134 20) (mil. cu. ft.)	Nitrogen, high and low purity (100%) (28134 40) (mil. cu. ft.)	Oxygen, high and low purity (100%) (28134 50) (mil. cu. ft.)
1979						
July.....	416	211,804	37,638	8,160	33,136	35,320
June.....	431	250,311	32,637	7,922	33,077	36,170
May.....	444	199,691	29,999	8,087	34,166	37,565
April.....	421	184,688	21,188	8,633	32,000	36,206
March.....	400	198,840	25,977	8,279	35,318	38,432
February.....	364	136,340	20,227	7,176	30,528	31,562
January.....	428	147,223	19,724	7,395	35,509	34,291
1978						
December.....	455	169,905	23,247	8,509	31,521	37,421
November.....	475	154,709	24,926	7,929	33,165	37,605
October.....	468	179,266	26,670	7,906	34,627	38,016
September.....	415	174,747	30,677	7,762	32,653	36,904
August.....	452	176,925	34,956	7,480	35,973	37,563
July.....	402	170,123	34,829	7,394	31,879	36,295
June.....	449	168,412	35,315	7,186	32,273	36,298
May.....	434	173,090	26,629	7,342	33,235	37,805
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Product code	Chemical and basis	Unit of measure	July 1979	June 1979	July 1978
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	Produced for compression, including cylinder and pipeline.....	..do.....	121	127	99
	Produced for pipeline shipment (excluding that shipped to be compressed) and for consumption in this plant.....	..do.....	295	304	303
28134 15	Argon, high purity: Produced for cylinder and bulk delivery and pipeline shipments, and for consumption in this plant.....	..do.....	652	667	560
28133 11	Carbon dioxide: Liquid and gas <sup>2</sup> .....	S. tons.....	211,804	250,311	170,123
28133 31	Solid (dry ice).....	..do.....	37,638	32,637	34,829
28134 20	Hydrogen, total <sup>3</sup> .....	Mil. cu. ft....	8,160	7,922	7,394
	Liquid and gas: Produced for cylinder and bulk shipment, and liquid produced for conversion to gas.....	..do.....	848	1,105	758
	Produced for pipeline and government use.....	..do.....	2,605	2,687	1,992
	Produced for consumption in this plant.....	..do.....	4,707	4,130	4,644
28134 40	Nitrogen, total <sup>4</sup> .....	..do.....	33,136	33,077	31,879
	Gas: Produced for pipeline shipment.....	..do.....	20,938	20,802	19,416
	Liquid: Produced for bulk delivery shipment to pipeline or to air separation plants.....	..do.....	771	925	1,358
	Liquid and gas: Produced for cylinder and bulk delivery shipment.....	..do.....	8,337	7,984	7,367
	Produced for consumption in this plant.....	..do.....	3,090	3,366	3,738
28134 50	Oxygen, total.....	..do.....	35,320	36,170	36,295
	Gas: Produced for pipeline shipments.....	..do.....	25,007	25,309	25,912
	Liquid: Produced for bulk delivery shipment to pipelines or to other air separation plants.....	..do.....	1,166	1,137	1,369
	Liquid and gas: Produced for cylinder and bulk delivery shipment.....	..do.....	5,157	5,307	5,011
	Produced for consumption in this plant.....	..do.....	3,990	4,417	4,003

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<sup>2</sup>Excludes production of liquid and gas CO<sub>2</sub> converted to and reported as dry ice and also amounts converted from pure CO<sub>2</sub> (liquid or solid) purchased or received from other plants. Also excludes quantities produced and consumed in plants manufacturing soda ash or urea.

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<sup>4</sup>Excludes amounts produced and used in the manufacture of ammonia and ammonia derivatives.

Table 3. PRODUCTION AND EXPORTS OF NITROGEN: JUNE 1979

Product code	Product	Quantity produced (m.c.f.)	Exports of domestic merchandise (m.c.f.)	Percent of exports to production
28134 40	Nitrogen.....	33,077	474	1.4

Note: Detailed export data for industrial gases, other than nitrogen are not available separately. Import data for industrial gases are included in "Chemical elements, not specially provided for," and are not separately identified.

Comparison of Standard Industrial Classification Codes and Schedule B Export Codes:

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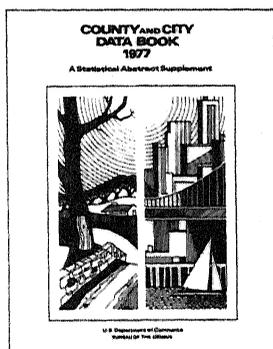
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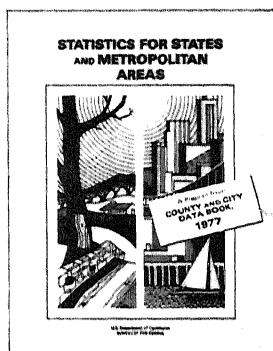
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# Industrial Gases



U.S. Department of Commerce  
BUREAU OF THE CENSUS

AUGUST 1979

M28C(79)-8  
Issued October 1979

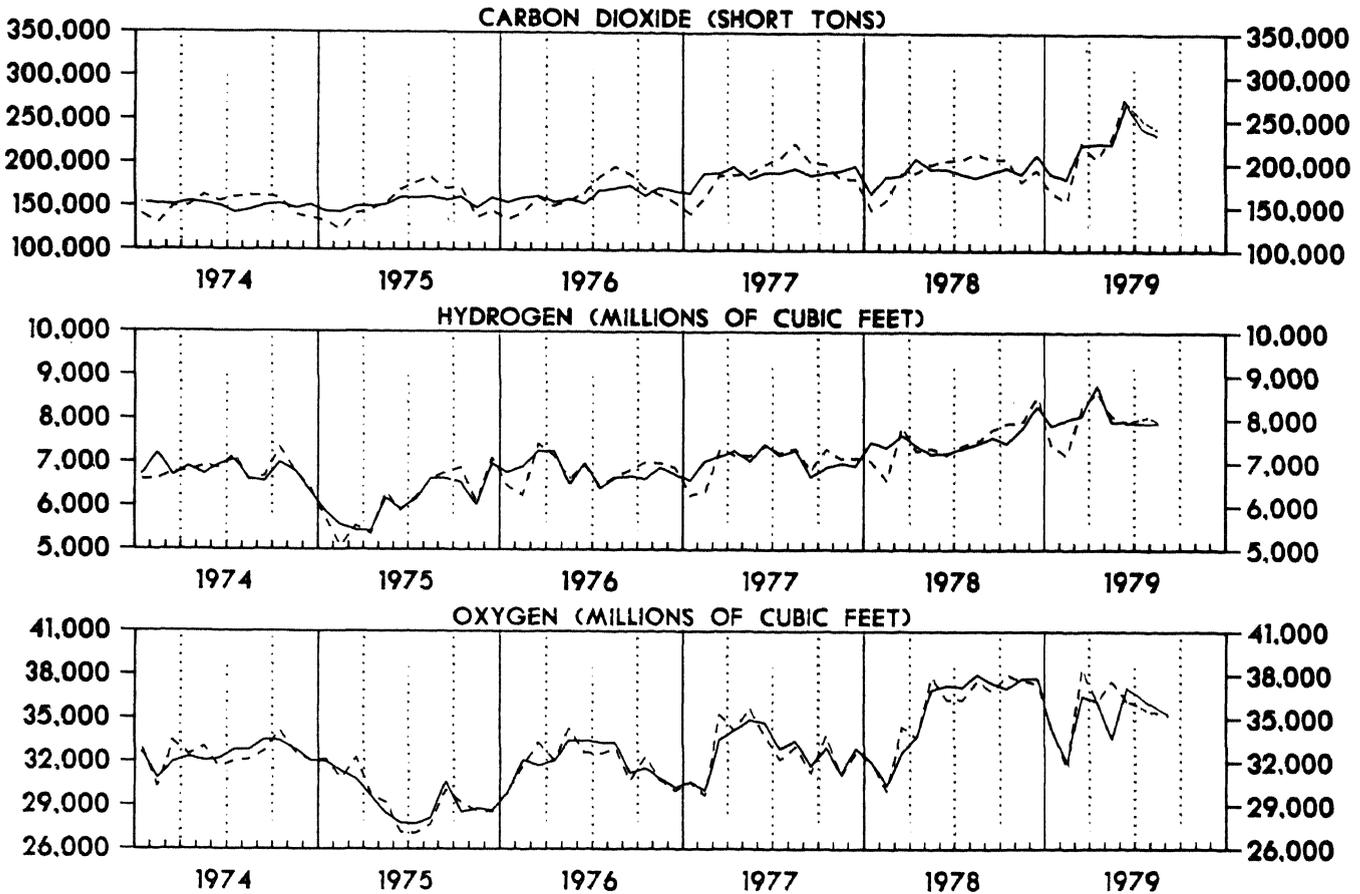
The statistics in this publication are based on a survey of manufacturers and represent total U.S. production of industrial gases. Estimates are included for companies whose reports were

not received in time for tabulation. A more complete description of this survey appears on page 4.

THIS REPORT INCLUDES DATA COMPARING DOMESTIC OUTPUT, EXPORTS, AND IMPORTS

## PRODUCTION OF SELECTED INDUSTRIAL GASES 1974 TO 1979

———— Seasonally Adjusted  
- - - - - Not Seasonally Adjusted



Address inquiries concerning these figures to U.S. Department of Commerce, Bureau of the Census, Industry Division, Washington, D.C. 20233, or call Geoff Embrey, (301) 763-7837.

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Table 1A. SUMMARY OF PRODUCTION OF PRINCIPAL GASES, SEASONALLY ADJUSTED: 1977 TO 1979

Month and year	Acetylene (28132 00) (mil. cu. ft.)	Carbon dioxide (28133 11) and (28133 31) (short tons)	Hydrogen, high and low purity (100%) (28134 20) (mil. cu. ft.)	Nitrogen, high and low purity (100%) (28134 40) (mil. cu. ft.)	Oxygen, high and low purity (100%) (28134 50) (mil. cu. ft.)
1979					
August.....	420	215,656	8,048	33,494	34,605
July.....	435	228,775	8,092	33,306	36,199
June.....	433	269,415	8,149	33,519	36,612
May.....	447	222,784	7,944	33,628	36,720
April.....	453	223,535	8,782	32,587	36,206
March.....	418	221,932	8,093	34,157	36,532
February.....	384	183,119	8,000	32,408	31,945
January.....	439	188,215	7,859	34,847	34,291
1978					
December.....	440	209,947	8,301	31,807	37,799
November.....	451	188,495	7,796	33,739	37,756
October.....	454	195,757	7,451	33,848	37,089
September.....	385	190,384	7,595	32,588	37,466
August.....	435	184,887	7,443	34,959	38,021
July.....	420	188,375	7,335	32,039	37,149
June.....	451	194,026	7,229	33,340	37,267
May.....	437	193,714	7,212	32,712	36,955
April.....	485	205,882	7,395	32,358	33,694
March.....	441	186,118	7,634	32,397	32,707
February.....	435	184,793	7,348	30,682	30,365
January.....	443	165,369	7,482	31,259	32,012
1977					
December.....	439	197,862	6,934	30,421	32,935
November.....	433	191,648	6,979	29,715	31,158
October.....	450	189,187	6,889	28,845	32,974
September.....	438	186,293	6,668	29,178	31,697
August.....	495	194,303	7,290	27,921	33,430
July.....	484	189,142	7,166	27,517	32,899
June.....	518	189,204	7,428	30,682	34,678
May.....	554	181,852	7,023	26,729	34,877
April.....	461	196,381	7,282	25,873	34,152

Table 1B. SUMMARY OF PRODUCTION OF PRINCIPAL GASES, NOT SEASONALLY ADJUSTED: 1977 TO 1979

Month and year	Acetylene (28132 00) (mil. cu. ft.)	Carbon dioxide, liquid and gas (28133 11) (short tons)	Carbon dioxide, solid (28134 31) (mil. cu. ft.)	Hydrogen, high and low purity (100%) (28134 20) (mil. cu. ft.)	Nitrogen, high and low purity (100%) (28134 40) (mil. cu. ft.)	Oxygen, high and low purity (100%) (28134 50) (mil. cu. ft.)
1979						
August.....	437	208,344	38,798	8,088	34,469	34,190
July.....	416	211,372	37,535	8,157	33,140	35,363
June.....	431	250,269	32,617	8,100	32,446	35,660
May.....	444	199,691	29,999	8,087	34,166	37,565
April.....	421	184,688	21,188	8,633	32,000	36,206
March.....	400	198,840	25,977	8,279	35,318	38,432
February.....	364	136,340	20,227	7,176	30,528	31,562
January.....	428	147,223	19,724	7,395	35,509	34,291
1978						
December.....	455	169,905	23,247	8,509	31,521	37,421
November.....	475	154,709	24,926	7,929	33,165	37,605
October.....	468	179,266	26,670	7,906	34,627	38,016
September.....	415	174,747	30,677	7,762	32,653	36,904
August.....	452	176,925	34,956	7,480	35,973	37,565
July.....	402	170,123	34,829	7,394	31,879	36,295
June.....	449	168,412	35,315	7,186	32,273	36,298
May.....	434	173,090	26,629	7,342	33,235	37,805
April.....	450	167,089	22,528	7,269	31,776	33,694
March.....	422	166,213	22,325	7,810	33,498	34,408
February.....	413	139,149	18,849	6,591	28,902	30,001
January.....	431	123,760	22,922	7,041	31,853	32,012
1977						
December.....	454	157,327	24,706	7,107	30,147	32,606
November.....	456	156,996	25,645	7,098	29,210	31,033
October.....	463	171,012	28,013	7,309	29,508	33,798
September.....	472	170,325	30,685	6,815	29,236	31,222
August.....	515	186,235	36,436	7,326	28,731	33,029
July.....	463	171,711	34,076	7,223	27,379	32,142
June.....	515	166,837	31,827	7,383	29,700	33,776
May.....	550	159,609	28,062	7,149	27,157	35,679
April.....	432	161,420	25,535	7,165	25,614	34,152

Table 2. PRIMARY PRODUCTION (QUANTITY) OF SPECIFIED INDUSTRIAL GASES

Product code	Chemical and basis	Unit of measure	August 1979	July 1979	August 1978
28132 00	Acetylene <sup>1</sup> .....	Mil. cu. ft....	437	416	448
	Produced for compression, including cylinder and pipeline.....	..do.....	140	121	106
	Produced for pipeline shipment (excluding that shipped to be compressed) and for consumption in this plant.....	..do.....	297	295	342
28134 15	Argon, high purity: Produced for cylinder and bulk delivery and pipeline shipments, and for consumption in this plant.....	..do.....	604	651	569
28133 11	Carbon dioxide:				
	Liquid and gas <sup>2</sup> .....	S. tons.....	208,344	211,372	175,722
28133 31	Solid (dry ice).....	..do.....	38,798	37,535	34,546
28134 20	Hydrogen, total <sup>3</sup> .....	Mil. cu. ft....	8,088	8,157	7,510
	Liquid and gas:				
	Produced for cylinder and bulk shipment, and liquid produced for conversion to gas.....	..do.....	1,002	842	612
	Produced for pipeline and government use.....	..do.....	2,703	2,596	2,106
	Produced for consumption in this plant.....	..do.....	4,383	4,719	4,792
28134 40	Nitrogen, total <sup>4</sup> .....	..do.....	34,465	33,140	34,001
	Gas:				
	Produced for pipeline shipment.....	..do.....	21,816	20,908	20,265
	Liquid:				
	Produced for bulk delivery shipment to pipeline or to air separation plants.....	..do.....	718	784	1,310
	Liquid and gas:				
Produced for cylinder and bulk delivery shipment.....	..do.....	8,637	8,336	7,896	
	Produced for consumption in this plant.....	..do.....	3,294	3,112	4,530
28134 50	Oxygen, total.....	..do.....	34,190	35,363	37,554
	Gas:				
	Produced for pipeline shipments.....	..do.....	23,474	25,007	26,203
	Liquid:				
	Produced for bulk delivery shipment to pipeline or to other air separation plants.....	..do.....	1,363	1,166	1,467
	Liquid and gas:				
Produced for cylinder and bulk delivery shipment.....	..do.....	5,294	5,153	5,438	
	Produced for consumption in this plant.....	..do.....	4,059	4,037	4,446

<sup>1</sup>Excludes quantities of acetylene produced and consumed by railroad shops, shipyards, and small establishments using portable generators.

<sup>2</sup>Excludes production of liquid and gas CO<sub>2</sub> converted to and reported as dry ice and also amounts converted from pure CO<sub>2</sub> (liquid or solid) purchased or received from other plants. Also excludes quantities produced and consumed in plants manufacturing soda ash or urea.

<sup>3</sup>Excludes quantities produced and consumed in the manufacture of methanol and ammonia, but includes an unspecified amount of hydrogen produced for sale or interplant transfer to plants consuming this gas in the production of ammonia. Also excludes amounts of hydrogen produced in petroleum refineries for captive use. However, of the total shown for lower purity hydrogen prior to 1969, 70 to 75 percent was accounted for by petroleum refiners with captive hydrogen production. Not all such petroleum refineries were canvassed in this survey.

<sup>4</sup>Excludes amounts produced and used in the manufacture of ammonia and ammonia derivatives.

Table 3. PRODUCTION AND EXPORTS OF NITROGEN: JULY 1979

Product code	Product	Quantity produced (m. c. f.)	Exports of domestic merchandise (m. c. f.)	Percent of exports to production
28134 40	Nitrogen.....	33,140	566	1.7

Note: Detailed export data for industrial gases, other than nitrogen are not available separately. Import data for industrial gases are included in "Chemical Elements, not specially provided for," and are not separately identified.

Comparison of Standard Industrial Classification Codes and Schedule B Export Codes:

<u>Domestic output</u>	<u>Exports</u>
28134 40	415.2600

## DESCRIPTION OF SURVEY

*Scope of Survey*—This survey covers firms engaged in the manufacture of industrial gases. Excluded from this survey are industrial gases vented or used for fuel by the producer.

*Survey Description*—The statistics in this publication were collected on Bureau of the Census monthly reporting Form M28A.2, **Production of Industrial Gases**. The mailing panel for this survey consisted of all known producers of industrial gases, approximately 670 producers of elemental gases, carbon dioxide, and acetylene.

*Survey Error*—Figures for the current month include estimates for respondents whose reports were not received in time for tabulation. Such missing figures are "imputed" from month-to-month movements shown by reporting firms and are generally limited to a maximum of 25 percent for any one item. Individual items with imputation greater than 25 percent are footnoted.

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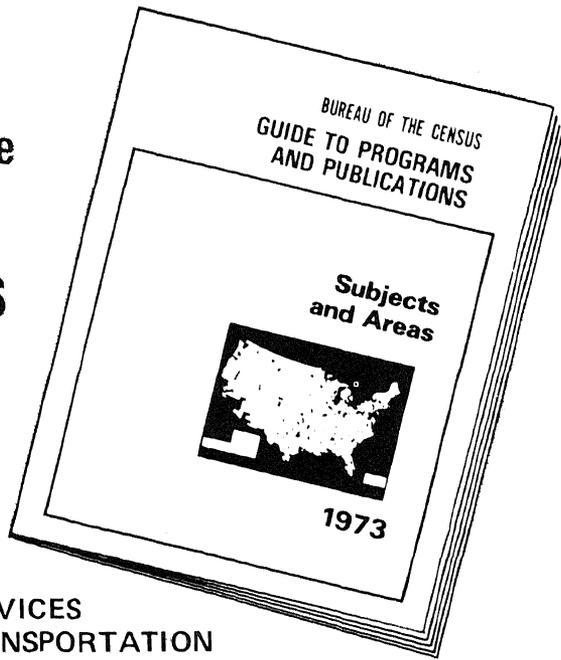
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# Industrial Gases



U.S. Department of Commerce  
BUREAU OF THE CENSUS

SEPTEMBER 1979

M28C (79)-9  
Issued November 1979

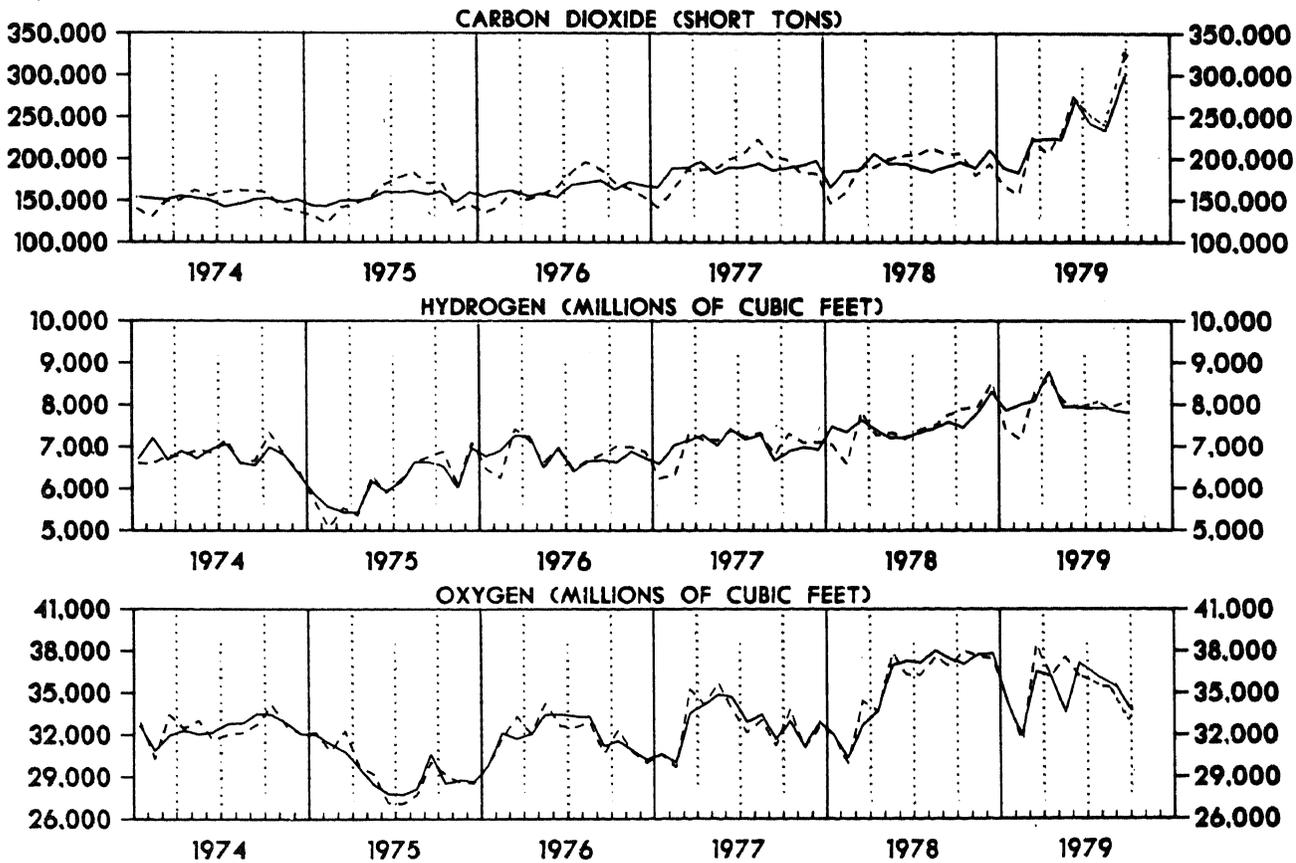
The statistics in this publication are based on a survey of manufacturers and represent total U.S. production of industrial gases. Estimates are included for companies whose reports were

not received in time for tabulation. A more complete description of this survey appears on page 4.

THIS REPORT INCLUDES DATA COMPARING DOMESTIC OUTPUT, EXPORTS, AND IMPORTS

## PRODUCTION OF SELECTED INDUSTRIAL GASES 1974 TO 1979

— Seasonally Adjusted  
- - - Not Seasonally Adjusted



Address inquiries concerning these figures to U.S. Department of Commerce, Bureau of the Census, Industry Division, Washington, D.C. 20233, or call Michael Kavros, (301) 763-7838.

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Table IA. SUMMARY OF PRODUCTION OF PRINCIPAL GASES, SEASONALLY ADJUSTED: 1977 TO 1979

Month and year	Acetylene (28132 00)	Carbon dioxide (28133 11) and (28133 31)	Hydrogen, high and low purity (100%) (28134 20)	Nitrogen, high and low purity (100%) (28134 40)	Oxygen, high and low purity (100%) (28134 50)
	(mil. cu. ft.)	(short tons)	(mil. cu. ft.)	(mil. cu. ft.)	(mil. cu. ft.)
1979					
September.....	405	306,285	7,843	33,153	32,709
August.....	421	283,362	8,049	33,626	35,136
July.....	435	228,775	8,092	33,306	36,199
June.....	433	269,474	7,970	34,170	37,136
May.....	447	222,784	7,944	33,628	33,628
April.....	453	223,535	8,782	32,587	36,206
March.....	418	221,932	8,093	34,157	36,532
February.....	384	183,119	8,000	32,408	31,945
January.....	439	188,215	7,859	34,847	34,291
1978					
December.....	440	209,947	8,301	31,807	37,799
November.....	451	188,495	7,796	33,739	37,756
October.....	454	195,757	7,451	33,848	37,089
September.....	385	190,384	7,595	32,588	37,466
August.....	435	184,887	7,443	34,959	38,021
July.....	420	188,375	7,335	32,039	37,149
June.....	451	194,026	7,229	33,340	37,267
May.....	437	193,714	7,212	32,712	36,955
April.....	485	205,882	7,395	32,358	33,694
March.....	441	186,118	7,634	32,397	32,707
February.....	435	184,793	7,348	30,682	30,365
January.....	443	165,369	7,482	31,259	32,012
1977					
December.....	439	197,862	6,934	30,421	32,935
November.....	433	191,648	6,979	29,715	31,158
October.....	450	189,187	6,889	28,845	32,974
September.....	438	186,293	6,668	29,178	31,697
August.....	495	194,303	7,290	27,921	33,430
July.....	484	189,142	7,166	27,517	32,899
June.....	518	189,204	7,428	30,682	34,678
May.....	554	181,852	7,023	26,729	34,877

Table IB. SUMMARY OF PRODUCTION OF PRINCIPAL GASES, NOT SEASONALLY ADJUSTED: 1977 TO 1979

Month and year	Acetylene (28132 00)	Carbon dioxide, liquid and gas (28133 11)	Carbon dioxide, solid (28134 31)	Hydrogen, high and low purity (100%) (28134 20)	Nitrogen, high and low purity (100%) (28134 40)	Oxygen, high and low purity (100%) (28134 50)
	(mil. cu. ft.)	(short tons)	(short tons)	(mil. cu. ft.)	(mil. cu. ft.)	(mil. cu. ft.)
1979						
September.....	436	287,774	42,707	8,016	33,219	32,218
August.....	438	283,565	41,168	8,089	34,601	34,716
July.....	416	211,372	37,535	8,157	33,140	35,363
June.....	431	250,311	32,637	7,922	33,077	36,170
May.....	444	199,691	29,999	8,087	34,166	37,565
April.....	421	184,688	21,188	8,633	32,000	36,206
March.....	400	198,840	25,977	8,279	35,318	38,432
February.....	364	136,340	20,227	7,176	30,528	31,562
January.....	428	147,223	19,724	7,395	35,509	34,291
1978						
December.....	455	169,905	23,247	8,509	31,521	37,421
November.....	475	154,709	24,926	7,929	33,165	37,605
October.....	468	179,266	26,670	7,906	34,627	38,016
September.....	415	174,747	30,677	7,762	32,653	36,904
August.....	452	176,925	34,956	7,480	35,973	37,563
July.....	402	170,123	34,829	7,394	31,879	36,295
June.....	449	168,412	35,315	7,186	32,273	36,298
May.....	434	173,090	26,629	7,342	33,235	37,805
April.....	450	167,089	22,528	7,269	31,776	33,694
March.....	422	166,213	22,325	7,810	33,498	34,408
February.....	413	139,149	18,849	6,591	28,902	30,001
January.....	431	123,760	22,922	7,041	31,853	32,012
1977						
December.....	454	157,327	24,706	7,107	30,147	32,606
November.....	456	156,996	25,645	7,098	29,210	31,033
October.....	463	171,012	28,013	7,309	29,508	33,798
September.....	472	170,325	30,685	6,815	29,236	31,222
August.....	515	186,235	36,436	7,326	28,731	33,029
July.....	463	171,711	34,076	7,223	27,379	32,142
June.....	515	166,837	31,827	7,383	29,700	33,776
May.....	550	159,609	28,062	7,149	27,157	35,679

Table 2. PRIMARY PRODUCTION (QUANTITY) OF SPECIFIED INDUSTRIAL GASES

Product code	Chemical and basis	Unit of measure	September 1979	August 1979	September 1978
28132 00	Acetylene <sup>1</sup> .....	Mil. cu. ft....	436	438	415
	Produced for compression, including cylinder and pipeline.....	..do.....	132	140	101
	Produced for pipeline shipment (excluding that shipped to be compressed) and for consumption in this plant.....	..do.....	304	298	314
28134 15	Argon, high purity: Produced for cylinder and bulk delivery and pipeline shipments, and for consumption in this plant.....	..do.....	631	604	570
	Carbon dioxide:				
28133 11	Liquid and gas <sup>2</sup> .....	S. tons.....	287,774	283,565	174,747
28133 31	Solid (dry ice).....	..do.....	42,707	41,168	30,677
28134 20	Hydrogen, total <sup>3</sup> .....	Mil. cu. ft....	8,016	8,089	7,762
	Liquid and gas:				
	Produced for cylinder and bulk shipment, and liquid produced for conversion to gas.....	..do.....	1,009	1,002	994
	Produced for pipeline and government use.....	..do.....	3,231	3,038	2,008
	Produced for consumption in this plant.....	..do.....	3,776	4,049	4,760
28134 40	Nitrogen, total <sup>4</sup> .....	..do.....	33,219	34,601	32,653
	Gas:				
	Produced for pipeline shipment.....	..do.....	20,992	21,795	19,697
	Liquid:				
	Produced for bulk delivery shipment to pipeline or to air separation plants.....	..do.....	784	658	1,277
	Liquid and gas:				
Produced for cylinder and bulk delivery shipment.....	..do.....	8,391	8,726	7,686	
	Produced for consumption in this plant.....	..do.....	3,052	3,422	3,993
28134 50	Oxygen, total.....	..do.....	32,218	34,716	36,904
	Gas:				
	Produced for pipeline shipments.....	..do.....	21,921	23,686	25,157
	Liquid:				
	Produced for bulk delivery shipment to pipelines or to other air separation plants.....	..do.....	1,210	1,660	1,601
	Liquid and gas:				
Produced for cylinder and bulk delivery shipment.....	..do.....	5,053	5,294	5,922	
	Produced for consumption in this plant.....	..do.....	4,034	4,076	4,224

<sup>1</sup>Excludes quantities of acetylene produced and consumed by railroad shops, shipyards, and small establishments using portable generators.

<sup>2</sup>Excludes production of liquid and gas CO<sub>2</sub> converted to and reported as dry ice and also amounts converted from pure CO<sub>2</sub> (liquid or solid) purchased or received from other plants. Also excludes quantities produced and consumed in plants manufacturing soda ash or urea.

<sup>3</sup>Excludes quantities produced and consumed in the manufacture of methanol and ammonia, but includes an unspecified amount of hydrogen produced for sale or interplant transfer to plants consuming this gas in the production of ammonia. Also excludes amounts of hydrogen produced in petroleum refineries for captive use. However, of the total shown for lower purity hydrogen prior to 1969, 70 to 75 percent was accounted for by petroleum refineries with captive hydrogen production. Not all such petroleum refineries were canvassed in this survey.

<sup>4</sup>Excludes amounts produced and used in the manufacture of ammonia and ammonia derivatives.

Table 3. PRODUCTION AND EXPORTS OF NITROGEN: AUGUST 1979

Product code	Product	Quantity produced (m.c.f.)	Exports of domestic merchandise (m.c.f.)	Percent of exports to production
28134 40	Nitrogen.....	34,601	127	.37

Note: Detailed export data for industrial gases, other than nitrogen are not available separately. Import data for industrial gases are included in "Chemical elements, not specially provided for," and are not separately identified.

Comparison of Standard Industrial Classification Codes and Schedule B Export Codes:

Domestic output	Exports
28134 40	415.2600

## DESCRIPTION OF SURVEY

*Scope of Survey*—This survey covers firms engaged in the manufacture of industrial gases. Excluded from this survey are industrial gases vented or used for fuel by the producer.

*Survey Description*—The statistics in this publication were collected on Bureau of the Census monthly reporting Form M28A.2, *Production of Industrial Gases*. The mailing panel for this survey consisted of all known producers of industrial gases, approximately 670 producers of elemental gases, carbon dioxide, and acetylene.

*Survey Error*—Figures for the current month include estimates for respondents whose reports were not received in time for tabulation. Such missing figures are "imputed" from month-to-month movements shown by reporting firms and are generally limited to a maximum of 25 percent for any one item. Individual items with imputation greater than 25 percent are footnoted.

The imputation rate is not an explicit indicator of the potential error in published figures due to nonresponse, because the actual monthly movements for nonrespondents may or may not closely agree with the imputed movements. The probable range of difference between the actual and imputed figures is unknown. The degree of uncertainty regarding the accuracy of the data, however, increases as the percentage of imputation increases. Figures with imputation rates above 25 percent should be used with caution.

*Revision to Previous Period Data*—Statistics for previous months may be revised due to receipt of corrected data from respondents, including late reports for which imputations were previously made as described above, and other corrections. Figures which have been revised by more than 5 percent from previously published figures are indicated by footnotes.

*Reporting Period Adjustment*—Since January 1975, the data have been adjusted for number of working days in the reporting period in order to compensate for differences in individual company reporting patterns, i.e., calendar month, 4-week, 5-week periods. Since the calendar month accounting system prevails in this industry, adjustments have been made to those reporting on other than a calendar month basis.

*Seasonal Adjustment*—This report presents seasonally adjusted data in table 1A for selected series shown in table 1B. The data were seasonally adjusted using the X-11 variant of the Bureau of the Census Method II seasonal adjustment program. This program is a ratio-to-moving average method. It largely eliminates the effect of seasonal variations (intra-year variations repeated constantly from year to year) within the series. The seasonally adjusted data provide a better measure of the month-to-month variations which are due to factors other than seasonal pattern. Additional information concerning seasonal adjustment is available in the seasonal adjustment supplement issued in this series.

## EXPLANATION OF TERMS

*Production*—Data shown for production represent total quantity of each chemical produced, including quantity consumed in plants, and for sale or transfer to other plants or warehouses of the same company. The statistics presented in the tables provide an up-to-date measure of activity in the inorganic field, but do not necessarily indicate amounts entering the market. In some cases, figures are included for material produced "in process" as an intermediate to the end products.

## COMPARISON OF EXPORT, IMPORT, AND DOMESTIC OUTPUT DATA

The Standard Industrial Classification (SIC) system used for domestic output and the statistical export and import commodity classifications were developed independently and are based on somewhat differing systems of classification. This results in considerable difficulty in comparing the three types of data for many commodity areas. The domestic output classification is based on type of industry; whereas, the export and import classification system is more materials oriented. Aside from the differences in the basic commodity classifications, there are additional problems involving import data, since there are a substantial number of imported commodities, which are not produced in the United States or which are produced only in very small quantities and which, therefore, have no comparable domestic output classification. The relationships shown in this report should be considered only as approximations, since, in addition to those mentioned above, there are also the following problems affecting the comparability of the three sets of data:

a. *Valuation*—There are different methods of valuation for the three types of data.

*Domestic Output*—Valued at the point of production. It includes the net sales price, f.o.b. plant, after discounts and allowances, exclusive of freight charges and excise taxes.

*Exports*—Valued at the point of exportation. It includes the selling price, or cost if not sold, and inland freight, insurance, and other charges to the export point.

*Imports*—Valued at the first port of entry in the United States. It includes c. i. f. (cost, insurance, and freight), duty, and other charges to the import point.

b. *Duplication in Quantity and Value of Output*—Because producers' shipments of some commodities may be used as materials for incorporation into other commodities, combinations of data for such commodities may contain a certain amount of duplication. Thus, percentages of exports to output or imports to apparent consumption (output plus imports minus exports) at four-digit or broader levels may be understated. Where duplication is known to be substantial, the output data are appropriately noted in the table.

c. *Low-Valued Export and Import Transactions*—Commodity information is not shown for individual imports valued under \$251. For exports, commodity information is not reported for shipments individually valued under \$251 effective October 1969 and for shipments valued under \$100 prior to October 1969. This is believed to have only negligible effect on the statistics for most commodities.

d. *Manufacturers' Shipments, Not Specified by Kind*—The value of manufacturers' shipments at the four-digit industry level often includes a small amount which is not distributed among the individual five-digit product classes. Export and import percentages at the more detailed levels might, therefore, be slightly overstated.

e. *Time Lag Between Output and Exports*—There will be a lag between the time a commodity is produced or shipped by the producer and the time it is actually exported, especially when intermediaries (wholesalers, exporters, etc.) are involved. Ordinarily, this type of discrepancy is insignificant in annual figures.

f. *"Direct" vs "Total" Commodity Export and Imports*—Export and import data do not include materials which are incorporated into other more finished products and exported or imported in finished form. Thus, by showing only direct exports and imports, the relation of exports to output and imports to apparent consumption for intermediate products is considerably understated.

g. *Used Commodities*—With a few exceptions, used or rebuilt commodities are classified in the same import or export codes as is new merchandise. Percentages are thus overstated to the extent that used or rebuilt products are significant in trade.

#### RELATIONSHIP BETWEEN M28C AND M28C-14 SERIES FOR INDUSTRIAL GASES

The data as shown in table 1 reflect levels of production as reported by establishments on monthly Form M28A.2. These data are revised in the annual publication collected on Form MA-28E.2 and are shown in table 9 of the annual report M28C-14. The actual data reported by establishments canvassed on the annual differ by varying amounts from those collected monthly due to receipt of revised data from the respondent and establishments reporting on the annual and not on the monthly. For these reasons, the monthly and annual data comprise two separate series and should be used as such for analytical purposes. Specifically, the monthly data should be useful in describing month-to-month changes while the annual data provide a better indication of the level of production.

Revisions to the 1976 monthly series based on findings from the 1976 annual will be forthcoming as soon as research into the differences are resolved.

#### RELATED REPORTS

An annual Current Industrial Report is published in this series. The annual report summarizes monthly figures and incorporates all known revisions in the series for both current and previous year, thus providing a single reference copy to replace the monthly publications. This annual summary provides additional information on the history of this survey.

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M28A	Monthly	Inorganic Chemicals
M28B	Monthly	Inorganic Fertilizer Materials
<i>Foreign Trade Reports</i>		
FT-410	Monthly	U.S. Exports
FT-135	Monthly	U.S. General Imports

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# Industrial Gases



U.S. Department of Commerce  
BUREAU OF THE CENSUS

OCTOBER 1979

M28C(79)-10  
Issued January 1980

The statistics in this publication are based on a survey of manufacturers and represent total U.S. production of industrial gases. Estimates are included for companies whose reports were

not received in time for tabulation. A more complete description of this survey appears on page 4.

THIS REPORT INCLUDES DATA COMPARING DOMESTIC OUTPUT, EXPORTS, AND IMPORTS

THE GRAPHIC PRESENTATION FOR THIS SURVEY WAS NOT AVAILABLE AT THE TIME OF PUBLICATION.

Address inquiries concerning these figures to U.S. Department of Commerce, Bureau of the Census, Industry Division, Washington, D.C. 20233, or call Michael Kavros, (301) 763-7838.

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Table LA. SUMMARY OF PRODUCTION OF PRINCIPAL GASES, SEASONALLY ADJUSTED: 1977 TO 1979F

Month and year	Acetylene (28132 00) (mil. cu. ft.)	Carbon dioxide (28133 11) and (28133 31) (short tons)	Hydrogen, high and low purity (100%) (28134 20) (mil. cu. ft.)	Nitrogen, high and low purity (100%) (28134 40) (mil. cu. ft.)	Oxygen, high and low purity (100%) (28134 50) (mil. cu. ft.)
1979					
October.....	451	286,720	6,941	33,084	32,615
September.....	403	275,613	7,539	31,949	33,387
August.....	427	265,726	8,049	33,626	35,138
July.....	443	300,162	8,104	32,743	36,332
June.....	445	356,901	8,017	33,323	37,334
May.....	456	310,746	8,007	33,088	36,892
April.....	463	314,031	8,893	32,053	36,433
March.....	428	310,684	8,165	33,759	36,755
February.....	391	255,508	8,054	31,948	32,157
January.....	451	263,464	7,895	34,289	34,535
1978					
December.....	451	293,645	8,388	31,354	37,962
November.....	462	263,163	7,818	33,281	37,943
October.....	466	273,290	7,505	33,303	37,140
September.....	395	264,522	7,583	32,057	37,555
August.....	442	254,040	7,471	32,470	38,159
July.....	428	260,358	7,347	31,495	37,291
June.....	463	267,873	7,273	32,816	37,464
May.....	446	270,028	7,270	32,188	37,129
April.....	496	288,142	7,488	31,829	33,905
March.....	451	260,368	7,704	32,021	32,907
February.....	444	258,444	7,397	30,245	30,565
January.....	454	229,393	7,516	30,758	32,238
1977					
December.....	441	247,508	6,959	26,763	32,834
November.....	435	239,747	7,005	28,620	30,988
October.....	451	236,625	6,911	28,480	32,959
September.....	441	232,453	6,693	27,270	31,574
August.....	498	242,051	7,315	27,549	33,403
July.....	486	235,480	7,190	26,945	32,843
June.....	520	235,842	7,453	27,975	34,616
May.....	557	227,238	7,046	27,411	34,849
April.....	464	245,813	7,306	26,926	34,096
March.....	566	235,886	7,169	27,368	33,693
February.....	568	235,771	7,070	25,908	29,971
January.....	603	207,308	6,628	26,670	30,574

Table 1B. SUMMARY OF PRODUCTION OF PRINCIPAL GASES, NOT SEASONALLY ADJUSTED: 1977 TO 1979\*

Month and year	Acetylene (28132 00) (mil. cu. ft.)	Carbon dioxide, liquid and gas (28133 11) (short tons)	Carbon dioxide, solid (28134 31) (short tons)	Hydrogen, high and low purity (100%) (28134 20) (mil. cu. ft.)	Nitrogen, high and low purity (100%) (28134 40) (mil. cu. ft.)	Oxygen, high and low purity (100%) (28134 50) (mil. cu. ft.)
1979						
October.....	465	262,565	39,065	7,365	33,845	33,430
September.....	434	254,679	42,707	7,705	32,013	32,886
August.....	438	263,354	41,168	8,089	34,601	34,716
July.....	424	284,979	41,597	8,169	32,579	35,496
June.....	443	338,580	36,167	7,969	32,257	36,363
May.....	453	287,153	33,226	8,151	33,617	37,741
April.....	430	265,763	23,460	8,742	31,476	36,433
March.....	409	285,949	28,774	8,353	34,907	38,666
February.....	371	196,039	22,420	7,224	30,095	31,771
January.....	439	211,828	21,865	7,429	34,941	34,535
1978						
December.....	466	244,388	25,766	8,598	31,072	37,582
November.....	487	222,374	27,631	7,951	32,715	37,791
October.....	480	257,935	29,566	7,963	34,069	38,068
September.....	425	251,444	33,975	7,750	32,121	36,992
August.....	460	252,854	38,276	7,529	33,412	37,698
July.....	410	244,671	38,598	7,406	31,338	36,433
June.....	461	242,131	39,136	7,229	31,766	36,490
May.....	443	248,904	29,495	7,401	32,703	37,983
April.....	460	240,436	24,943	7,361	31,256	33,905
March.....	431	239,025	24,728	7,881	33,110	34,618
February.....	421	200,077	20,893	6,635	28,491	30,198
January.....	442	178,063	25,409	7,073	31,342	32,238
1977						
December.....	456	201,162	26,546	7,132	26,522	32,506
November.....	458	200,918	27,561	7,124	28,133	30,864
October.....	465	218,828	30,102	7,333	29,135	33,783
September.....	475	217,846	32,971	6,840	27,325	31,100
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July.....	465	219,564	36,638	7,248	26,810	32,079
June.....	517	213,429	34,205	7,408	27,080	33,716
May.....	553	204,107	30,175	7,173	27,850	35,651
April.....	435	206,561	27,453	7,189	26,657	34,096
March.....	547	203,370	29,086	7,334	28,326	35,445
February.....	540	176,383	25,201	6,356	24,405	29,611
January.....	574	153,075	23,966	6,270	27,070	30,574

Note: Data from January 1977 to September 1979 have been revised as the result of the reconciliation with the 1977 Census of Manufactures and the 1978 annual Current Industrial Report, MA-28C, "Industrial Gases."

Table 2. PRIMARY PRODUCTION (QUANTITY) OF SPECIFIED INDUSTRIAL GASES

Product code	Chemical and basis	Unit of measure	October 1979	September 1979	October 1978
28132 00	Acetylene <sup>1</sup> .....	Mil. cu. ft....	465	434	480
	Produced for compression, including cylinder and pipeline.....	..do.....	168	130	116
	Produced for pipeline shipment (excluding that shipped to be compressed) and for consumption in this plant.....	..do.....	297	304	364
28134 15	Argon, high purity: Produced for cylinder and bulk delivery and pipeline shipments, and for consumption in this plant.....	..do.....	693	623	645
28133 11	Carbon dioxide: Liquid and gas <sup>2</sup> .....	S. tons.....	262,565	254,679	257,935
28133 31	Solid (dry ice).....	..do.....	39,065	42,707	29,566
28134 20	Hydrogen, total <sup>3</sup> .....	Mil. cu. ft....	7,365	7,705	7,963
	Liquid and gas: Produced for cylinder and bulk shipment, and liquid produced for conversion to gas.....	..do.....	1,095	964	1,175
	Produced for pipeline and government use.....	..do.....	2,668	2,892	2,531
	Produced for consumption in this plant.....	..do.....	3,602	3,849	4,257
28134 40	Nitrogen, total <sup>4</sup> .....	..do.....	33,845	32,013	34,069
	Gas: Produced for pipeline shipment.....	..do.....	22,180	21,114	21,058
	Liquid: Produced for bulk delivery shipment to pipeline or to air separation plants.....	..do.....	857	873	990
	Liquid and gas: Produced for cylinder and bulk delivery shipment.....	..do.....	8,965	8,352	8,182
	Produced for consumption in this plant.....	..do.....	1,843	1,674	3,839
28134 50	Oxygen, total.....	..do.....	33,430	32,886	38,068
	Gas: Produced for pipeline shipments.....	..do.....	22,447	22,258	27,068
	Liquid: Produced for bulk delivery shipment to pipelines or to other air separation plants.....	..do.....	1,068	1,215	1,512
	Liquid and gas: Produced for cylinder and bulk delivery shipment.....	..do.....	5,385	5,083	5,281
	Produced for consumption in this plant.....	..do.....	4,530	4,330	4,207

(NA) Not available. Revised by 5 percent or more from previously published figures.

<sup>1</sup>Excludes quantities of acetylene produced and consumed by railroad shops, shipyards and small establishments using portable generators.

<sup>2</sup>Excludes production of liquid and gas CO<sub>2</sub> converted to and reported as dry ice and also amounts converted from pure CO<sub>2</sub> (liquid or solid) purchased or received from other plants. Also excludes quantities produced and consumed in plants manufacturing soda ash or urea.

<sup>3</sup>Excludes quantities produced and consumed in the manufacture of methanol and ammonia, but includes and unspecified amount of hydrogen produced for sale or interplant transfer to plants consuming this gas in the production of ammonia. Also excludes amounts of hydrogen produced in petroleum refineries for captive use. However, of the total shown for lower purity hydrogen prior to 1969, 70 to 75 percent was accounted for by petroleum refineries with captive hydrogen production. Not all such petroleum refineries were canvassed in this survey.

<sup>4</sup>Excludes amounts produced and used in the manufacture of ammonia and ammonia derivatives.

Table 3. PRODUCTION AND EXPORTS OF NITROGEN: SEPTEMBER 1979

Product code	Product	Quantity produced (m.c.f.)	Exports of domestic merchandise (m.c.f.)	Percent of exports to production
28134 40	Nitrogen.....	32,013	274	.86

Note: Detailed export data for industrial gases, other than nitrogen are not available separately. Import data for industrial gases are included in "Chemical elements, not specially provided for," and are not separately identified.

Comparison of Standard Industrial Classification Codes and Schedule B Export Codes:

Domestic output	Exports
28134 40	415.2600

## DESCRIPTION OF SURVEY

*Scope of Survey*—This survey covers firms engaged in the manufacture of industrial gases. Excluded from this survey are industrial gases vented or used for fuel by the producer.

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a. *Valuation*—There are different methods of valuation for the three types of data.

*Domestic Output*—Valued at the point of production. It includes the net sales price, f.o.b. plant, after discounts and allowances, exclusive of freight charges and excise taxes.

*Exports*—Valued at the point of exportation. It includes the selling price, or cost if not sold, and inland freight, insurance, and other charges to the export point.

*Imports*—Valued at the first port of entry in the United States. It includes c. i. f. (cost, insurance, and freight), duty, and other charges to the import point.

b. *Duplication in Quantity and Value of Output*—Because producers' shipments of some commodities may be used as materials for incorporation into other commodities, combinations of data for such commodities may contain a certain amount of duplication. Thus, percentages of exports to output or imports to apparent consumption (output plus imports minus exports) at four-digit or broader levels may be understated. Where duplication is known to be substantial, the output data are appropriately noted in the table.

c. *Low-Valued Export and Import Transactions*—Commodity information is not shown for individual imports valued under \$251. For exports, commodity information is not reported for shipments individually valued under \$251 effective October 1969 and for shipments valued under \$100 prior to October 1969. This is believed to have only negligible effect on the statistics for most commodities.

d. *Manufacturers' Shipments, Not Specified by Kind*—The value of manufacturers' shipments at the four-digit industry level often includes a small amount which is not distributed among the individual five-digit product classes. Export and import percentages at the more detailed levels might, therefore, be slightly overstated.

e. *Time Lag Between Output and Exports*—There will be a lag between the time a commodity is produced or shipped by the producer and the time it is actually exported, especially when intermediaries (wholesalers, exporters, etc.) are involved. Ordinarily, this type of discrepancy is insignificant in annual figures.

f. *"Direct" vs "Total" Commodity Export and Imports*—Export and import data do not include materials which are incorporated into other more finished products and exported or imported in finished form. Thus, by showing only direct exports and imports, the relation of exports to output and imports to apparent consumption for intermediate products is considerably understated.

g. *Used Commodities*—With a few exceptions, used or rebuilt commodities are classified in the same import or export codes as is new merchandise. Percentages are thus overstated to the extent that used or rebuilt products are significant in trade.

#### RELATIONSHIP BETWEEN M28C AND M28C-14 SERIES FOR INDUSTRIAL GASES

The data as shown in table 1 reflect levels of production as reported by establishments on monthly Form M28C. These data are revised in the annual publication collected on Form M28C and are shown in table 9 of the annual report. The actual data reported by establishments canvassed on the annual differ by varying amounts from those collected monthly due to receipt of revised data from the respondent and establishments reporting on the annual and not on the monthly. For these reasons, the monthly and annual data comprise two separate series and should be used as such for analytical purposes. Specifically, the monthly data should be useful in describing month-to-month changes while the annual data provide a better indication of the level of production. Revisions to the 1977 and 1978

monthly series based on findings from the 1978 annual will be forthcoming as soon as research into the differences are resolved.

#### RELATED REPORTS

An annual Current Industrial Report is published in this series. The annual report summarizes monthly figures and incorporates all known revisions in the series for both current and previous year, thus providing a single reference copy to replace the monthly publications. This annual summary provides additional information on the history of this survey.

The Bureau of the Census also publishes reports on other related products as follows:

Series	Frequency	Title
<i>Current Industrial Reports</i>		
M3-1	Monthly	Manufacturers' Shipments, Inventories, and Orders
M28A	Monthly	Inorganic Chemicals
M28B	Monthly	Inorganic Fertilizer Materials
<i>Foreign Trade Reports</i>		
FT-410	Monthly	U.S. Exports
FT-135	Monthly	U.S. General Imports

#### CONTACTS FOR DATA USERS

Subject Area	Contact	Phone Number
Current Industrial Report M28C	Michael Kavros	(301) 763-7838
Foreign Trade publications	Juanita Noone	(301) 763-5140
Bureau of Industrial Economics	David H. Blank	(202) 377-5496
To order a Census Bureau publication	Daisy Williams	(301) 763-7472
To order Census Bureau microfiche	Maria Brown	(301) 763-5511



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# Industrial Gases



U.S. Department of Commerce  
BUREAU OF THE CENSUS

NOVEMBER 1979

M28C(79)-11  
Issued January 1980

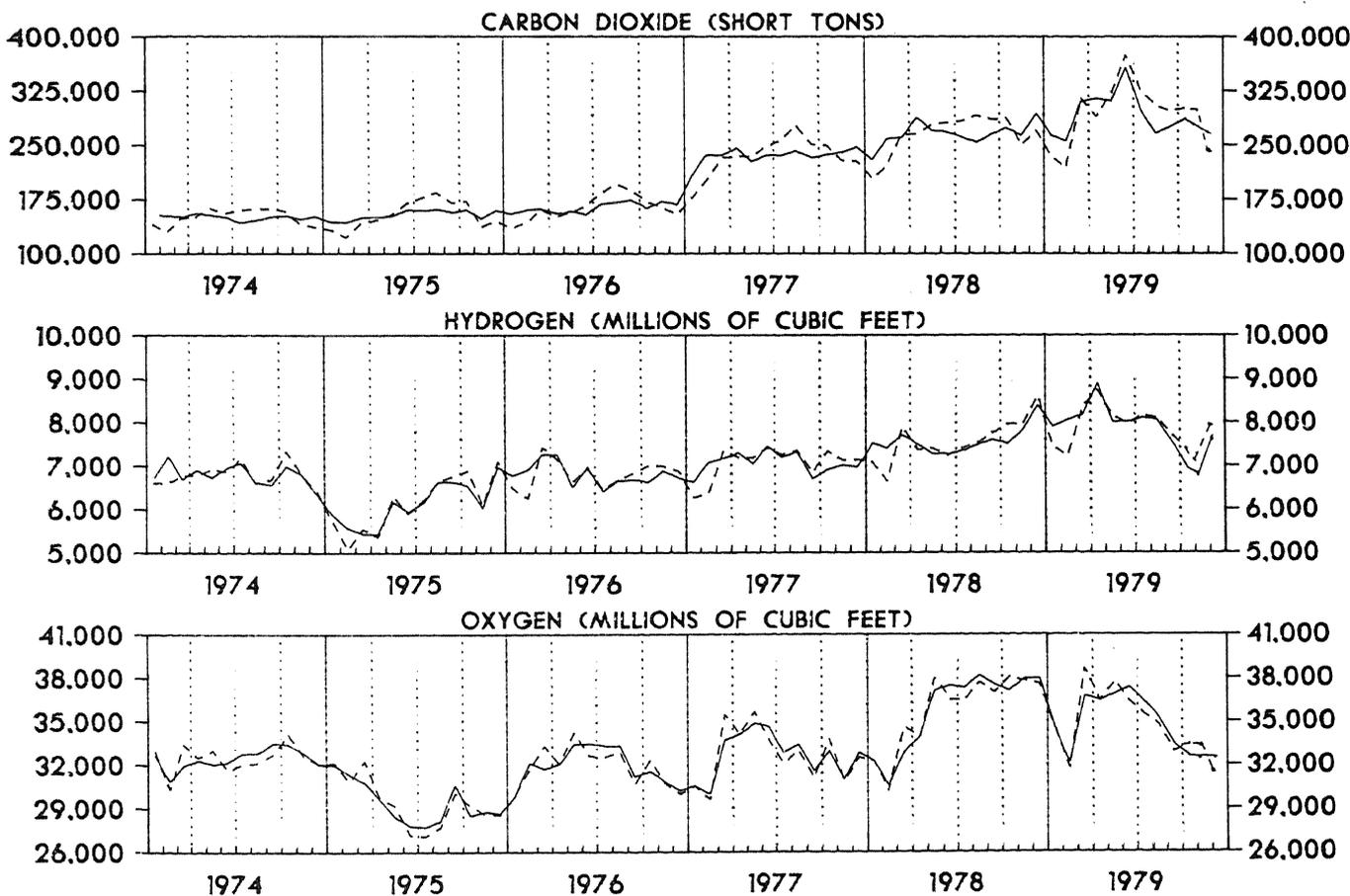
The statistics in this publication are based on a survey of manufacturers and represent total U.S. production of industrial gases. Estimates are included for companies whose reports were

not received in time for tabulation. A more complete description of this survey appears on page 4.

THIS REPORT INCLUDES DATA COMPARING DOMESTIC OUTPUT, EXPORTS, AND IMPORTS

## PRODUCTION OF SELECTED INDUSTRIAL GASES 1974 TO 1979

———— Seasonally Adjusted  
- - - - - Not Seasonally Adjusted



Address inquiries concerning these figures to U.S. Department of Commerce, Bureau of the Census, Industry Division, Washington, D.C. 20233, or call Michael Kavros (301)763-7838.  
For sale by the Subscriber Services Section (Publications), Bureau of the Census, Washington, D.C. 20233, or any U.S. Department of Commerce district office. Postage stamps not acceptable; currency submitted at sender's risk. Remittances from foreign countries must be by international money order or by a draft on a U.S. bank. Price 25 cents per copy, \$3.50 per year.

Table 1A. SUMMARY OF PRODUCTION OF PRINCIPAL GASES, SEASONALLY ADJUSTED: 1977 TO 1979

Month and year	Acetylene (28131 00)	Carbon dioxide (28133 11) and (28133 31)	Hydrogen, high and low purity (100%) (28134 20)	Nitrogen, high and low purity (100%) (28134 40)	Oxygen, high and low purity (100%) (28134 50)
	(mil. cu. ft.)	(short tons)	(mil. cu. ft.)	(mil. cu. ft.)	(mil. cu. ft.)
1979					
November.....	448	260,900	7,823	33,840	31,826
October.....	448	267,607	6,921	33,226	32,540
September.....	403	275,613	7,539	31,949	33,387
August.....	421	265,726	8,049	33,626	35,138
July.....	443	300,162	8,104	32,743	36,332
June.....	445	356,901	8,017	33,323	37,334
May.....	456	310,746	8,007	33,088	36,892
April.....	463	314,031	8,893	32,053	36,433
March.....	428	310,684	8,165	33,759	36,755
February.....	391	255,508	8,054	31,948	32,157
January.....	451	263,464	7,895	34,289	34,535
1978					
December.....	451	293,645	8,388	31,354	37,962
November.....	462	263,163	7,818	33,281	37,943
October.....	466	273,290	7,505	33,303	37,140
September.....	395	264,522	7,583	32,057	37,555
August.....	442	254,040	7,491	32,470	38,159
July.....	428	260,358	7,347	31,495	37,291
June.....	463	267,873	7,273	32,816	37,464
May.....	446	270,028	7,270	32,188	37,129
April.....	496	288,142	7,488	31,829	33,905
March.....	451	260,368	7,704	32,021	32,907
February.....	444	258,444	7,397	30,245	30,565
January.....	454	229,393	7,516	30,758	32,238
1977					
December.....	441	247,508	6,959	26,763	32,834
November.....	435	239,747	7,005	28,620	30,988
October.....	451	236,625	6,911	28,480	32,959
September.....	441	232,453	6,693	27,270	31,574
August.....	498	242,051	7,315	27,549	33,403
July.....	486	235,480	7,190	26,945	32,843
June.....	520	235,842	7,453	27,975	34,616
May.....	557	227,238	7,046	27,411	34,849
April.....	464	245,813	7,306	26,926	34,096
March.....	566	235,886	7,169	27,368	33,693
February.....	568	235,771	7,070	25,908	29,971
January.....	603	207,308	6,628	26,670	30,574

Note: Data in tables 1A and 1B from January 1977 to September 1979 have been revised as the result of the reconciliation with the 1977 Census of Manufactures and the 1978 Annual Current Industrial Report, MA-28C, "Industrial Gases."

Table 1B. SUMMARY OF PRODUCTION OF PRINCIPAL GASES, NOT SEASONALLY ADJUSTED: 1977 TO 1979

Month and year	Acetylene (28132 00)  (mil. cu. ft.)	Carbon dioxide, liquid and gas (28133 11)  (short tons)	Carbon dioxide, solid (28134 31)  (short tons)	Hydrogen, high and low purity (100%) (28134 20)  (mil. cu. ft.)	Nitrogen, high and low purity (100%) (28134 40)  (mil. cu. ft.)	Oxygen, high and low purity (100%) (28134 50)  (mil. cu. ft.)
1979						
November.....	472	217,502	31,136	7,956	33,265	31,699
October.....	461	244,619	36,904	7,343	33,990	33,353
September.....	434	254,679	42,707	7,705	32,013	32,886
August.....	438	263,354	41,168	8,089	34,601	34,716
July.....	424	284,979	41,597	8,169	32,579	35,496
June.....	443	338,580	36,167	7,969	32,257	36,363
May.....	453	287,153	33,226	8,151	33,617	37,741
April.....	430	265,763	23,460	8,742	31,476	36,433
March.....	409	285,949	28,774	8,353	34,907	38,666
February.....	371	196,039	22,420	7,224	30,095	31,771
January.....	439	211,828	21,865	7,429	34,941	34,535
1978						
December.....	466	244,388	25,766	8,598	31,072	37,582
November.....	487	222,374	27,631	7,951	32,715	37,791
October.....	480	257,935	29,566	7,963	34,069	38,068
September.....	425	251,444	33,975	7,750	32,121	36,992
August.....	460	252,854	38,276	7,529	33,412	37,698
July.....	410	244,671	38,598	7,406	31,338	36,433
June.....	461	242,131	39,136	7,229	31,766	36,490
May.....	443	248,904	29,495	7,401	32,703	37,983
April.....	460	240,436	24,943	7,361	31,256	33,905
March.....	431	239,025	24,728	7,881	33,110	34,618
February.....	421	200,077	20,893	6,635	28,491	30,198
January.....	442	178,063	25,409	7,073	31,342	32,238
1977						
December.....	456	201,162	26,546	7,132	26,522	32,506
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Product code	Chemical and basis	Unit of measure	November 1979	October 1979	November 1978
28132 00	Acetylene <sup>1</sup> .....	Mil. cu. ft....	472	461	487
	Produced for compression, including cylinder and pipeline.....	..do.....	157	164	115
	Produced for pipeline shipment (excluding that shipped to be compressed) and for consumption in this plant.....	..do.....	315	297	371
28134 15	Argon, high purity: Produced for cylinder and bulk delivery and pipeline shipments, and for consumption in this plant.....	..do.....	660	693	655
28133 11	Carbon dioxide: Liquid and gas <sup>2</sup> .....	S. tons.....	217,502	244,619	222,374
28133 31	Solid (dry ice).....	..do.....	31,136	36,904	27,631
28134 20	Hydrogen, total <sup>3</sup> .....	Mil. cu. ft....	7,956	7,343	7,951
	Liquid and gas: Produced for cylinder and bulk shipment, and liquid produced for conversion to gas.....	..do.....	858	1,091	1,069
	Produced for pipeline and government use.....	..do.....	2,801	2,664	2,424
	Produced for consumption in this plant.....	..do.....	4,297	3,588	4,458
28134 40	Nitrogen, total <sup>4</sup> .....	..do.....	33,265	33,990	32,715
	Gas: Produced for pipeline shipment.....	..do.....	21,263	22,347	19,882
	Liquid: Produced for bulk delivery shipment to pipeline or to air separation plants.....	..do.....	995	857	641
	Liquid and gas: Produced for cylinder and bulk delivery shipment.....	..do.....	8,457	8,954	8,333
	Produced for consumption in this plant.....	..do.....	2,550	1,832	3,859
28134 50	Oxygen, total.....	..do.....	31,699	33,353	37,791
	Gas: Produced for pipeline shipments.....	..do.....	21,383	22,441	27,008
	Liquid: Produced for bulk delivery shipment to pipeline or to other air separation plants.....	..do.....	1,094	1,069	925
	Liquid and gas: Produced for cylinder and bulk delivery shipment.....	..do.....	4,941	5,385	5,702
	Produced for consumption in this plant.....	..do.....	4,281	4,458	4,156

<sup>1</sup>Excludes quantities of acetylene produced and consumed by railroad shops, shipyards, and small establishments using portable generators.

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Product code	Product	Quantity produced (m.c.f.)	Exports of domestic merchandise (m.c.f.)	Percent of exports to production
28134 40	Nitrogen.....	33,990	480	1.4

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## COMPARISON OF EXPORT, IMPORT, AND DOMESTIC OUTPUT DATA

The Standard Industrial Classification (SIC) system used for domestic output and the statistical export and import commodity classifications were developed independently and are based on somewhat differing systems of classification. This results in considerable difficulty in comparing the three types of data for many commodity areas. The domestic output classification is based on type of industry; whereas, the export and import classification system is more materials oriented. Aside from the differences in the basic commodity classifications, there are additional problems involving import data, since there are a substantial number of imported commodities, which are not produced in the United States or which are produced only in very small quantities and which, therefore, have no comparable domestic output classification. The relationships shown in this report should be considered only as approximations, since, in addition to those mentioned above, there are also the following problems affecting the comparability of the three sets of data:

a. *Valuation*—There are different methods of valuation for the three types of data.

*Domestic Output*—Valued at the point of production. It includes the net sales price, f.o.b. plant, after discounts and allowances, exclusive of freight charges and excise taxes.

*Exports*—Valued at the point of exportation. It includes the selling price, or cost if not sold, and inland freight, insurance, and other charges to the export point.

*Imports*—Valued at the first port of entry in the United States. It includes c. i. f. (cost, insurance, and freight), duty, and other charges to the import point.

b. *Duplication in Quantity and Value of Output*—Because producers' shipments of some commodities may be used as materials for incorporation into other commodities, combinations of data for such commodities may contain a certain amount of duplication. Thus, percentages of exports to output or imports to apparent consumption (output plus imports minus exports) at four-digit or broader levels may be understated. Where duplication is known to be substantial, the output data are appropriately noted in the table.

c. *Low-Valued Export and Import Transactions*—Commodity information is not shown for individual imports valued under \$251. For exports, commodity information is not reported for shipments individually valued under \$251 effective October 1969 and for shipments valued under \$100 prior to October 1969. This is believed to have only negligible effect on the statistics for most commodities.

d. *Manufacturers' Shipments, Not Specified by Kind*—The value of manufacturers' shipments at the four-digit industry level often includes a small amount which is not distributed among the individual five-digit product classes. Export and import percentages at the more detailed levels might, therefore, be slightly overstated.

e. *Time Lag Between Output and Exports*—There will be a lag between the time a commodity is produced or shipped by the producer and the time it is actually exported, especially when intermediaries (wholesalers, exporters, etc.) are involved. Ordinarily, this type of discrepancy is insignificant in annual figures.

f. *"Direct" vs "Total" Commodity Export and Imports*—Export and import data do not include materials which are incorporated into other more finished products and exported or imported in finished form. Thus, by showing only direct exports and imports, the relation of exports to output and imports to apparent consumption for intermediate products is considerably understated.

g. *Used Commodities*—With a few exceptions, used or rebuilt commodities are classified in the same import or export codes as is new merchandise. Percentages are thus overstated to the extent that used or rebuilt products are significant in trade.

#### RELATIONSHIP BETWEEN M28C AND M28C-14 SERIES FOR INDUSTRIAL GASES

The data as shown in table 1 reflect levels of production as reported by establishments on monthly Form M28C. These data are revised in the annual publication collected on Form MA-28C and are shown in table 9 of the annual report MA-28C-14. The actual data reported by establishments canvassed on the annual, differ by varying amounts from those collected monthly due to receipt of revised data from the respondent and establishments reporting on the annual and not on the monthly. For these reasons, the monthly and annual data comprise two separate series and should be used as such for analytical purposes. Specifically, the monthly data should be

useful in describing month-to-month changes while the annual data provide a better indication of the level of production.

#### RELATED REPORTS

An annual Current Industrial Report is published in this series. The annual report summarizes monthly figures and incorporates all known revisions in the series for both current and previous year, thus providing a single reference copy to replace the monthly publications. This annual summary provides additional information on the history of this survey.

The Bureau of the Census also publishes reports on other related products as follows:

Series	Frequency	Title
<i>Current Industrial Reports</i>		
M3-1	Monthly	Manufacturers' Shipments, Inventories, and Orders
M28A	Monthly	Inorganic Chemicals
M28B	Monthly	Inorganic Fertilizer Materials
<i>Foreign Trade Reports</i>		
FT-410	Monthly	U.S. Exports
FT-135	Monthly	U.S. General Imports

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To order a Census Bureau publication	Daisy Williams	(301) 763-7472
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