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CURRENT INDUSTRIAL REPORTS

Industrial Gases



U.S. Department of Commerce
BUREAU OF THE CENSUS

1976 (Preliminary)

Issued May 1977
M28C(76)-13

GENERAL

Annual data for 1976 shown in this release are a compilation of the monthly figures which have been appearing in this series. The figures for 1976 should be considered as preliminary and subject to revisions based on information furnished on Form MA-28E.2, and published as **Annual Report on Shipments and Production of Industrial Gases, M28C(76)-14.**

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. Melva R. Martin was directly responsible for the review of the data and preparation of the report. Milton Eisen, Chief of the Division, and James S. Werking, Assitant Chief for Current Programs, provided overall direction and coordination to this project.

PRIMARY PRODUCTION OF SPECIFIED INDUSTRIAL GASES

Census product code	Chemical and basis	Unit of measure	1976	1975
2813200	Acetylene ¹	Mil.cu.ft.	7,171	6,697
	Produced for pipeline shipment (excluding that shipped to be compressed).....	do		2,705
	Produced for compression, including cylinder and pipeline.....	do	7,171	3,992
	Produced for consumption in this plant.....	do		
2813415	Argon, high purity.....	do	5,085	4,457
	Produced for cylinder and bulk delivery shipment.....	do		
	Produced for pipeline shipment.....	do	5,085	4,457
	Produced for consumption in this plant.....	do		
2813311	Carbon dioxide:	S.tons	1,646,437	1,499,371
	Liquid and gas ²	do	364,259	351,602
2813331	Solid (dry ice).....	do		
2813420	Hydrogen, total ³	Mil.cu.ft.	80,478	73,552
	Produced for cylinder and bulk delivery shipment.....	do		
	Liquid produced for conversion to gas.....	do	8,768	6,882
	Produced for pipeline shipment.....	do		
	Liquid produced for government use.....	do	22,313	20,780
	Produced for consumption in this plant.....	do	49,397	45,890
2813440	Nitrogen, total ⁴	do	292,220	252,980
	Gas:			
	Produced for cylinder and bulk delivery shipment.....	do		
	Produced for pipeline shipment.....	do	180,049	148,866
	Produced for consumption in this plant.....	do	19,795	21,666
	Liquid:			
	Produced for cylinder and bulk delivery shipment.....	do	81,570	73,592
	Produced for bulk shipment to pipeline or to other air separation plants.....	do	7,479	
	Produced for consumption in this plant.....	do	3,327	8,856
2813450	Oxygen, total.....	do	386,717	352,560
	Gas:			
	Produced for cylinder and bulk delivery shipment.....	do	327	224
	Produced for pipeline shipment.....	do	265,940	245,259
	Produced for consumption in this plant.....	do	⁵ 53,985	⁵ 47,299
	Liquid:			
	Produced for cylinder and bulk delivery shipment.....	do	58,928	51,835
	Produced for bulk shipment to pipelines or to other air separation plants.....	do	7,537	7,943
	Produced for consumption in this plant.....	do	(⁵)	(⁵)

¹Excludes quantities of acetylene produced and consumed by railroad ships, shipyards, and small establishments using portable generators.

²Excludes production of liquid and gas CO₂ converted to and reported as dry ice and also amounts converted from pure manufacturing soda ash or urea.

³Excludes quantities produced and consumed in the manufacture of methanol and ammonia, but includes as 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 refiners for captive use.

⁴Excludes amounts produced and used in the manufacture of ammonia and ammonia derivatives.

⁵Data for oxygen (gas), produced for consumption in this plant, combined with data for oxygen (liquid), produced for consumption in this plant, to avoid disclosing figures for individual companies.

Industrial Gases



U.S. Department of Commerce
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1976

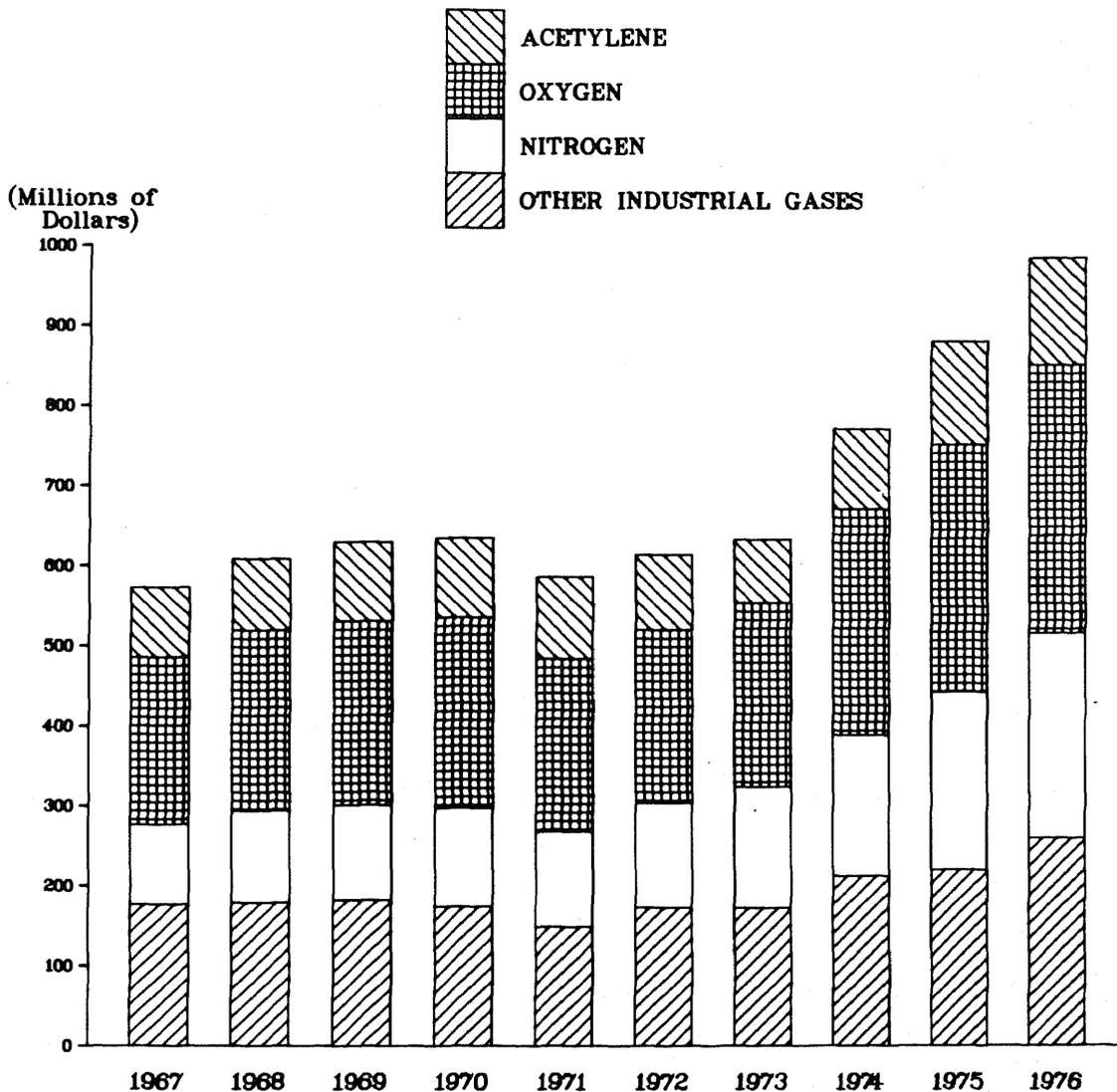
M28C(76)-14
Issued August 1977

SUMMARY OF FINDINGS

Shipments of industrial gases by primary manufactures in 1976 totaled \$984 million, or about 12 percent more than the 1975

figure of \$880 million. The 1976 total is composed of \$134 million for acetylene; \$75 million for carbon dioxide; and \$775 million for the product grouping elemental gases and other industrial gases, n.e.c. Compared with 1975, the 1976 totals

VALUE OF SHIPMENTS OF INDUSTRIAL GASES: 1967 TO 1976



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

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showed a 4-percent increase for acetylene, an increase of 14 percent for carbon dioxide, and an increase of 13 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.

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 (76)-14, Inorganic Chemicals.

Survey Description—The statistics in this publication were collected on Bureau of the Census annual reporting form M-28E.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—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 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.

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, 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
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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 1976 monthly series are based on findings from the 1976 annual. These revisions are shown in table 9 of the annual report M28C-14.

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	Melva Martin	(201) 763-7838
Foreign Trade publications	Paul Finn	(301) 763-5140
Bureau of Domestic Commerce	Tom Gillett	(202) 377-5496
To order a Census publication	Daisy Williams	(301) 763-7472
To order microfilm of Census publications	Theresa Allen	(301) 763-5042

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. Melva R. Martin was directly responsible for the review of the data and preparation of the report. Milton Eisen, Chief of the Division, and James S. Werking, Assistant Chief for Current Programs, provided overall direction and coordination to this project.

Table 1.--VALUE OF SHIPMENTS OF SELECTED INDUSTRIAL GASES: 1976 AND 1975

Product code	Product	1976	1975	
			M28C	ASM
28132--	Acetylene.....	134.0	129.1	122.8
28133--	Carbon dioxide.....	75.1	65.8	64.6
28134--	Elemental compressed, liquefied gases, n.e.c.....	775.0	684.6	709.4

N.e.c. Not elsewhere classified.

ASM: Annual Survey of Manufactures, "Value of Product Shipments," 1975.

Table 2.--ANNUAL PRODUCTION AND SHIPMENTS OF INDUSTRIAL GASES: 1972 TO 1976

Code	Product	Unit of measure	Year	Quantity produced for all purposes	Total shipments including transfers quantity	Total shipments including transfers value (\$1,000)	
2813--	Industrial gases, total.....		1976	(X)	(X)	¹ 984,083	
			1975	(X)	(X)	¹ 879,590	
			1974	(X)	(X)	¹ 769,395	
			1973	(X)	(X)	¹ 631,225	
			1972	(X)	(X)	¹ 612,330	
28132--	Acetylene ²	Mil.cu.ft	1976	7,111	4,415	133,984	
			1975	6,704	4,138	129,100	
			1974	7,808	4,799	99,844	
			1973	8,269	5,063	78,864	
			1972	11,456	7,208	93,876	
	Produced for pipeline shipment excluding that shipped to be compressed.....	...do....	1976	(D)	(D)	70,662	
			1975	2,705	2,705	63,119	
	Produced for compression, including cylinder and pipeline.....	...do....	1976	(D)	(D)	63,322	
			1975	1,461	1,433	65,981	
	Produced for consumption in this plant.....	...do....	1976	(D)	(X)	(X)	
			1975	2,538	(X)	(X)	
	28133--	Carbon dioxide, total.....	Short tons	1976	1,966,727	1,820,643	75,091
				1975	1,850,318	1,728,256	65,883
1974				1,804,251	1,674,116	59,966	
1973				1,565,506	1,449,265	44,178	
1972				1,610,251	1,500,523	48,375	
2813311	Liquid and gas.....	...do....	1976	³ 1,610,854	³ 1,464,761	46,651	
			1975	³ 1,498,716	³ 1,376,592	41,099	
			1974	³ 1,435,612	³ 1,305,481	37,566	
			1973	³ 1,193,537	³ 1,077,300	25,424	
			1972	³ 1,259,935	³ 1,149,995	29,552	
2813331	Solid (dry ice).....	...do....	1976	355,873	355,882	28,440	
			1975	351,602	351,664	24,784	
			1974	368,639	368,635	22,400	
			1973	371,969	371,965	18,754	
			1972	350,316	350,528	18,823	
28134--	Elemental gases and other industrial gases, n.e.c., total.....		1976	(X)	(X)	775,008	
			1975	(X)	(X)	684,607	
			1974	(X)	(X)	609,585	
			1973	(X)	(X)	508,183	
			1972	(X)	(X)	470,079	
2813415	Argon, high purity, total.....	Mil.cu.ft	1976	5,107	4,941	66,741	
			1975	4,457	4,457	63,144	
			1974	4,688	4,688	47,380	
			1973	4,325	4,325	35,032	
			1972	3,795	3,798	32,493	
	Produced for cylinder and bulk delivery shipment.....	...do....	1976	5,107	4,941	66,741	
			1975	4,457	4,457	63,144	
	Helium ⁴.....	...do....	1976	1,339	580	(NA)
			1975	1,078	601	(NA)	
			1974	883	570	(NA)	
			1973	3,205	497	(NA)	
			1972	4,094	489	(NA)	
	2813420	Hydrogen, total.....	...do....	1976	⁵ 81,641	31,961	77,997
1975				⁵ 73,552	27,662	57,358	
1974				⁵ 81,536	29,327	74,878	
1973				⁵ 65,169	19,138	38,566	
1972				⁵ 58,890	17,949	30,312	
Produced for cylinder and bulk delivery shipment.....		...do....	1976	8,534	8,534	51,898	
			1975	6,882	6,882	^r 35,194	
Produced for pipeline shipment.....		...do....	1976	23,448	23,427	26,099	
			1975	20,780	20,780	22,164	
Produced for consumption in this plant.....		...do....	1976	49,659	(X)	(X)	
			1975	45,890	(X)	(X)	
2813440		Nitrogen, total ⁶do....	1976	⁷ 289,926	⁷ 266,531	⁷ 255,795
				1975	⁷ 252,368	⁷ 228,266	⁷ 222,157
	1974			⁷ 243,316	⁷ 219,271	⁷ 175,661	
	1973			⁷ 227,160	⁷ 203,267	⁷ 150,746	
	1972			⁷ 193,540	⁷ 176,833	⁷ 130,358	
	Gas:	Produced for cylinder and bulk delivery shipment.....	...do....	1976	(⁸)	(⁸)	(⁸)
				1975	(⁸)	(⁸)	(⁸)
		Produced for pipeline shipment.....	...do....	1976	⁸ 177,640	⁸ 177,603	⁸ 75,796
				1975	⁸ 148,780	⁸ 148,780	⁸ 60,006
		Produced for consumption in this plant.....	...do....	1976	20,159	(X)	(X)
				1975	21,666	(X)	(X)

See footnotes at end of table.

Table 2.--ANNUAL PRODUCTION AND SHIPMENTS OF INDUSTRIAL GASES: 1972 TO 1976--Continued

Code	Product	Unit of measure	Year	Quantity produced for all purposes	Total shipments including transfers quantity	Total shipments including transfers value (\$1,000)
	Elemental gases and other industrial gases, n.e.c.--Continued					
	Nitrogen ⁶ --Continued					
	Liquid:					
	Produced for cylinder and bulk delivery shipment.....	Mil.cu.ft.	1976	82,164	82,200	171,181
			1975	73,066	73,527	154,382
	Produced for bulk shipment to pipelines or to other air separation plants.....	...do....	1976	6,728	6,728	8,818
			1975	5,951	5,959	7,769
	Produced for consumption in this plant.....	...do....	1976	3,235	(X)	(X)
			1975	2,905	(X)	(X)
2813450	Oxygen, total ⁶.....	...do....	1976	7382,914	7330,581	7335,230
			1975	7352,554	7306,289	7308,579
			1974	7389,628	7337,032	7282,421
			1973	7389,436	7331,327	7229,730
			1972	7351,733	7300,263	7215,724
	Gas:					
	Produced for cylinder and bulk delivery shipment.....	...do....	1976	191	144	3,938
			1975	218	184	3,744
	Produced for pipeline shipments.....	...do....	1976	263,938	264,137	178,562
			1975	245,259	246,282	156,267
	Produced for consumption in this plant.....	...do....	1976	952,480	(X)	(X)
			1975	947,299	(X)	(X)
	Liquid:					
	Produced for cylinder and bulk delivery shipments.....	...do....	1976	59,133	59,127	141,194
			1975	51,835	51,880	136,502
	Produced for bulk shipment to pipeline or to other air separation plants.....	...do....	1976	7,172	7,173	11,536
			1975	7,943	7,943	12,066
	Produced for consumption in this plant.....	...do....	1976	(⁹)	(X)	(X)
			1975	(⁹)	(X)	(X)
2813471	Nitrous oxide.....	1,000 gals (STP)	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
			1973	1,281,590	1,281,590	4,659
			1972	1,278,285	1,278,285	4,500
2813498	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 ¹⁰		1976	(X)	(X)	29,753
			1975	(X)	(X)	25,099
			1974	(X)	(X)	23,371
			1973	(X)	(X)	49,450
			1972	(X)	(X)	56,692

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

Revised by 5 percent or more. (X) Not applicable.

¹Excludes value for helium produced in government owned plants.

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

³Excludes 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.

⁴Source: U.S. Department of Interior, Bureau of Mines.

⁵Excludes 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.

⁶Excludes amounts produced and consumed in the manufacture of synthetic ammonia or ammonia derivatives.

⁷Data for 1973 and 1972 include figures for high and lower purity gas.

⁸1975 data for nitrogen (gas), produced for cylinder and bulk delivery shipment combined with produced for pipeline shipment to avoid disclosing figures for individual companies.

⁹Data for oxygen (liquid), produced for consumption in this plant, combined with data for oxygen (gases), produced for consumption in this plant, to avoid disclosing figures for individual companies.

¹⁰Excludes 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: 1976

Production	Production (mil. cu. ft.)	Total shipments including interplant transfers	
		Quantity (mil. cu. ft.)	Value (\$1,000)
UNITED STATES, TOTAL ¹	7,111	4,415	133,984
Northeast Region and North Central Region....	794	675	30,996
South Region.....	6,063	3,493	92,289
Mountain Division.....	97	90	3,967
Pacific Division.....	157	157	6,732

¹See table 10 for the number of establishments reporting production by State.

Table 4.--PRODUCTION AND SHIPMENTS OF CARBON DIOXIDE, BY DIVISIONS: 1976

Division	Total liquid and solid			Liquid and gas			Solid (dry ice)		
	Production	Shipments		Production	Shipments		Production	Shipments	
		Quantity	Value		Quantity	Value		Quantity	Value
(short tons)	(short tons)	(\$1,000)	(short tons)	(short tons)	(\$1,000)	(short tons)	(short tons)	(\$1,000)	
UNITED STATES, TOTAL ¹	1,966,727	1,820,643	75,091	1,610,854	1,464,761	46,651	355,873	355,882	28,440
New England and Middle Atlantic.....	106,123	107,428	8,986	46,991	48,287	956	59,132	59,141	8,030
East North Central.....	338,566	318,307	12,728	262,940	242,681	5,151	75,626	75,626	7,577
West North Central.....	252,523	246,894	9,385	213,867	208,238	6,640	38,656	38,656	2,745
South Atlantic and East South Central.....	520,217	480,497	24,156	469,023	429,303	20,570	51,194	51,194	3,586
West South Central.....	421,517	348,842	12,422	390,869	318,194	9,964	30,648	30,648	2,458
Mountain.....	93,496	93,496	2,253	49,089	49,089	818	44,407	44,407	1,435
Pacific.....	234,285	225,179	5,161	178,075	168,969	2,552	56,210	56,210	2,609

¹See table 10 for the number of establishments reporting production by State.

Table 5.--SHIPMENTS OF ARGON (HIGH PURITY) BY GEOGRAPHIC AREA: 1976

Geographic area	Total shipments including interplant transfers	
	Quantity (mil. cu. ft.)	Value (\$1,000)
UNITED STATES, TOTAL ¹	4,941	66,741
Northeast Region.....	931	13,995
East North Central Division.....	2,048	24,430
Ohio.....	740	8,398
South Atlantic Division.....	623	9,266
East South Central Division.....	164	3,369
West South Central Division.....	637	8,095
West Region.....	538	7,586
California.....	410	5,597

¹See table 10 for the number of establishments reporting production by State.

Table 6.--PRODUCTION AND SHIPMENTS OF HYDROGEN (TOTAL) BY GEOGRAPHIC AREA: 1976

Geographic area	Production (mil. cu. ft.)	Total shipments including interplant transfers	
		Quantity (mil. cu. ft.)	Value (\$1,000)
UNITED STATES, TOTAL ¹	81,641	31,961	77,997
Northeast Region.....	4,116	2,449	10,636
North Central Region.....	6,295	2,957	8,097
South Region and West Region.....	71,230	26,555	59,264
East South Central Division.....	5,025	1,802	3,729
West South Central Division.....	50,892	16,432	31,932

¹See table 10 for the number of establishments reporting production by State.

Table 7.--PRODUCTION AND SHIPMENTS OF NITROGEN (TOTAL) BY GEOGRAPHIC AREA: 1976

Geographic area	Production (mil. cu. ft.)	Total shipments including interplant transfers	
		Quantity (mil. cu. ft.)	Value (\$1,000)
UNITED STATES, TOTAL ¹	289,926	266,531	255,795
New England Division.....	5,808	5,686	11,145
Middle Atlantic Division.....	31,740	29,895	38,753
New York.....	6,638	5,913	7,146
New Jersey.....	10,428	10,428	14,536
Pennsylvania.....	14,674	13,554	17,071
North Central Region.....	62,738	61,599	57,275
Ohio.....	13,913	13,464	14,792
Illinois.....	9,203	8,980	14,103
South Atlantic Division.....	40,220	34,674	28,153
West Virginia.....	15,808	10,295	6,811
East South Central Division.....	23,716	21,302	18,368
Tennessee.....	7,233	5,474	5,611
Alabama.....	13,487	13,475	11,379
West South Central Division.....	94,345	83,853	60,036
Texas.....	75,461	68,652	42,792
Mountain Division.....	3,844	3,844	6,604
Pacific Division.....	27,515	25,678	35,461
California.....	25,295	24,367	31,902

¹See table 10 for the number of establishments reporting production by State.

Table 8.--PRODUCTION AND SHIPMENTS OF OXYGEN (TOTAL) BY GEOGRAPHIC AREAS: 19/6

Geographic area	Production (mil. cu. ft.)	Total shipments including interplant transfers	
		Quantity (mil. cu. ft.)	Value (\$1,000)
UNITED STATES, TOTAL ¹	382,914	330,581	335,230
New England Division.....	1,921	1,889	5,110
Middle Atlantic Division.....	60,196	59,531	62,063
New York.....	13,379	13,339	14,540
New Jersey.....	2,603	2,603	6,176
Pennsylvania.....	44,214	43,589	41,347
North Central Region.....	146,690	129,739	120,097
Ohio.....	40,022	40,209	34,497
Michigan.....	22,909	13,980	13,098
South Atlantic Region.....	40,505	40,339	39,884
East South Central Division.....	29,503	29,400	29,327
West South Central Division.....	78,565	44,510	44,694
Texas.....	56,567	36,895	33,133
Mountain Division.....	8,606	8,277	9,082
Pacific Division.....	16,928	16,896	24,973
California.....	15,225	15,192	18,615

¹See table 10 for number of establishments reporting production by State.

Table 9. --PRIMARY PRODUCTION OF SPECIFIED INDUSTRIAL GASES, BY MONTHS: 1976 AND 1975

Code	Product	Unit of measure	Year	Total	January	February	March	April	May	June	July	August	September	October	November	December	
2813200	Acetylene.....	mil. cu. ft.	1976	7,111	578	584	596	610	600	615	603	633	621	577	557	537	
			1975	6,704	492	526	431	509	548	552	581	607	641	645	564	604	649
	Produced for pipeline shipment, excluding that produced to be compressed.....	do.	1976	(D)	226	238	238	269	254	1501	1499	1530	1505	1454	1438	1414	
			1975	2,705	200	200	179	177	211	234	244	259	255	259	216	259	271
	Produced for compression, including cylinder and pipeline.....	do.	1976	(D)	(2)	(2)	(2)	(2)	(2)	114	104	103	116	123	119	123	
			1975	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
2813415	Produced for consumption in this plant.....	do.	1976	(D)	2352	2346	2358	2341	2346	318	337	348	386	348	345	378	
			1975	23,999	292	326	252	332	337	337	318	337	348	386	348	345	378
	Argon, high purity, total.....	do.	1976	5,107	367	456	475	398	442	418	408	445	397	454	431	416	
			1975	4,457	372	360	426	401	359	336	373	373	343	380	386	373	348
	Produced for cylinder and bulk delivery shipment.....	do.	1976	5,107	367	456	475	398	442	418	408	445	397	454	431	416	
			1975	4,457	372	360	426	401	359	336	373	373	343	380	386	373	348
2813311	Carbon dioxide, total.....	Short tons	1976	1,966,727	134,985	142,421	160,815	150,361	156,879	165,549	183,321	195,900	187,292	171,234	163,776	154,194	
			1975	1,850,318	132,207	122,163	141,797	146,175	153,827	169,033	176,732	184,120	170,009	172,494	136,978	144,783	
2813331	Liquid and gas.....	do.	1976	1,610,854	112,029	117,828	132,165	124,594	128,621	130,529	146,984	156,005	153,589	141,185	136,514	130,811	
			1975	1,498,716	105,896	100,650	115,488	119,385	123,289	135,271	139,617	148,610	148,610	138,568	141,715	113,540	116,687
2813420	Solid (dry ice).....	do.	1976	355,873	22,956	24,593	28,650	25,767	28,258	35,020	36,337	39,895	33,703	33,703	30,049	27,262	23,383
			1975	351,602	26,311	21,513	26,309	26,790	30,538	33,762	37,115	35,510	31,441	31,441	30,779	23,438	28,096
2813420	Hydrogen, total.....	mil. cu. ft.	1976	81,641	6,470	6,250	7,426	7,143	6,629	6,939	6,456	6,677	6,818	6,999	6,999	6,958	6,876
			1975	73,552	5,712	5,074	5,550	5,356	6,306	5,890	6,209	6,633	6,759	6,879	6,879	6,085	7,099
	Produced for cylinder and bulk delivery shipment.....	do.	1976	8,534	737	567	737	618	703	754	669	679	806	857	857	584	823
			1975	6,882	597	486	636	527	558	547	541	541	522	547	706	504	711
2813440	Liquid produced for conversion to gas.....	do.	1976	23,448	1,464	1,652	1,934	1,770	1,910	2,074	1,957	2,238	2,080	2,097	2,104	2,168	
			1975	20,780	1,773	1,603	1,674	1,402	1,856	1,633	1,751	1,878	1,920	1,650	1,755	1,885	
	Produced for consumption in this plant.....	do.	1976	49,659	4,269	4,031	4,755	4,755	4,016	4,111	3,830	3,760	3,932	4,045	4,270	3,885	
			1975	45,890	3,342	2,985	3,240	3,427	3,892	3,710	3,917	4,233	4,292	4,523	3,836	4,503	
	Nitrogen, total.....	do.	1976	289,926	22,115	22,221	24,425	23,107	24,214	23,122	23,623	25,042	24,444	25,886	25,568	25,159	
			1975	252,368	21,055	19,440	20,612	20,386	20,692	19,941	20,840	21,401	21,710	21,913	21,395	22,983	
	Gas: Produced for cylinder and bulk delivery shipment.....	do.	1976	177,640	13,412	13,234	14,655	13,944	14,833	14,477	14,122	14,894	15,010	16,254	16,254	16,609	
			1975	148,780	12,687	11,730	11,858	11,752	12,047	11,554	12,117	12,593	13,023	12,657	12,863	13,959	
	Produced for consumption in this plant.....	do.	1976	20,159	1,844	1,764	1,824	1,830	1,521	1,602	1,562	1,783	1,461	1,542	1,703	1,723	
			1975	21,666	1,773	1,606	1,886	1,765	1,945	1,850	1,834	1,849	1,821	1,741	1,609	1,987	

See footnotes at end of table.

Table 9.--PRIMARY PRODUCTION OF SPECIFIED INDUSTRIAL GASES, BY MONTHS: 1976 AND 1975--Continued

Code	Product	Unit of measure	Year	Total	January	February	March	April	May	June	July	August	September	October	November	December	
	Nitrogen--Continued Liquid: Produced for cylinder and bulk delivery.....	mil.cu.ft.	1976	82,164	5,751	6,327	6,984	6,655	7,066	6,327	7,059	7,522	7,214	7,304	6,873	7,082	
			1975	73,066	5,805	5,360	6,032	6,075	6,127	6,149	6,295	6,246	6,207	6,785	6,246	6,136	
	Produced for bulk shipment to pipelines or to other air separation plants.....	....do.....	1976	6,728	822	620	660	418	495	465	620	653	512	519	472	472
			1975	38,856	790	744	836	794	573	688	740	724	659	730	677	901	
2813450	Produced for consumption in this plant.....	....do.....	1976	3,235	286	276	302	260	299	251	260	250	247	267	264	273
			1975	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	
	Oxygen, total.....	....do.....	1976	382,914	29,841	31,719	33,292	32,089	34,245	32,603	32,520	32,884	30,691	32,312	30,729	29,989
			1975	352,554	32,165	30,846	32,275	29,725	29,174	27,161	27,087	27,716	30,061	29,196	28,618	28,530	
	Gas: Produced for cylinder and bulk delivery shipment.....	....do.....	1976	191	15	15	19	15	17	18	13	16	17	12	15	19
			1975	218	22	21	21	20	24	24	14	14	14	14	14	14	
	Produced for pipeline shipment.....	....do.....	1976	263,938	20,500	21,554	23,138	22,869	23,930	22,346	22,882	22,876	21,027	21,818	20,763	20,235
			1975	245,259	23,413	22,463	23,489	20,986	20,510	18,347	18,138	18,937	20,278	20,261	19,121	19,316	
	Produced for consumption in this plant.....	....do.....	1976	452,480	4,533	4,700	4,592	4,087	4,697	4,644	4,224	4,277	4,220	3,900	4,224	4,382
			1975	447,299	3,692	3,318	3,371	3,655	3,466	4,166	4,297	4,457	4,489	3,713	4,257	4,418	
	Liquid: Produced for cylinder and bulk delivery shipment.....	....do.....	1976	59,133	4,171	4,881	5,076	4,698	5,029	4,928	4,727	4,999	4,816	5,951	5,118	4,739
			1975	51,835	4,218	4,388	4,595	4,514	4,331	3,794	4,034	3,643	4,648	4,732	4,761	4,177	
	Produced for bulk shipment to pipelines or to other air separation plants.....	....do.....	1976	7,172	622	569	467	420	572	667	674	716	611	631	609	614
			1975	7,943	820	656	799	550	843	830	843	665	604	632	476	465	603
	Produced for consumption in this plant.....	....do.....	1976	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)
			1975	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	

(D) Withheld to avoid disclosing figures for individual companies.

¹Data for (acetylene) produced for consumption in this plant, combined with produced for pipeline shipment (excluding that shipped to be compressed), to avoid disclosure.

²1975 and 1976 data for acetylene, produced for compression including cylinder and pipeline, combined with produced for consumption in this plant, to avoid disclosing figures for individual companies.

³1975 data for nitrogen (liquid), produced for consumption in this plant, combined with produced for bulk shipment to pipelines or to other air separation plants to avoid disclosing figures for individual companies.

⁴Data for oxygen (liquid), produced for consumption in this plant, combined with data for oxygen (gas), produced for consumption in this plant, to avoid disclosing figures for individual companies.

Table 10.--NUMBER OF ESTABLISHMENTS REPORTING THE PRODUCTION OF SELECTED INDUSTRIAL GASES, BY STATE: 1976

State	Acetylene	Carbon dioxide			Argon (refined)	Hydrogen	Nitrogen	Oxygen	Nitrous oxide
		Total ¹	Liquid or gas ²	Solid					
UNITED STATES, TOTAL.....	202	79	62	44	83	127	275	180	8
New England.....	5	1	-	1	2	4	12	5	-
Maine.....	-	-	-	-	-	1	1	1	-
New Hampshire.....	-	-	-	-	-	-	-	-	-
Vermont.....	-	-	-	-	-	-	1	-	-
Massachusetts.....	3	1	-	1	1	1	5	3	-
Rhode Island.....	1	-	-	-	-	-	1	-	-
Connecticut.....	1	-	-	-	1	2	4	1	-
Middle Atlantic.....	20	5	3	3	11	13	41	28	-
New York.....	6	2	2	-	2	3	11	5	-
New Jersey.....	4	2	-	2	2	7	8	4	-
Pennsylvania.....	10	1	1	1	7	3	22	19	-
East North Central.....	37	10	8	5	20	30	52	40	1
Ohio.....	15	3	3	2	9	9	18	19	1
Indiana.....	6	2	2	-	4	2	7	4	-
Illinois.....	6	4	2	3	4	13	17	11	-
Michigan.....	6	-	-	-	2	6	8	5	-
Wisconsin.....	4	1	1	-	1	-	2	1	-
West North Central.....	17	10	7	7	-	4	12	6	1
Minnesota.....	3	2	1	1	-	-	1	2	-
Iowa.....	4	4	3	3	-	-	3	-	-
Missouri.....	2	1	-	1	-	2	6	3	-
North Dakota.....	-	-	-	-	-	-	-	-	-
South Dakota.....	3	-	-	-	-	-	1	1	-
Nebraska.....	1	-	-	-	-	1	-	-	-
Kansas.....	4	3	3	2	-	1	1	-	1
South Atlantic.....	26	10	7	6	10	14	46	19	2
Delaware.....	-	1	1	-	1	4	2	2	-
Maryland.....	2	-	-	-	1	-	5	2	-
District of Columbia.....	-	-	-	-	-	-	-	-	-
Virginia.....	3	1	1	1	1	2	3	2	1
West Virginia.....	4	1	1	1	2	4	12	5	-
North Carolina.....	3	1	1	-	1	-	8	2	-
South Carolina.....	1	-	-	-	1	-	6	2	1
Georgia.....	4	2	1	1	2	2	4	2	-
Florida.....	9	4	2	3	1	2	6	2	-
East South Central.....	16	6	6	1	5	17	28	17	2
Kentucky.....	3	2	2	-	-	4	7	5	-
Tennessee.....	6	4	4	1	3	8	13	4	1
Alabama.....	5	-	-	-	2	4	7	7	-
Mississippi.....	2	-	-	-	-	1	1	1	1
West South Central.....	39	17	14	5	18	26	46	35	-
Arkansas.....	2	1	1	-	1	-	1	1	-
Louisiana.....	6	3	2	1	3	7	13	9	-
Oklahoma.....	4	-	-	-	2	-	3	2	-
Texas.....	27	13	11	4	12	19	29	23	-
Mountain.....	19	8	7	8	3	2	11	11	-
Montana.....	2	-	-	-	-	-	-	1	-
Idaho.....	2	-	-	-	-	-	1	1	-
Wyoming.....	1	-	-	-	-	-	-	-	-
Colorado.....	3	2	1	2	1	-	1	1	-
New Mexico.....	2	2	2	2	1	-	3	2	-
Arizona.....	4	2	2	2	-	-	3	2	-
Utah.....	3	2	2	2	1	1	2	3	-
Nevada.....	2	-	-	-	-	-	-	-	-
Pacific.....	23	12	10	8	14	17	27	19	2
Washington.....	4	2	2	2	2	2	4	3	-
Oregon.....	4	-	-	-	1	1	1	1	-
California.....	12	6	4	5	11	11	19	14	2
Alaska.....	1	1	1	-	-	-	1	1	-
Hawaii.....	2	3	3	1	-	3	2	2	-

-Represents zero.

¹Unduplicated.²Excludes plants converting entire production to solid.

Industrial Gases



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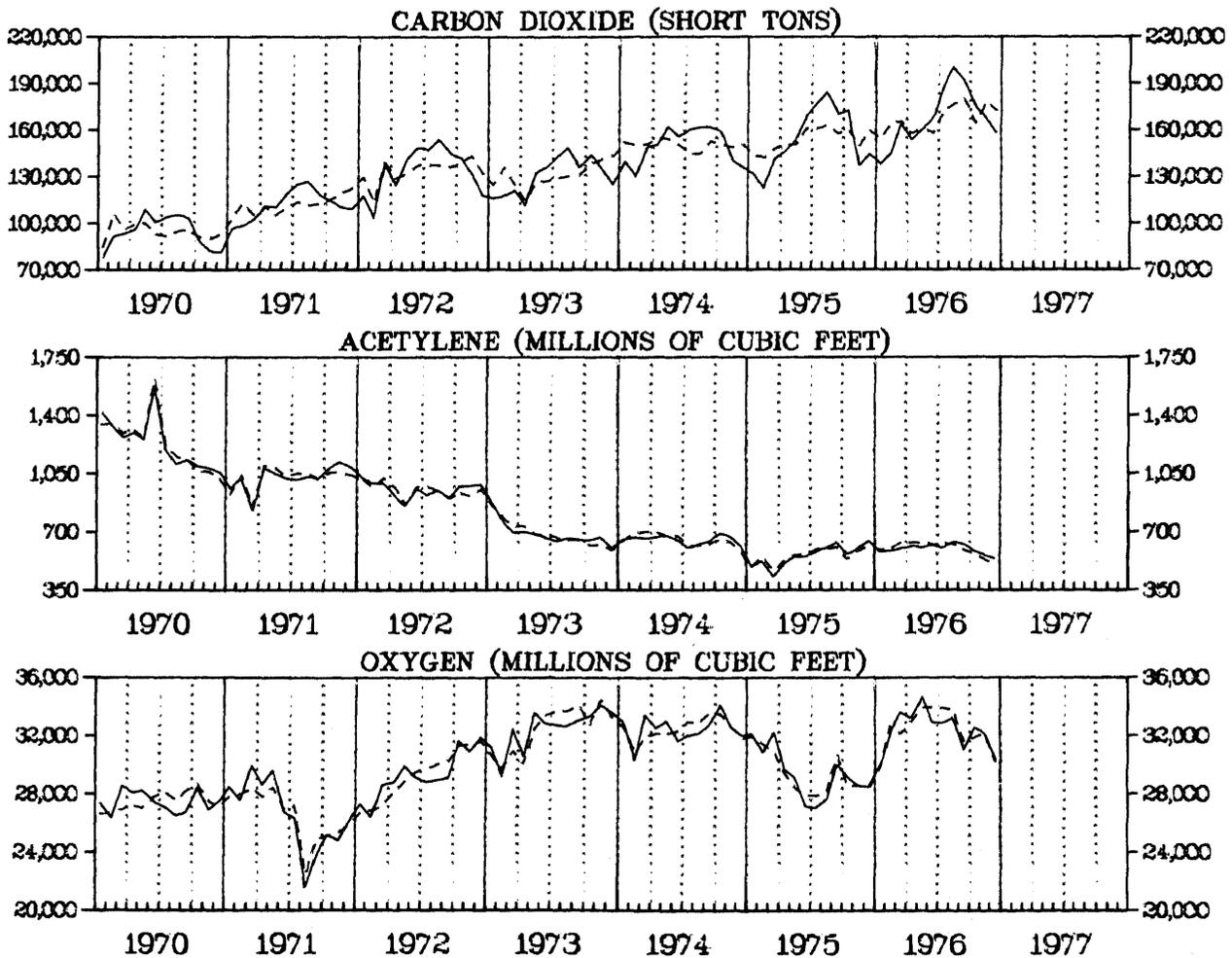
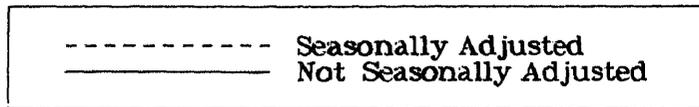
JANUARY 1977

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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 and includes all the months for the current and previous years and incorporates all known revisions in the series.

PRODUCTION OF SELECTED INDUSTRIAL GASES 1970 TO 1977



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) 763-7838.

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TABLE 1A.--SUMMARY OF PRODUCTION OF PRINCIPAL GASES: 1975 TO 1977

(Seasonally adjusted)

Month and year	Acetylene (2813200)	Carbon dioxide (2813311) and (2813311)	Hydrogen, high and low purity and (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.)
1977					
January.....	547	152,384	6,114	24,527	29,684
1976					
December.....	527	181,522	6,697	26,548	29,899
November.....	540	178,411	7,069	26,504	32,471
October.....	544	160,558	6,612	25,615	31,573
September.....	619	188,282	6,735	24,781	32,096
August.....	658	178,534	6,727	25,216	34,687
July.....	617	174,657	6,277	23,794	33,669
June.....	629	156,840	6,946	23,650	33,074
May.....	615	156,280	6,389	23,826	33,145
April.....	634	156,988	7,101	23,782	33,222
March.....	639	172,021	7,138	23,487	31,761
February.....	607	163,998	6,453	23,719	34,284
January.....	564	148,723	6,365	22,180	29,609
1975					
December.....	630	165,957	7,015	23,244	28,082
November.....	578	146,012	6,285	21,969	28,936
October.....	526	158,133	6,584	21,580	30,225
September.....	633	161,860	6,871	21,986	31,120
August.....	624	164,215	6,810	21,282	28,925
July.....	594	164,625	6,135	20,788	27,722
June.....	557	157,413	5,986	20,355	27,274
May.....	557	149,886	6,171	20,241	25,961
April.....	523	149,434	5,383	20,707	29,183
March.....	458	148,496	5,400	19,814	30,493
February.....	543	137,709	5,311	20,590	32,939
January.....	477	142,630	5,684	20,851	31,722

TABLE 1B.--SUMMARY OF PRODUCTION PRINCIPAL GASES: 1975 TO 1977

(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) ¹	(Short tons) ¹	(Mil. cu. ft.) ¹	(Mil. cu. ft.) ¹	(Mil. cu. ft.)
1977						
January.....	564	118,495	22,841	6,144	24,821	30,100
1976						
December.....	542	134,427	23,929	6,778	26,309	30,376
November.....	563	139,610	27,893	6,844	25,869	32,144
October.....	583	144,386	30,726	6,909	26,076	32,584
September.....	626	157,029	34,488	6,626	24,532	31,044
August.....	639	159,424	40,855	6,552	25,342	33,237
July.....	603	150,201	37,390	6,353	23,913	32,898
June.....	622	132,705	35,815	6,835	23,226	32,938
May.....	605	131,485	28,916	6,528	24,421	34,679
April.....	617	127,317	26,338	7,065	23,471	33,213
March.....	601	135,063	29,300	7,337	24,496	33,618
February.....	588	120,316	25,142	6,165	22,448	32,107
January.....	582	114,474	23,467	6,397	22,445	30,024
1975 ²						
December.....	648	116,682	28,096	7,099	23,035	28,530
November.....	603	113,647	23,438	6,085	21,443	28,618
October.....	563	141,687	30,779	6,879	21,968	29,196
September.....	640	138,619	31,441	6,759	21,765	30,061
August.....	606	148,706	35,510	6,633	21,452	27,716
July.....	580	139,701	37,115	6,209	20,892	27,087
June.....	551	135,374	33,762	5,890	19,990	27,162
May.....	548	123,301	30,538	6,306	20,746	29,175
April.....	509	119,472	26,790	5,356	20,436	29,726
March.....	431	115,576	26,309	5,550	20,665	32,276
February.....	526	100,628	21,513	5,074	19,487	30,847
January.....	492	105,978	26,311	5,712	21,101	32,166

Note: Beginning in January of 1975, the data are adjusted for report period variation. Comparable data are not available for previous years; however, the effect of this adjustment is considered to be negligible at the total level. See "Reporting Period Adjustment" in the text. ¹See footnote 6, table 2. ²See text--Relationship between M28C and M28C-14 series for Industrial Gases.

TABLE 2.--PRIMARY PRODUCTION OF SPECIFIED INDUSTRIAL GASES

PRODUCT CODE	CHEMICAL AND BASIS	UNIT OF MEASURE	JANUARY 1977	DECEMBER 1976	JANUARY 1976
			QUANTITY PRODUCED	QUANTITY PRODUCED	QUANTITY PRODUCED
2813200	ACETYLENE (1)	MIL.CU.FT	564	542	582
	PRODUCED FOR PIPELINE SHIPMENT (EXCLUDING THAT SHIPPED TO BE COMPRESSED)	DO	2453	2420	232
	PRODUCED FOR PIPELINE SHIPMENT	DO	111	122	350
	PRODUCED FOR CONSUMPTION IN THIS PLANT	DO	(2)	(2)	
2813415	ARGON, HIGH PURITY	DO	378	415	365
	PRODUCED FOR CYLINDER AND BULK DELIVERY SHIPMENT	DO	378	415	365
	PRODUCED FOR PIPELINE SHIPMENT	DO			
	PRODUCED FOR CONSUMPTION IN THIS PLANT	DO			
2813311	CARBON DIOXIDE:				
	LIQUID AND GAS (2)	S.TONS	118,495	134,427	114,474
2813331	SOLID (DRY ICE)	DO	22,841	23,929	23,467
2813420	HYDROGEN, TOTAL (3)	MIL.CU.FT	6,144	5,778	6,397
	PRODUCED FOR CYLINDER AND BULK DELIVERY SHIPMENT	DO	773	846	757
	LIQUID PRODUCED FOR CONVERSION TO GAS	DO			
	PRODUCED FOR PIPELINE SHIPMENT	DO			
	LIQUID PRODUCED FOR GOVERNMENT USE	DO			
	PRODUCED FOR CONSUMPTION IN THIS PLANT	DO			
		1,739			
2813440	NITROGEN, TOTAL (4)	DO	24,821	26,309	22,445
	GAS:				
	PRODUCED FOR CYLINDER AND BULK DELIVERY SHIPMENT	DO	15,743	16,788	13,663
	PRODUCED FOR PIPELINE SHIPMENT	DO			
	PRODUCED FOR CONSUMPTION IN THIS PLANT	DO			
			1,526	1,690	1,816
	LIQUID:				
	PRODUCED FOR CYLINDER AND BULK DELIVERY SHIPMENT	DO	6,560	7,040	5,719
PRODUCED FOR BULK SHIPMENT TO PIPELINES OR TO OTHER AIR SEPARATION PLANTS	DO	992	791	954	
PRODUCED FOR CONSUMPTION IN THIS PLANT	DO				
2813450	OXYGEN, TOTAL	DO	30,100	30,376	30,024
	GAS:				
	PRODUCED FOR CYLINDER AND BULK DELIVERY SHIPMENT	DO	17	22	18
	PRODUCED FOR PIPELINE SHIPMENT	DO	20,317	20,466	20,528
	PRODUCED FOR CONSUMPTION IN THIS PLANT	DO	64,551	64,523	4,665
	LIQUID:				
	PRODUCED FOR CYLINDER AND BULK DELIVERY SHIPMENT	DO	4,799	4,721	4,158
	PRODUCED FOR BULK SHIPMENT TO PIPELINES OR TO OTHER AIR SEPARATION PLANTS	DO	416	644	655
PRODUCED FOR CONSUMPTION IN THIS PLANT	DO	(6)	(6)	(6)	

¹Revised by 5 percent or more from previously published figures.

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

³Data for (acetylene) produced for consumption in this plant, combined with, produced for pipeline shipment (excluding that shipped to be compressed), to avoid disclosure.

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⁶Excludes amounts produced and used in the manufacture of ammonia and ammonia derivatives.

⁷Data for oxygen (liquid), produced for consumption in this plant, combined with data for oxygen (gas) produced for consumption in this plant to avoid disclosure.

DESCRIPTION OF SURVEY

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

Sampling 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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Reporting Period Adjustment—Beginning January 1975 the data were adjusted for number of working days in the reporting period to compensate for differences in individual company reporting patterns (i.e., calendar month, 4-week, 5-week periods). It has been determined that the calendar month accounting system prevails in the industry. Hence, adjustments have been made to those reporting on other than a calendar month basis.

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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:

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CONTACTS FOR DATA USERS

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Industrial Gases



U.S. Department of Commerce
BUREAU OF THE CENSUS

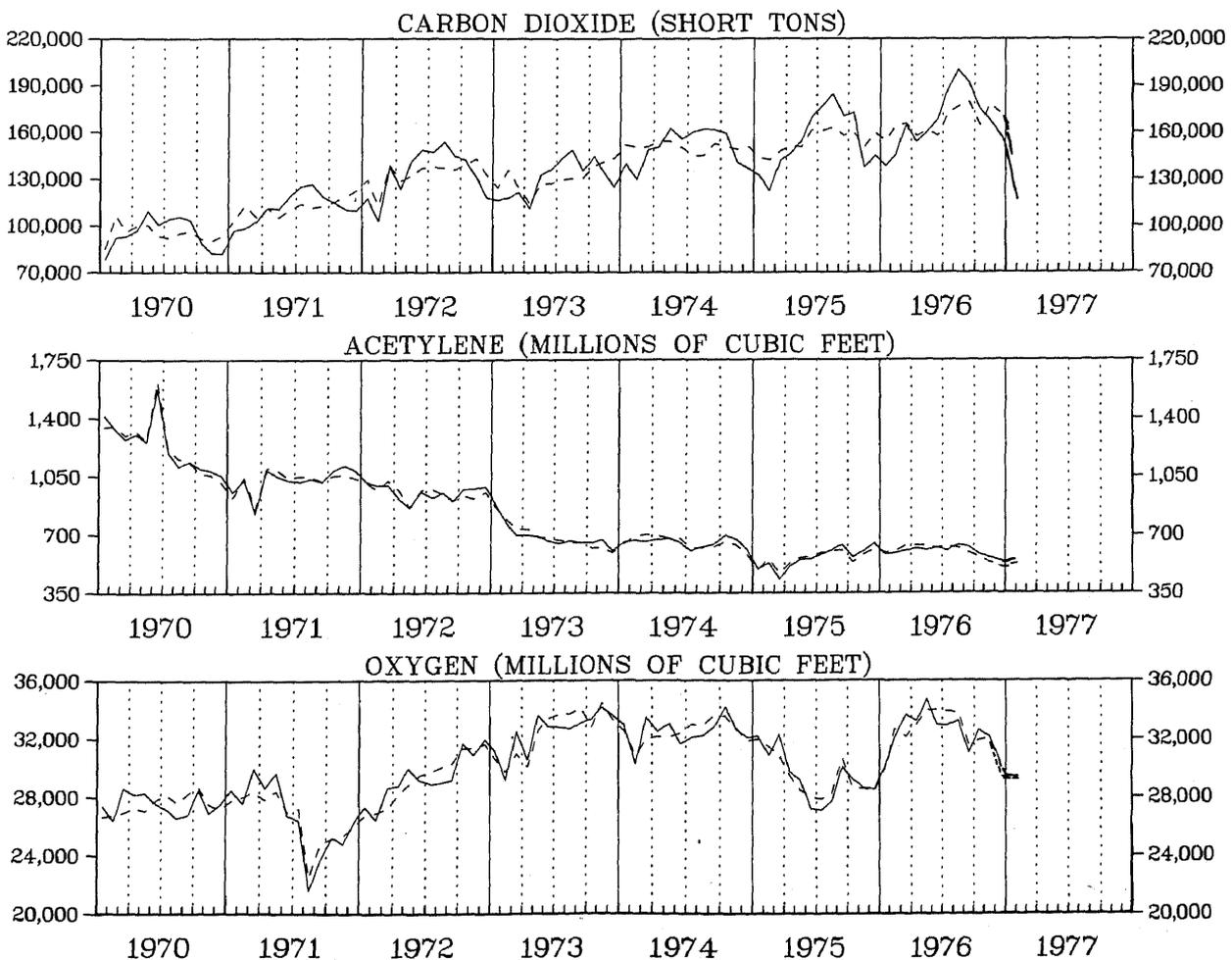
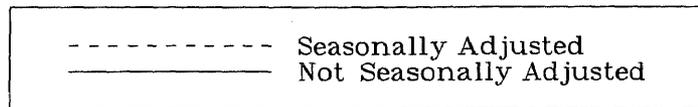
FEBRUARY 1977

Issued April 1977
Series: M28C(77)-2

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 and includes all the months for the current and previous years and incorporates all known revisions in the series.

PRODUCTION OF SELECTED INDUSTRIAL GASES 1970 TO 1977



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) 763-7838.

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: 1975 TO 1977

(Seasonally adjusted)

Month and year	Acetylene (2813200)	Carbon dioxide (2813311) and (2813311)	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.)
1977					
February.....	549	175,818	6,870	24,917	31,305
January.....	548	151,605	6,234	24,451	29,455
1976					
December.....	527	181,522	6,697	26,548	29,899
November.....	540	178,411	7,069	26,504	32,471
October.....	544	160,558	6,612	25,615	31,573
September.....	619	188,282	6,735	24,781	32,096
August.....	658	178,534	6,727	25,216	34,687
July.....	617	174,657	6,277	23,794	33,669
June.....	629	156,840	6,946	23,650	33,074
May.....	615	156,280	6,389	23,826	33,145
April.....	634	156,988	7,101	23,782	33,222
March.....	639	172,021	7,138	23,487	31,761
February.....	607	163,998	6,453	23,719	34,284
January.....	564	148,723	6,365	22,180	29,609
1975					
December.....	630	165,957	7,015	23,244	28,082
November.....	578	146,012	6,285	21,969	28,936
October.....	526	158,133	6,584	21,580	30,225
September.....	633	161,860	6,871	21,986	31,120
August.....	624	164,215	6,810	21,282	28,925
July.....	594	164,625	6,135	20,788	27,722
June.....	557	157,413	5,986	20,355	27,274
May.....	557	149,886	6,171	20,241	25,961
April.....	523	149,434	5,383	20,707	29,183
March.....	458	148,496	5,400	19,814	30,493
February.....	543	137,709	5,311	20,590	32,939

TABLE 1B.--SUMMARY OF PRODUCTION PRINCIPAL GASES: 1975 TO 1977

(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) ¹	(Short tons) ¹	(Mil. cu. ft.) ¹	(Mil. cu. ft.) ¹	(Mil. cu. ft.)
1977						
February.....	532	131,911	24,031	6,563	23,582	29,317
January.....	565	117,726	22,888	6,265	24,744	29,867
1976						
December.....	542	134,427	23,929	6,778	26,309	30,376
November.....	563	139,610	27,893	6,844	25,869	32,144
October.....	583	144,386	30,726	6,909	26,076	32,584
September.....	626	157,029	34,488	6,626	24,532	31,044
August.....	639	159,424	40,855	6,552	25,342	33,237
July.....	603	150,201	37,390	6,353	23,913	32,898
June.....	622	132,705	35,815	6,835	23,226	32,938
May.....	605	131,485	28,916	6,528	24,421	34,679
April.....	617	127,317	26,338	7,065	23,471	33,213
March.....	601	135,063	29,300	7,337	24,496	33,618
February.....	588	120,316	25,142	6,165	22,448	32,107
January.....	582	114,474	23,467	6,397	22,445	30,024
1975 ²						
December.....	648	116,682	28,096	7,099	23,035	28,530
November.....	603	113,647	23,438	6,085	21,443	28,618
October.....	563	141,687	30,779	6,879	21,968	29,196
September.....	640	138,619	31,441	6,759	21,765	30,061
August.....	606	148,706	35,510	6,633	21,452	27,716
July.....	580	139,701	37,115	6,209	20,892	27,087
June.....	551	135,374	33,762	5,890	19,990	27,162
May.....	548	123,301	30,538	6,306	20,746	29,175
April.....	509	119,472	26,790	5,356	20,436	29,726
March.....	431	115,576	26,309	5,550	20,665	32,276
February.....	526	100,628	21,513	5,074	19,487	30,847

Note: Beginning in January of 1975, the data are adjusted for report period variation. Comparable data are not available for previous years; however, the effect of this adjustment is considered to be negligible at the total level. See "Reporting Period Adjustment" in the text. ¹See footnote 6, table 2. ²See text--Relationship between M28C and M28C-14 series for Industrial Gases.

TABLE 2.--PRIMARY PRODUCTION OF SPECIFIED INDUSTRIAL GASES

PRODUCT CODE	CHEMICAL AND BASIS	UNIT OF MEASURE	FEBRUARY 1977 QUANTITY PRODUCED	JANUARY 1977 QUANTITY PRODUCED	FEBRUARY 1976 QUANTITY PRODUCED
2813200	ACETYLENE (1)	MIL. CU. FT	532	565	588
	PRODUCED FOR PIPELINE SHIPMENT (EXCLUDING THAT SHIPPED TO BE COMPRESSED)	DO	2420	2454	245
	PRODUCED FOR COMPRESSION, INCLUDING CYLINDER AND PIPELINE	DO	112	111	343
	PRODUCED FOR CONSUMPTION IN THIS PLANT.	DO	(²)	(²)	
2813415	ARGON, HIGH PURITY	DO	449	380	454
	PRODUCED FOR CYLINDER AND BULK DELIVERY SHIPMENT	DO	449	380	454
	PRODUCED FOR PIPELINE SHIPMENT.	DO			
	PRODUCED FOR CONSUMPTION IN THIS PLANT.	DO			
2813311	CARBON DIOXIDE: LIQUID AND GAS (3)	S. TONS	131,911	117,726	120,316
2813331	SOLID (DRY ICE)	DO	24,031	22,888	25,142
2813420	HYDROGEN, TOTAL (4)	MIL. CU. FT	6,563	6,265	6,165
	PRODUCED FOR CYLINDER AND BULK DELIVERY SHIPMENT	DO	968	768	583
	LIQUID PRODUCED FOR CONVERSION TO GAS	DO			
	PRODUCED FOR PIPELINE SHIPMENT.	DO			
	LIQUID PRODUCED FOR GOVERNMENT USE.	DO	1,861	1,744	1,573
	PRODUCED FOR CONSUMPTION IN THIS PLANT.	DO	3,734	3,753	4,009
2813440	NITROGEN, TOTAL (5)	DO	23,582	24,744	22,448
	GAS: PRODUCED FOR CYLINDER AND BULK DELIVERY SHIPMENT.	DO	14,431	15,633	13,401
	PRODUCED FOR PIPELINE SHIPMENT	DO			
	PRODUCED FOR CONSUMPTION IN THIS PLANT	DO			
	LIQUID: PRODUCED FOR CYLINDER AND BULK DELIVERY SHIPMENT.	DO	7,001	6,590	6,337
	PRODUCED FOR BULK SHIPMENT TO PIPELINES OR TO OTHER AIR SEPARATION PLANTS.	DO	675	996	687
	PRODUCED FOR CONSUMPTION IN THIS PLANT	DO			
2813450	OXYGEN, TOTAL	DO	29,317	29,867	32,107
	GAS: PRODUCED FOR CYLINDER AND BULK DELIVERY SHIPMENT.	DO	20	17	60
	PRODUCED FOR PIPELINE SHIPMENT	DO	19,753	20,239	21,734
	PRODUCED FOR CONSUMPTION IN THIS PLANT	DO	⁶ 4,069	⁶ 4,432	⁶ 4,851
	LIQUID: PRODUCED FOR CYLINDER AND BULK DELIVERY SHIPMENT.	DO	5,088	4,762	4,864
	PRODUCED FOR BULK SHIPMENT TO PIPELINES OR TO OTHER AIR SEPARATION PLANTS.	DO	387	417	598
	PRODUCED FOR CONSUMPTION IN THIS PLANT	DO	(⁶)	(⁶)	(⁶)

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²Data for (acetylene) produced for consumption in this plant, combined with, produced for pipeline shipment (excluding that shipped to be compressed), to avoid disclosure.

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⁵Excludes amounts produced and used in the manufacture of ammonia and ammonia derivatives.

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EXPLANATION OF TERMS

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Industrial Gases



U.S. Department of Commerce
BUREAU OF THE CENSUS

MARCH 1977

Issued May 1977
Series: M28C(77)-3

The publication in this series will not be issued for March due to a significant number of major producers whose reports were not received in time for tabulation. These data will be shown in the April issue.

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) 763-7838.

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Industrial Gases



U.S. Department of Commerce
BUREAU OF THE CENSUS

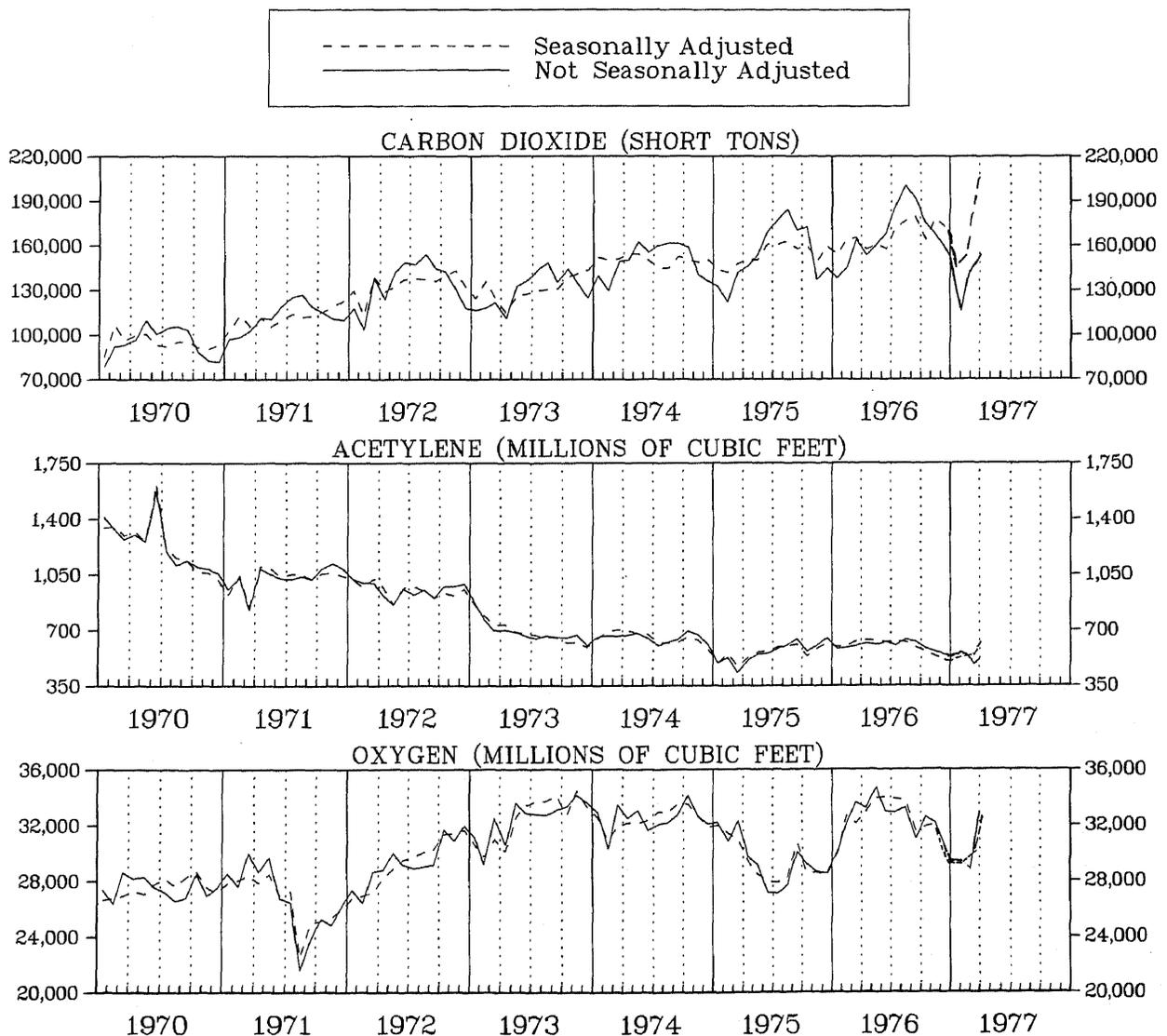
MARCH AND APRIL 1977

M28C(77)-3 and 4
Issued June 1977

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-

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PRODUCTION OF SELECTED INDUSTRIAL GASES 1970 TO 1977



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	(Mil. cu. ft.)	(Short tons)	(Mil. cu. ft.)	(Mil. cu. ft.)	(Mil. cu. ft.)
1977					
April.....	445	185,257	7,224	25,338	33,367
March.....	572	192,684	7,130	25,264	32,738
February.....	548	179,989	6,645	24,994	30,900
January.....	548	151,605	6,234	24,451	29,455
1976					
December.....	527	181,522	6,697	26,548	29,899
November.....	540	178,411	7,069	26,504	32,471
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	(Mil. cu. ft.)	(Short tons) ¹	(Short tons) ¹	(Mil. cu. ft.) ¹	(Mil. cu. ft.) ¹	(Mil. cu. ft.)
1977						
April.....	433	155,223	26,101	7,187	25,006	33,358
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.....	542	134,427	23,929	6,778	26,309	30,376
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June.....	551	135,374	37,762	5,890	19,990	27,162
May.....	548	123,301	30,538	6,306	20,746	29,175
April.....	509	119,472	26,790	5,356	20,436	29,726

Note: Beginning in January of 1975, the data are adjusted for report period variation. Comparable data are not available for previous years; however, the effect of this adjustment is considered to be negligible at the total level. See "Reporting Period Adjustment" in the text. ¹See footnote 6, table 2. ²See text--Relationship between M28C and M28C-14 series for Industrial Gases.

TABLE 2.--PRIMARY PRODUCTION OF SPECIFIED INDUSTRIAL GASES

PRODUCT CODE	CHEMICAL AND BASIS	UNIT OF MEASURE	APRIL	MARCH	FEBRUARY
			1977	1977	1977
			QUANTITY PRODUCED	QUANTITY PRODUCED	QUANTITY PRODUCED
2813200	ACETYLENE (1)	MIL.CU.FT	433	538	531
	PRODUCED FOR PIPELINE SHIPMENT (EXCLUDING THAT SHIPPED TO BE COMPRESSED)	DO	2330	2414	2421
	PRODUCED FOR COMPRESSION, INCLUDING CYLINDER AND PIPELINE	DO	103	124	110
	PRODUCED FOR CONSUMPTION IN THIS PLANT	DO	(2)	(2)	(2)
2813415	ARGON, HIGH PURITY	DO	534	503	449
	PRODUCED FOR CYLINDER AND BULK DELIVERY SHIPMENT	DO	534	503	449
	PRODUCED FOR PIPELINE SHIPMENT	DO			
PRODUCED FOR CONSUMPTION IN THIS PLANT	DO				
2813311	CARBON DIOXIDE:				
2813331	LIQUID AND GAS (3)	S.TONS	155,223	156,321	135,583
	SOLID (DRY ICE)	DO	26,101	27,785	24,058
2813420	HYDROGEN, TOTAL (4)	MIL.CU.FT	7,187	7,329	6,348
	PRODUCED FOR CYLINDER AND BULK DELIVERY SHIPMENT	DO	928	693	753
	LIQUID PRODUCED FOR CONVERSION TO GAS	DO			
	PRODUCED FOR PIPELINE SHIPMENT	DO			
	LIQUID PRODUCED FOR GOVERNMENT USE	DO			
PRODUCED FOR CONSUMPTION IN THIS PLANT	DO				
2813440	NITROGEN, TOTAL (5)	DO	25,006	26,349	23,655
	GAS:				
	PRODUCED FOR CYLINDER AND BULK DELIVERY SHIPMENT	DO	15,450	16,642	14,633
	PRODUCED FOR PIPELINE SHIPMENT	DO			
	PRODUCED FOR CONSUMPTION IN THIS PLANT	DO			
	LIQUID:				
	PRODUCED FOR CYLINDER AND BULK DELIVERY SHIPMENT	DO	6,958	7,592	6,817
	PRODUCED FOR BULK SHIPMENT TO PIPELINES OR TO OTHER AIR SEPARATION PLANTS	DO	553	449	474
	PRODUCED FOR CONSUMPTION IN THIS PLANT	DO	267	261	201
2813450	OXYGEN, TOTAL	DO	33,358	34,653	28,938
	GAS:				
	PRODUCED FOR CYLINDER AND BULK DELIVERY SHIPMENT	DO	21	33	20
	PRODUCED FOR PIPELINE SHIPMENT	DO	23,296	23,565	19,570
	PRODUCED FOR CONSUMPTION IN THIS PLANT	DO	63,946	64,949	64,142
	LIQUID:				
	PRODUCED FOR CYLINDER AND BULK DELIVERY SHIPMENT	DO	5,276	5,483	4,807
	PRODUCED FOR BULK SHIPMENT TO PIPELINES OR TO OTHER AIR SEPARATION PLANTS	DO	819	613	399
PRODUCED FOR CONSUMPTION IN THIS PLANT	DO	(6)	(6)	(6)	

^r Revised by 5 percent or more from previously published figures.

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

² Data for (acetylene) produced for consumption in this plant, combined with, produced for pipeline shipment (excluding that shipped to be compressed), to avoid disclosure.

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Scope of Survey—This survey includes 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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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.

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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	Melva Martin	(201) 763-7838
Foreign Trade publications	Paul Finn	(301) 763-5140
Bureau of Domestic Commerce	Chemicals Program (OBRA)	(202) 377-5496
To order a Census publication	Dorothy Dunham	(301) 763-7472
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Industrial Gases



U.S. Department of Commerce
BUREAU OF THE CENSUS

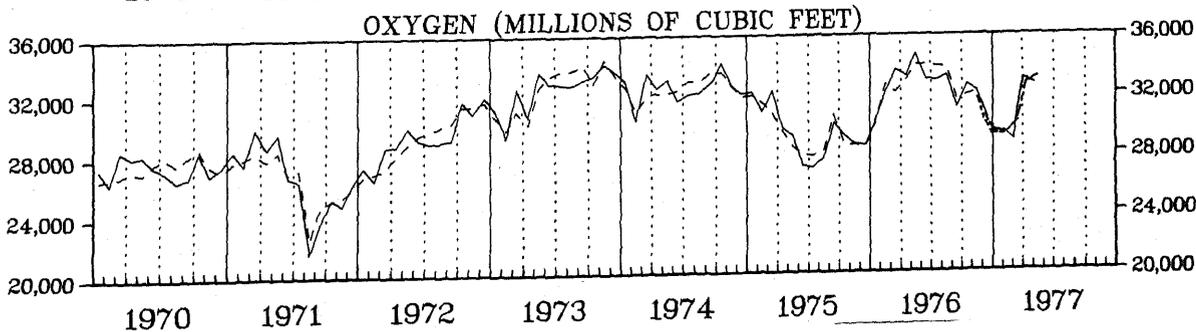
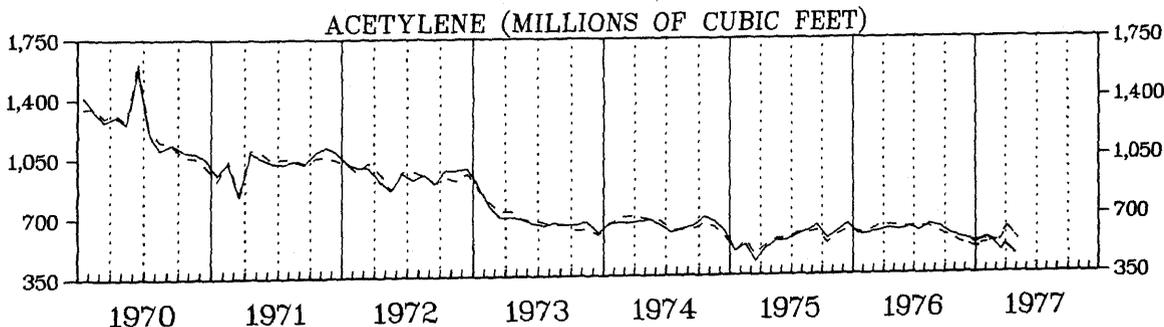
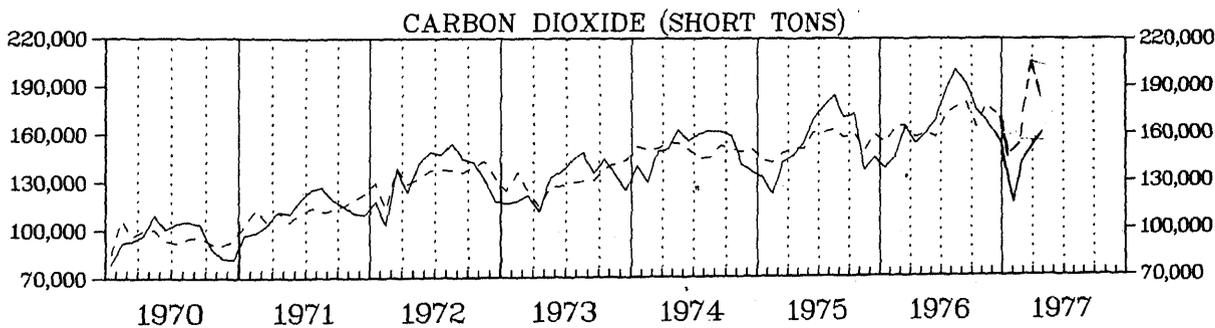
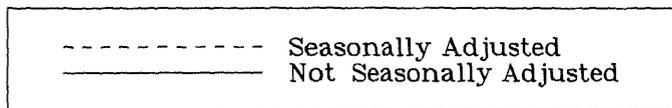
MAY 1977

M28C(77)-5
Issued July 1977

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PRODUCTION OF SELECTED INDUSTRIAL GASES 1970 TO 1977



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TABLE 1A.--SUMMARY OF PRODUCTION OF PRINCIPAL GASES: 1975 TO 1977

(Seasonally adjusted)					
Month and year	Acetylene (2813200)	Carbon dioxide (2813311) and (2813311)	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.)
1977					
May.....	552	185,957	6,894	26,357	33,459
April.....	440	188,960	7,067	25,915	33,410
March.....	572	192,684	7,130	25,264	32,738
February.....	548	179,989	6,645	24,994	30,900
January.....	548	151,605	6,234	24,451	29,455
1976					
December.....	527	181,522	6,697	26,548	29,899
November.....	540	178,411	7,069	26,504	32,471
October.....	544	160,558	6,612	25,615	31,573
September.....	619	188,282	6,735	24,781	32,096
August.....	658	178,534	6,727	25,216	34,687
July.....	617	174,657	6,277	23,794	33,669
June.....	629	156,840	6,946	23,650	33,074
May.....	615	156,280	6,389	23,826	33,145
April.....	634	156,988	7,101	23,782	33,222
March.....	639	172,021	7,138	23,487	31,761
February.....	607	163,998	6,453	23,719	34,284
January.....	564	148,723	6,365	22,180	29,609
1975					
December.....	630	165,957	7,015	23,244	28,082
November.....	578	146,012	6,285	21,969	28,936
October.....	526	158,133	6,584	21,580	30,225
September.....	633	161,860	6,871	21,986	31,120
August.....	624	164,215	6,810	21,282	28,925
July.....	594	164,625	6,135	20,788	27,722
June.....	557	157,413	5,986	20,355	27,274
May.....	557	149,886	6,171	20,241	25,961
April.....	523	149,434	5,383	20,707	29,183

TABLE 1B.--SUMMARY OF PRODUCTION PRINCIPAL GASES: 1975 TO 1977

(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) ¹	(Short tons) ¹	(Mil. cu. ft.) ¹	(Mil. cu. ft.) ¹	(Mil. cu. ft.)
1977						
May.....	543	161,352	29,509	7,044	27,015	35,007
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.....	542	134,427	23,929	6,778	26,309	30,376
November.....	563	139,610	27,893	6,844	25,869	32,144
October.....	583	144,386	30,726	6,909	26,076	32,584
September.....	626	157,029	34,488	6,626	24,532	31,044
August.....	639	159,424	40,855	6,552	25,342	33,237
July.....	603	150,201	37,390	6,353	23,913	32,898
June.....	622	132,705	35,815	6,835	23,226	32,938
May.....	605	131,485	28,916	6,528	24,421	34,679
April.....	617	127,317	26,338	7,065	23,471	33,213
March.....	601	135,063	29,300	7,337	24,496	33,618
February.....	588	120,316	25,142	6,165	22,448	32,107
January.....	582	114,474	23,467	6,397	22,445	30,024
1975 ²						
December.....	648	116,682	28,096	7,099	23,035	28,530
November.....	603	113,647	23,438	6,085	21,443	28,618
October.....	563	141,687	30,779	6,879	21,968	29,196
September.....	640	138,619	31,441	6,759	21,765	30,061
August.....	606	148,706	35,510	6,633	21,452	27,716
July.....	580	139,701	37,115	6,209	20,892	27,087
June.....	551	135,374	37,762	5,890	19,990	27,162
May.....	548	123,301	30,538	6,306	20,746	29,175
April.....	509	119,472	26,790	5,356	20,436	29,726

Note: Beginning in January of 1975, the data are adjusted for report period variation. Comparable data are not available for previous years; however, the effect of this adjustment is considered to be negligible at the total level. See "Reporting Period Adjustment" in the text. ¹See footnote 6, table 2. ²See text--Relationship between M28C and M28C-14 series for Industrial Gases.

TABLE 2.--PRIMARY PRODUCTION OF SPECIFIED INDUSTRIAL GASES

PRODUCT CODE	CHEMICAL AND BASIS	UNIT OF MEASURE	MAY 1977	APRIL 1977	MAY 1976
			QUANTITY PRODUCED	QUANTITY PRODUCED	QUANTITY PRODUCED
2813200	ACETYLENE (1)	MIL.CU.FT	543	428	605
	PRODUCED FOR PIPELINE SHIPMENT (EXCLUDING THAT SHIPPED TO BE COMPRESSED)	DO	² 438	² 324	261
	PRODUCED FOR COMPRESSION, INCLUDING CYLINDER AND PIPELINE	DO	105	104	344
	PRODUCED FOR CONSUMPTION IN THIS PLANT	DO	(²)	(²)	
2813415	ARGON, HIGH PURITY	DO	484	536	440
	PRODUCED FOR CYLINDER AND BULK DELIVERY SHIPMENT	DO	484	536	440
	PRODUCED FOR PIPELINE SHIPMENT	DO			
PRODUCED FOR CONSUMPTION IN THIS PLANT	DO				
2813311	CARBON DIOXIDE:				
	LIQUID AND GAS (3)	S.TONS	161,352	158,736	131,485
2813331	SOLID (DRY ICE)	DO	29,509	26,212	28,916
2813420	HYDROGEN, TOTAL (4)	MIL.CU.FT	7,044	7,031	6,528
	PRODUCED FOR CYLINDER AND BULK DELIVERY SHIPMENT	DO	604	^r 879	722
	LIQUID PRODUCED FOR CONVERSION TO GAS	DO			
	PRODUCED FOR PIPELINE SHIPMENT	DO			
	LIQUID PRODUCED FOR GOVERNMENT USE	DO			
PRODUCED FOR CONSUMPTION IN THIS PLANT	DO				
2813440	NITROGEN, TOTAL (5)	DO	27,015	25,576	24,421
	GAS:				
	PRODUCED FOR CYLINDER AND BULK DELIVERY SHIPMENT	DO	16,447	15,885	15,049
	PRODUCED FOR PIPELINE SHIPMENT	DO			
	PRODUCED FOR CONSUMPTION IN THIS PLANT	DO			
	LIQUID:				
	PRODUCED FOR CYLINDER AND BULK DELIVERY SHIPMENT	DO	7,723	7,051	7,030
	PRODUCED FOR BULK SHIPMENT TO PIPELINES OR TO OTHER AIR SEPARATION PLANTS	DO	586	^r 556	855
	PRODUCED FOR CONSUMPTION IN THIS PLANT	DO	300	^r 302	
	2813450	OXYGEN, TOTAL	DO	35,007	33,401	34,679
GAS:					
PRODUCED FOR CYLINDER AND BULK DELIVERY SHIPMENT		DO	21	21	20
PRODUCED FOR PIPELINE SHIPMENT		DO	25,011	23,504	24,197
PRODUCED FOR CONSUMPTION IN THIS PLANT		DO	(⁶)	(⁶)	(⁶)
LIQUID:					
PRODUCED FOR CYLINDER AND BULK DELIVERY SHIPMENT		DO	5,515	5,292	5,013
PRODUCED FOR BULK SHIPMENT TO PIPELINES OR TO OTHER AIR SEPARATION PLANTS		DO	689	820	602
PRODUCED FOR CONSUMPTION IN THIS PLANT	DO	(⁶)	(⁶)	(⁶)	

¹Revised by 5 percent or more from previously published figures.

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⁸The overall estimation of this survey for May 1977 does not exceed 25%.

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Scope of Survey—This survey includes 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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Industrial Gases



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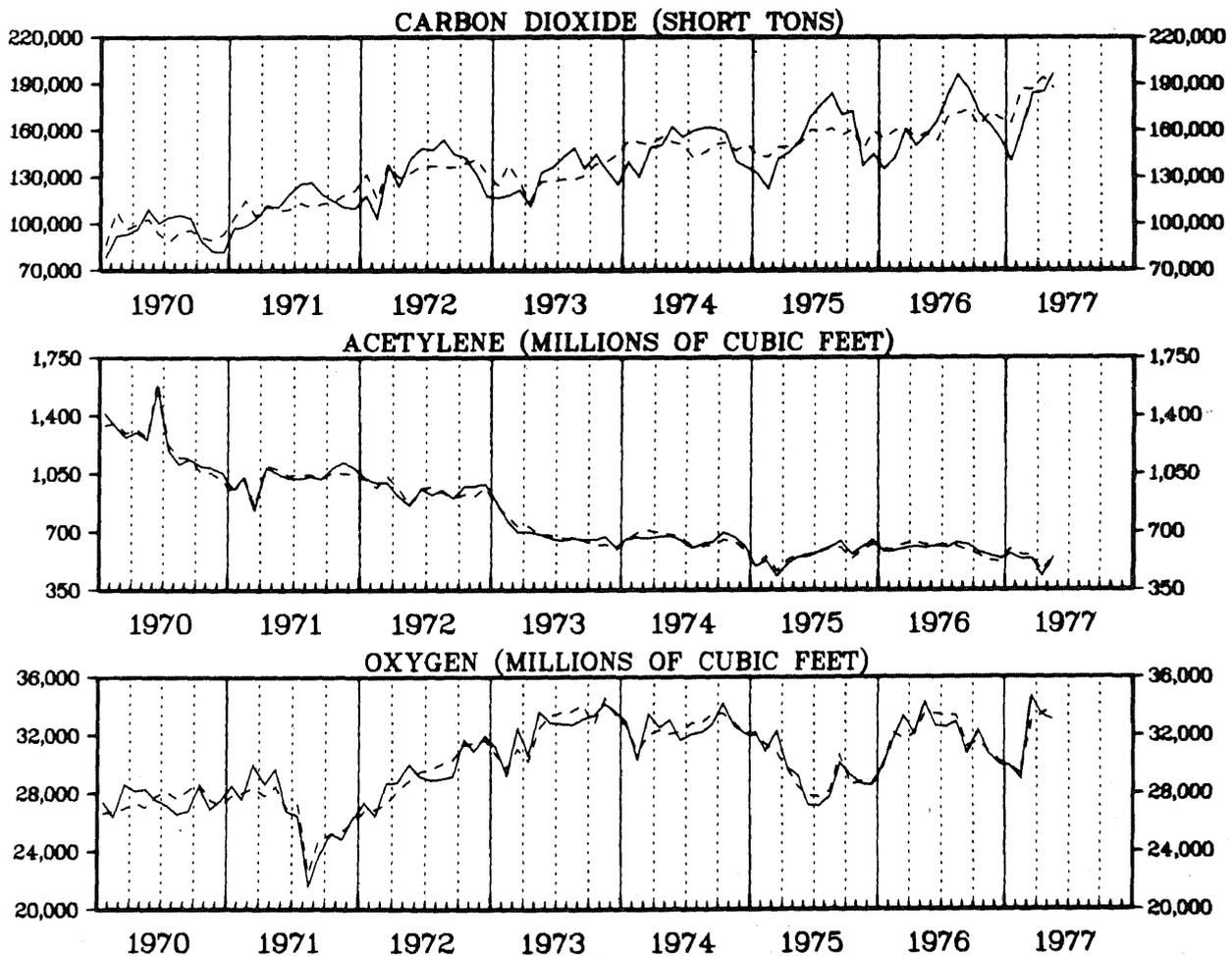
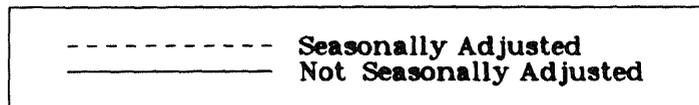
JUNE 1977

M28C(77)-6
Issued August 1977

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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.)
1977					
June.....	504	187,473	7,469	30,638	33,941
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
1975					
December.....	625	159,514	6,967	22,915	28,645
November.....	586	148,026	6,025	22,054	28,762
October.....	534	160,573	6,533	21,379	28,540
September.....	602	156,968	6,620	21,452	30,612
August.....	599	161,271	6,626	21,023	28,138
July.....	587	159,490	6,148	20,840	27,725
June.....	563	160,247	5,937	20,597	27,800
May.....	556	151,929	6,170	20,408	28,435
April.....	531	149,601	5,432	20,512	29,636
March.....	464	149,329	5,436	19,976	30,826
February.....	551	143,007	5,570	20,562	31,348
January.....	497	143,513	5,883	20,662	32,005

Table 1B.--SUMMARY OF PRODUCTION PRINCIPAL GASES: 1975 TO 1977

(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) ¹	(Short tons) ¹	(Mil. cu. ft.) ¹	(Mil. cu. ft.) ¹	(Mil. cu. ft.)
1977						
June.....	501	164,118	32,561	7,424	29,658	33,059
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
1975						
December.....	649	116,687	28,096	7,099	22,983	28,530
November.....	604	113,540	23,438	6,085	21,395	28,618
October.....	564	141,715	30,779	6,879	21,913	29,196
September.....	641	138,568	31,441	6,759	21,710	30,061
August.....	607	148,610	35,510	6,633	21,401	27,716
July.....	581	139,617	37,115	6,209	20,840	27,087
June.....	552	135,271	33,762	5,890	19,941	27,161
May.....	548	123,289	30,538	6,306	20,692	29,174
April.....	509	119,385	26,790	5,356	20,386	29,725
March.....	431	115,488	26,309	5,550	20,612	32,275
February.....	526	100,650	21,513	5,074	19,440	30,846
January.....	492	105,896	26,311	5,712	20,155	32,165

Note: The seasonally adjusted series shown above have been revised to reflect revisions to 1976. A new seasonal adjustment supplement is forthcoming.

TABLE 2.--PRIMARY PRODUCTION OF SPECIFIED INDUSTRIAL GASES

PRODUCT CODE	CHEMICAL AND BASIS	UNIT OF MEASURE	JUNE 1977	MAY 1977	JUNE 1976
			QUANTITY PRODUCED	QUANTITY PRODUCED	QUANTITY PRODUCED
2813200	ACETYLENE (1)	MIL.CU.FT	501	544	622
	PRODUCED FOR PIPELINE SHIPMENT (EXCLUDING THAT SHIPPED TO BE COMPRESSED)	DO	² 396	² 439	² 509
	PRODUCED FOR COMPRESSION, INCLUDING CYLINDER AND PIPELINE	DO	105	105	113
	PRODUCED FOR CONSUMPTION IN THIS PLANT.	DO	(²)	(²)	(²)
2813415	ARGON, HIGH PURITY	DO	483	483	416
	PRODUCED FOR CYLINDER AND BULK DELIVERY SHIPMENT	DO	483	483	416
	PRODUCED FOR PIPELINE SHIPMENT.	DO			
PRODUCED FOR CONSUMPTION IN THIS PLANT.	DO				
2813311	CARBON DIOXIDE: LIQUID AND GAS (3)	S.TONS	164,118	156,955	132,705
2813331	SOLID (DRY ICE)	DO	32,561	28,807	35,815
2813420	HYDROGEN, TOTAL (4)	MIL.CU.FT	7,424	7,169	6,835
	PRODUCED FOR CYLINDER AND BULK DELIVERY SHIPMENT	DO	718	^r 722	775
	LIQUID PRODUCED FOR CONVERSION TO GAS	DO			
	PRODUCED FOR PIPELINE SHIPMENT.	DO			
	LIQUID PRODUCED FOR GOVERNMENT USE.	DO			
PRODUCED FOR CONSUMPTION IN THIS PLANT.	DO				
2813440	NITROGEN, TOTAL (5)	DO	29,658	27,119	23,266
	GAS:				
	PRODUCED FOR CYLINDER AND BULK DELIVERY SHIPMENT.	DO	19,380	16,563	14,597
	PRODUCED FOR PIPELINE SHIPMENT	DO			
	PRODUCED FOR CONSUMPTION IN THIS PLANT	DO			
	LIQUID:				
	PRODUCED FOR CYLINDER AND BULK DELIVERY SHIPMENT.	DO	7,404	7,708	6,285
	PRODUCED FOR BULK SHIPMENT TO PIPELINES OR TO OTHER AIR SEPARATION PLANTS.	DO	524	588	763
	PRODUCED FOR CONSUMPTION IN THIS PLANT	DO	350	301	
	2813450	OXYGEN, TOTAL.	DO	33,059	34,943	32,938
GAS:					
PRODUCED FOR CYLINDER AND BULK DELIVERY SHIPMENT.		DO	19	^r 17	21
PRODUCED FOR PIPELINE SHIPMENT		DO	23,318	24,975	22,531
PRODUCED FOR CONSUMPTION IN THIS PLANT		DO	⁶ 3,752	⁶ 3,771	⁶ 4,773
LIQUID:					
PRODUCED FOR CYLINDER AND BULK DELIVERY SHIPMENT.		DO	5,326	5,491	4,912
PRODUCED FOR BULK SHIPMENT TO PIPELINES OR TO OTHER AIR SEPARATION PLANTS.	DO	644	689	701	
		DO	(⁶)	(⁶)	(⁶)

^rRevised by 5 percent or more from previously published figures.

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

²Data for (acetylene) produced for consumption in this plant, combined with, produced for pipeline shipment (excluding that shipped to be compressed), to avoid disclosure.

³Excludes production of liquid and gas CO₂ converted to and reported as dry ice and also amounts converted from pure CO₂ (liquid or solid) purchased or received from other plants, also excludes quantities produced and consumed in plants manufacturing soda ash or urea.

⁴Excludes 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.

⁵Excludes amounts produced and used in the manufacture of ammonia and ammonia derivatives.

⁶Data for oxygen (liquid), produced for consumption in this plant, combined with data for oxygen (gas) produced for consumption in this plant to avoid disclosure.

⁷The overall estimation for this survey for June 1977 does not exceed 20%.

DESCRIPTION OF SURVEY

Scope of Survey—This survey includes 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—The current month's figures 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 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 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 estimates were made, and other corrections. Figures which have been revised by more than 5 percent from previously published figures are indicated by footnotes.

Reporting Period Adjustment—Beginning January 1975 the data were adjusted for number of working days in the reporting period to compensate for differences in individual company reporting patterns (i.e., calendar month, 4-week, 5-week periods). It has been determined that the calendar month accounting system prevails in the industry. Hence, 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
<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	(201) 763-7838
Foreign Trade publications	Paul Finn	(301) 763-5140
Bureau of Domestic Commerce	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

Seasonal Adjustment Supplement

1973 to 1977



U.S. Department of Commerce
BUREAU OF THE CENSUS

M28C Supplement (SA)
Issued September 1977

GENERAL

This supplement presents seasonal adjustments to data published monthly in Current Industrial Report Series M28C, "Industrial Gases."

The seasonal adjustment program largely eliminates the effect of normal seasonal variations (including variations due to vacations, weather, etc.) as measured over the time period for which data were used. The resulting information thus provides a better measure than the original data of the month-to-month variations which are due to factors that are not associated with a repetitive seasonal pattern.

The seasonal adjustments were made using the X-11 variant of the Census Bureau's seasonal adjustment program. The X-11 variant of the seasonal adjustment program has developed improved techniques for the treatment of extremes and a regression program to identify trading-day adjustment to the monthly aggregates. The trading-day routine is optional and has been used for the series presented in this publication with the exceptions of hydrogen, and oxygen.

This program is amply described in the literature on this method.¹ It should be noted that the data included in this report have been adjusted on an establishment basis, prior to tabulation for variation in the length of the reporting period such as 4-weeks, 5-weeks, or calendar month.

For each series included in this report the following tables are shown:

- (1) Seasonally adjusted data
- (2) Data without seasonal adjustment (original series)
- (3) Seasonal adjustment factors. The seasonally adjusted data are obtained by dividing the unadjusted data by the seasonal factors for the specific month. Factors are included for a year ahead.
- (4) Average percentage changes and related measures for each series

Beginning in the June 1977 publication, these seasonally adjusted data will be included in table 1 of the regular M28C

¹*Electronic Computers and Business Indicators*, National Bureau of Economic Research Occasional Paper 57 (New York, 1957); *Tests and Revisions of Bureau of the Census Methods of Seasonal Adjustments*, Bureau of the Census Technical Paper No. 5 (Washington, 1961, \$1.00); *The X-11 Variant of the Census Method II Seasonal Adjustment Program*, Bureau of the Census Technical Paper No. 15 (Washington, 1967).

report. This report also includes a detailed description of the survey, including a discussion of the scope and coverage of the report together with an explanation of the terms.

TRADING-DAY FACTORS

Variation in the rate of activity that arises from the existence of different numbers of trading days in the same month for different years can be an important cause of month-to-month irregular fluctuations. Unlike some other causes of irregular fluctuations, such as unexpected economic developments, unusual weather, and statistical errors, trading-day irregularities can be approximately identified and removed so that the underlying trend-cycle stands out more clearly. Hence, it is often possible to reduce the irregular factor by a trading-day adjustment.

BRIEF DEFINITIONS OF MEASURES SHOWN IN TABLE 6

The following are brief definitions; more complete explanations appear in *Electronic Computers and Business Indicators*, by Julius Shiskin, issued as Occasional Paper 57 by the National Bureau of Economic Research, 1957 (reprinted from *Journal of Business*, October 1957).

\overline{CI} is the average month-to-month percentage change, without regard to sign, in the seasonally adjusted series (i.e., the series after adjustment for measurable seasonal, trading-day and holiday variations).

\overline{T} is the same for the irregular component, obtained by dividing the cyclical component into the seasonally adjusted series.

\overline{C} is the same for the cyclical component, a smooth, flexible moving average of the seasonally adjusted series.

$\overline{I/C}$ is a measure of the relative smoothness (small values) or irregularity (large values) of the seasonally adjusted series. It is shown for 1-month spans and for spans of the period of MCD. When MCD is "6", no I/C ratio is shown for the MCD period.

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) 763-7838.

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.

\overline{MCD} (months for cyclical dominance) provides an estimate of the appropriate time span over which to observe cyclical movements in a monthly series. It is small for smooth series and large for irregular series. In deriving MCD, percentage changes are computed separately for the irregular component and the cyclical component over 1-month spans (Jan.-Feb., Feb.-Mar., etc.), 2-months spans (Jan.-Mar., Feb.-Apr., etc.), up to 12-month spans. Averages, without regard to sign, are then computed for the changes over each span. MCD is the shortest span in months for which the average percentage change (without regard to sign) in the cyclical component is larger than the average percentage change (without regard to sign) in the irregular component, and remains so. Thus, it indicates the point at

which fluctuations in the seasonally adjusted series became dominated by cyclical rather than irregular movements. All series with an MCD greater than "5" are shown as "6."

\overline{ADR} (*Average Duration of Run*) is another measure of smoothness and is equal to the average number of consecutive monthly changes in the same direction in any series of observations. When there is no change between 2 months, a change in the same direction as the preceding change is assumed. The ADR is shown for the seasonally adjusted series CI, irregular component I, cyclical component C, and the MCD curve. The MCD curve is an unweighted moving average (with the number of terms equal to MCD) of the seasonally adjusted series.

Table 1.--PRODUCTION OF ACETYLENE

YR	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEP	OCT	NOV	DEC
FINAL SEASONALLY ADJUSTED--MIL. CU. FT.												
73	867	792	731	734	681	677	661	654	649	618	622	591
74	647	692	706	694	683	667	616	611	619	649	641	582
75	497	551	464	531	556	563	587	599	602	534	586	625
76	592	595	626	635	621	616	620	609	584	557	526	517
77	594	559	557	457	548	504	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)
ORIGINAL SERIES--MIL. CU. FT.												
73	879	767	696	698	685	661	646	662	651	652	669	602
74	656	664	659	669	677	647	602	624	639	694	669	608
75	492	526	431	509	548	552	581	607	641	564	604	649
76	578	584	596	610	600	615	603	633	621	577	557	537
77	565	531	538	428	544	501	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)
FINAL COMBINED FACTORS--PERCENT (SEASONALS COMBINED WITH FINAL TRADING-DAY)												
73	101.4	96.8	95.2	95.1	100.6	97.6	97.7	101.2	100.4	105.5	107.6	101.8
74	101.4	95.9	93.3	96.4	99.1	97.0	97.8	102.1	103.2	106.9	104.4	104.4
75	99.1	95.4	92.9	95.9	98.5	98.1	99.1	101.4	106.6	105.6	103.0	103.9
76	97.7	98.1	95.3	96.0	96.6	99.8	97.3	103.9	106.3	103.5	106.0	103.8
77	95.1	95.0	96.6	93.7	99.3	99.5	(X)	(X)	(X)	(X)	(X)	(X)
COMBINED FINAL SEASONAL AND TRADING-DAY FACTORS ONLY, ONE YEAR AHEAD--PERCENT												
77	(X)	(X)	(X)	(X)	(X)	(X)	95.7	104.0	107.7	103.0	105.4	103.3
78	97.4	94.9	95.6	92.8	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)

(NA) Not available. (X) Not applicable.

Table 2.--PRODUCTION OF CARBON DIOXIDE

YR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
FINAL SEASONALLY ADJUSTED--1,000 SHORT TONS												
73	124523	138085	126381	114221	126872	127306	128417	128464	130796	137934	139892	144712
74	153654	151905	151147	155487	152637	150528	142405	145594	150995	151932	147164	151069
75	143513	143007	149329	149601	151929	160247	159490	161271	156968	160573	148026	159514
76	154465	160068	161169	155282	158295	153400	168466	170987	173501	162734	171852	167567
77	164649	186664	186723	194283	180177	187473	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)
ORIGINAL SERIES--1,000 SHORT TONS												
73	116429	117958	121499	111145	132714	135844	142739	148424	135385	144338	134323	124705
74	139811	129613	149017	150195	162401	155517	159836	161581	161381	158624	140240	136035
75	132207	122163	141797	146175	153827	169033	176732	184120	170009	172494	136978	144783
76	134985	142421	160815	150361	156879	165549	183321	195900	187292	171234	163776	154194
77	140614	159641	184106	184948	185762	196679	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)
FINAL COMBINED FACTORS--PERCENT (SEASONALS COMBINED WITH FINAL TRADING-DAY)												
73	93.5	85.4	96.1	97.3	104.6	106.7	111.2	115.5	103.5	104.6	96.0	86.2
74	91.0	85.3	98.6	96.6	106.4	103.3	112.2	111.0	106.9	104.4	95.3	90.0
75	92.1	85.4	95.0	97.7	101.2	105.5	110.8	114.2	108.3	107.4	92.5	90.8
76	87.4	89.0	99.8	96.8	99.1	107.9	108.8	114.6	107.9	105.2	95.3	92.0
77	85.4	85.5	98.6	95.2	103.1	105.0	(X)	(X)	(X)	(X)	(X)	(X)
COMBINED FINAL SEASONAL AND TRADING-DAY FACTORS ONLY, ONE YEAR AHEAD--PERCENT												
77	(X)	(X)	(X)	(X)	(X)	(X)	108.8	114.6	107.9	105.2	95.3	92.0
78	88.7	85.5	101.3	92.1	(NA)							

(NA) Not available. (X) Not applicable.

Table 3.--PRODUCTION OF HYDROGEN, HIGH AND LOW PURITY (100%)

YR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
FINAL SEASONALLY ADJUSTED--MIL. CU. FT.												
73	5483	5490	5343	5343	5462	5211	5516	5422	5533	5293	5484	5575
74	6722	7210	6682	6901	6722	6931	7057	6608	6561	6991	6796	6329
75	5883	5570	5436	5432	6170	5937	6148	6626	6620	6533	6025	6967
76	6768	6906	7259	7252	6505	6981	6405	6650	6671	6615	6882	6721
77	6623	7061	7164	7145	7042	7469	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)
ORIGINAL SERIES--MIL. CU. FT.												
73	5423	5051	5391	5258	5615	5159	5599	5395	5605	5574	5468	5631
74	6601	6604	6776	6784	6917	6862	7163	6595	6686	7341	6796	6411
75	5712	5074	5550	5356	6306	5890	6209	6633	6759	6879	6085	7099
76	6470	6250	7426	7143	6629	6939	6456	6677	6818	6999	6985	6876
77	6265	6348	7329	7031	7169	7424	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)
FINAL SEASONAL FACTORS--PERCENT (SEASONALS WITHOUT FINAL TRADING-DAY)												
73	98.9	92.0	100.9	98.4	102.8	99.0	101.5	99.5	101.3	105.3	99.7	101.0
74	98.2	91.6	101.4	98.3	102.9	99.0	101.5	99.8	101.9	105.0	100.0	101.3
75	97.1	91.1	102.1	98.6	102.2	99.2	101.0	100.1	102.1	105.3	101.0	101.9
76	95.6	90.5	102.3	98.5	101.9	99.4	100.8	100.4	102.2	105.8	101.5	102.3
77	94.6	89.9	102.3	98.4	101.8	99.4	(X)	(X)	(X)	(X)	(X)	(X)
SEASONAL FACTORS WITHOUT FINAL TRADING-DAY ONLY, ONE YEAR AHEAD--PERCENT												
77	(X)	(X)	(X)	(X)	(X)	(X)	100.8	100.5	102.2	106.1	101.7	102.5
78	94.1	89.7	102.3	98.3	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)

(NA) Not available. (X) Not applicable.

Table 4.--PRODUCTION OF NITROGEN, HIGH AND LOW PURITY (100%)

YR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
FINAL SEASONALLY ADJUSTED--MIL. CU. FT.												
73	17524	18268	18558	18854	19129	18958	19296	19058	19503	19346	19856	19961
74	20104	19765	19877	19814	20079	20607	20501	20680	20822	20878	20147	20241
75	20662	20562	19976	20512	20408	20597	20840	21023	21452	21379	22054	22915
76	21790	22861	23366	23600	23929	23528	23813	24600	24347	25205	26147	26290
77	24381	25100	25457	25836	26692	30638	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)
ORIGINAL SERIES--MIL. CU. FT.												
73	17982	17307	19205	18404	19512	18691	19354	19344	19425	19950	19243	19682
74	20486	18706	20632	19555	20461	20073	20727	20927	20801	21380	19742	20099
75	21055	19440	20612	20386	20692	19941	20840	21401	21710	21913	21395	22983
76	22115	22221	24425	23107	24214	23122	23623	25042	24444	25886	25568	26159
77	24744	23655	26349	25576	27119	29658	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)
FINAL COMBINED FACTORS--PERCENT (SEASONALS COMBINED WITH FINAL TRADING-DAY)												
73	102.6	94.7	103.5	97.6	102.0	98.6	100.3	101.5	99.6	103.1	96.9	98.6
74	101.9	94.6	103.8	98.7	101.9	97.4	101.1	101.2	99.9	102.4	98.0	99.3
75	101.9	94.5	103.2	99.4	101.4	96.8	100.0	101.8	101.2	102.5	97.0	100.3
76	101.5	97.2	104.5	97.9	101.2	98.3	99.2	101.8	100.4	102.7	97.8	99.5
77	101.5	94.2	103.5	99.0	101.6	96.8	(X)	(X)	(X)	(X)	(X)	(X)
COMBINED FINAL SEASONAL AND TRADING-DAY FACTORS ONLY, ONE YEAR AHEAD--PERCENT												
77	(X)	(X)	(X)	(X)	(X)	(X)	99.5	102.9	100.2	102.3	98.3	99.1
78	101.9	94.2	103.4	98.2	(NA)							

(NA) Not available. (X) Not applicable.

Table 5.--PRODUCTION OF OXYGEN, HIGH AND LOW PURITY (100%)

YR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
FINAL SEASONALLY ADJUSTED--MIL. CU. FT.												
73	30649	29736	31032	30182	32494	33306	33538	33626	34057	32747	34520	33430
74	32624	30868	31978	32309	32064	32204	32802	32823	33496	33446	32841	32031
75	32005	31348	30826	29636	28435	27800	27725	28138	30612	28540	28762	28645
76	29811	32137	31707	32057	33442	33439	33286	33317	31190	31555	30852	30231
77	29867	29289	32940	33401	34157	33941	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)
ORIGINAL SERIES--MIL. CU. FT.												
73	31139	29201	32490	30574	33599	32840	32767	32684	33069	33336	34140	33597
74	32918	30312	33449	32503	33026	31624	32048	32167	32759	34148	32611	32063
75	32165	30846	32275	29725	29174	27161	27087	27716	30061	29196	28618	28530
76	29841	31719	33292	32089	34245	32603	32520	32884	30691	32312	30729	29989
77	29867	28938	34653	33401	34943	33059	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)
FINAL SEASONAL FACTORS--PERCENT (SEASONALS WITHOUT FINAL TRADING-DAY)												
73	101.6	98.2	104.7	101.3	103.4	98.6	97.7	97.2	97.1	101.8	98.9	100.5
74	100.9	98.2	104.6	100.6	103.0	98.2	97.7	98.0	97.8	102.1	99.3	100.1
75	100.5	98.4	104.7	100.3	102.6	97.7	97.7	98.5	98.2	102.3	99.5	99.6
76	100.1	98.7	105.0	100.1	102.4	97.5	97.7	98.7	98.4	102.4	99.6	99.2
77	100.0	98.8	105.2	100.0	102.3	97.4	(X)	(X)	(X)	(X)	(X)	(X)
SEASONAL FACTORS WITHOUT FINAL TRADING-DAY ONLY, ONE YEAR AHEAD--PERCENT												
77	(X)	(X)	(X)	(X)	(X)	(X)	97.7	98.8	98.5	102.5	99.6	99.0
78	100.0	98.8	105.2	100.0	(NA)							

(NA) Not available. (X) Not applicable.

Table 6.--AVERAGE PERCENTAGE CHANGES AND RELATED MEASURES

Item	Average percentage change			Ratio of irregular component to cyclical component (I/C)	Number of months for cyclical dominance	(I/C) for MCD span	Average duration of run			
	Seasonally adjusted series (CI)	Irregular component (I)	Cyclical component (C)				CI	I	C	MCD
Acetylene.....	4.88	4.39	1.48	2.96	4	.83	1.96	1.59	10.38	3.47
Carbon Dioxide.....	4.35	4.11	1.19	3.46	4	.85	1.71	1.48	7.11	2.93
Hydrogen, high and low purity.....	5.17	5.13	2.20	2.34	4	.82	1.69	1.57	7.94	3.22
Nitrogen, high and low purity.....	1.94	1.47	1.05	1.40	2	.70	2.14	1.39	10.38	4.62
Oxygen, high and low purity.....	2.81	2.42	1.26	1.92	3	.74	2.29	1.73	7.94	4.29

Industrial Gases

JULY 1977

M28C(77)-7
Issued September 1977

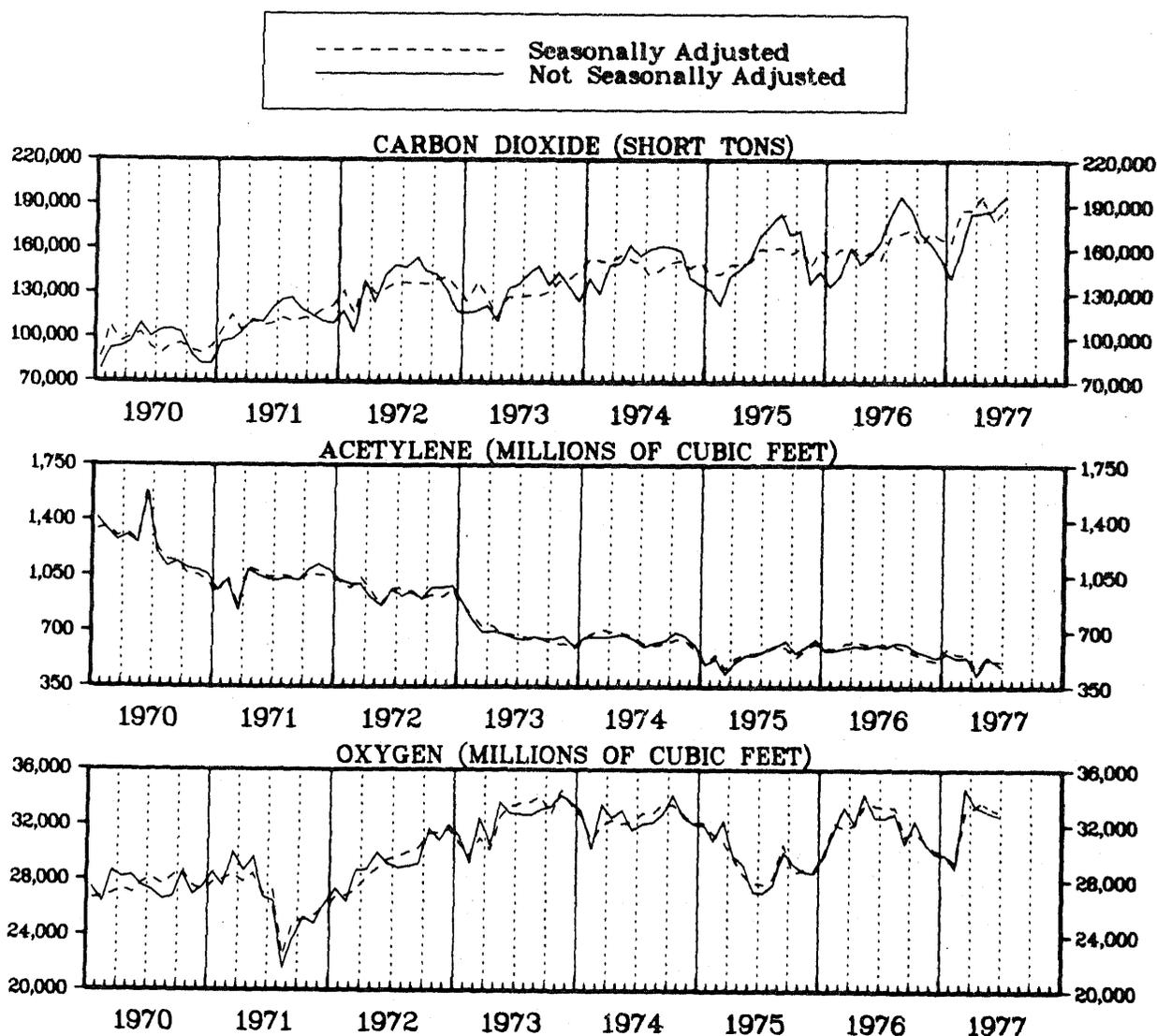


U.S. Department of Commerce
BUREAU OF THE CENSUS

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 and includes all the months for the current and previous years and incorporates all known revisions in the series.

PRODUCTION OF SELECTED INDUSTRIAL GASES 1970 TO 1977



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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: 1975 TO 1977

(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.)
1977					
July.....	478	187,770	6,963	27,943	31,874
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
1975					
December.....	625	159,514	6,967	22,915	28,645
November.....	586	148,026	6,025	22,054	28,762
October.....	534	160,573	6,533	21,379	28,540
September.....	602	156,968	6,620	21,452	30,612
August.....	599	161,271	6,626	21,023	28,138
July.....	587	159,490	6,148	20,840	27,725

Table 1B.--SUMMARY OF PRODUCTION PRINCIPAL GASES: 1975 TO 1977

(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.)
1977						
July.....	457	169,538	34,756	7,019	27,803	31,141
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
1975						
December.....	649	116,687	28,096	7,099	22,983	28,530
November.....	604	113,540	23,438	6,085	21,395	28,618
October.....	564	141,715	30,779	6,879	21,913	29,196
September.....	641	136,568	31,441	6,759	21,710	30,061
August.....	607	148,610	35,510	6,633	21,401	27,716
July.....	581	139,617	37,115	6,209	20,840	27,087

Note: The seasonally adjusted series shown above have been revised to reflect revisions to 1976. A new seasonal adjustment supplement is forthcoming.

TABLE 2.--PRIMARY PRODUCTION OF SPECIFIED INDUSTRIAL GASES

PRODUCT CODE	CHEMICAL AND BASIS	UNIT OF MEASURE	JULY 1977	JUNE 1977	JULY 1976
			QUANTITY PRODUCED	QUANTITY PRODUCED	QUANTITY PRODUCED
2813200	ACETYLENE (1)	MIL. CU. FT	457	509	603
	PRODUCED FOR PIPELINE SHIPMENT (EXCLUDING THAT SHIPPED TO BE COMPRESSED)	DO	378	2403	2499
	PRODUCED FOR COMPRESSION, INCLUDING CYLINDER AND PIPELINE	DO	79	106	104
	PRODUCED FOR CONSUMPTION IN THIS PLANT.	DO	(²)	(²)	(²)
2813415	ARGON, HIGH PURITY	DO	499	484	408
	PRODUCED FOR CYLINDER AND BULK DELIVERY SHIPMENT	DO	499	484	408
	PRODUCED FOR PIPELINE SHIPMENT.	DO			
	PRODUCED FOR CONSUMPTION IN THIS PLANT.	DO			
2813311	CARBON DIOXIDE:				
	LIQUID AND GAS (3)	S. TONS	169,538	164,063	146,984
2813331	SOLID (DRY ICE)	DO	34,756	32,672	36,337
2813420	HYDROGEN, TOTAL (4)	MIL. CU. FT	7,019	7,404	6,456
	PRODUCED FOR CYLINDER AND BULK DELIVERY SHIPMENT	DO	782	718	669
	LIQUID PRODUCED FOR CONVERSION TO GAS	DO			
	PRODUCED FOR PIPELINE SHIPMENT.	DO	1,959	2,220	1,957
	LIQUID PRODUCED FOR GOVERNMENT USE.	DO			
PRODUCED FOR CONSUMPTION IN THIS PLANT.	DO				
2813440	NITROGEN, TOTAL (5)	DO	27,803	29,651	23,623
	GAS:				
	PRODUCED FOR CYLINDER AND BULK DELIVERY SHIPMENT	DO	17,646	19,352	14,122
	PRODUCED FOR PIPELINE SHIPMENT	DO			
	PRODUCED FOR CONSUMPTION IN THIS PLANT	DO			
	LIQUID:				
	PRODUCED FOR CYLINDER AND BULK DELIVERY SHIPMENT	DO	7,346	7,433	7,059
	PRODUCED FOR BULK SHIPMENT TO PIPELINES OR TO OTHER AIR SEPARATION PLANTS.	DO	712	892	620
	PRODUCED FOR CONSUMPTION IN THIS PLANT	DO	292		260
	2813450	OXYGEN, TOTAL	DO	31,141	33,028	32,520
GAS:					
PRODUCED FOR CYLINDER AND BULK DELIVERY SHIPMENT		DO	14	19	13
PRODUCED FOR PIPELINE SHIPMENT		DO	22,250	23,325	22,882
PRODUCED FOR CONSUMPTION IN THIS PLANT		DO	8,877	8,684	9,625
LIQUID:					
PRODUCED FOR CYLINDER AND BULK DELIVERY SHIPMENT		DO	4,456	5,276	4,727
PRODUCED FOR BULK SHIPMENT TO PIPELINES OR TO OTHER AIR SEPARATION PLANTS.		DO	666	643	674
PRODUCED FOR CONSUMPTION IN THIS PLANT		DO	(⁶)	(⁶)	(⁶)

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

²Data for (acetylene) produced for consumption in this plant, combined with, produced for pipeline shipment (excluding that shipped to be compressed), to avoid disclosure.

³Excludes production of liquid and gas CO₂ converted to and reported as dry ice and also amounts converted from pure CO₂ (liquid or solid) purchased or received from other plants. Also excludes quantities produced and consumed in plants manufacturing soda ash or urea.

⁴Excludes 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.

⁵Excludes amounts produced and used in the manufacture of ammonia and ammonia derivatives.

⁶Data for oxygen (liquid), produced for consumption in this plant. Combined with data for oxygen (gas) produced for consumption in this plant to avoid disclosure.

DESCRIPTION OF SURVEY

Scope of Survey—This survey includes 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—The current month's figures 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 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 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 estimates were made, and other corrections. Figures which have been revised by more than 5 percent from previously published figures are indicated by footnotes.

Reporting Period Adjustment—Beginning January 1975 the data were adjusted for number of working days in the reporting period to compensate for differences in individual company reporting patterns (i.e., calendar month, 4-week, 5-week periods). It has been determined that the calendar month accounting system prevails in the industry. Hence, 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
<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	(201) 763-7838
Foreign Trade publications	Paul Finn	(301) 763-5140
Bureau of Domestic Commerce	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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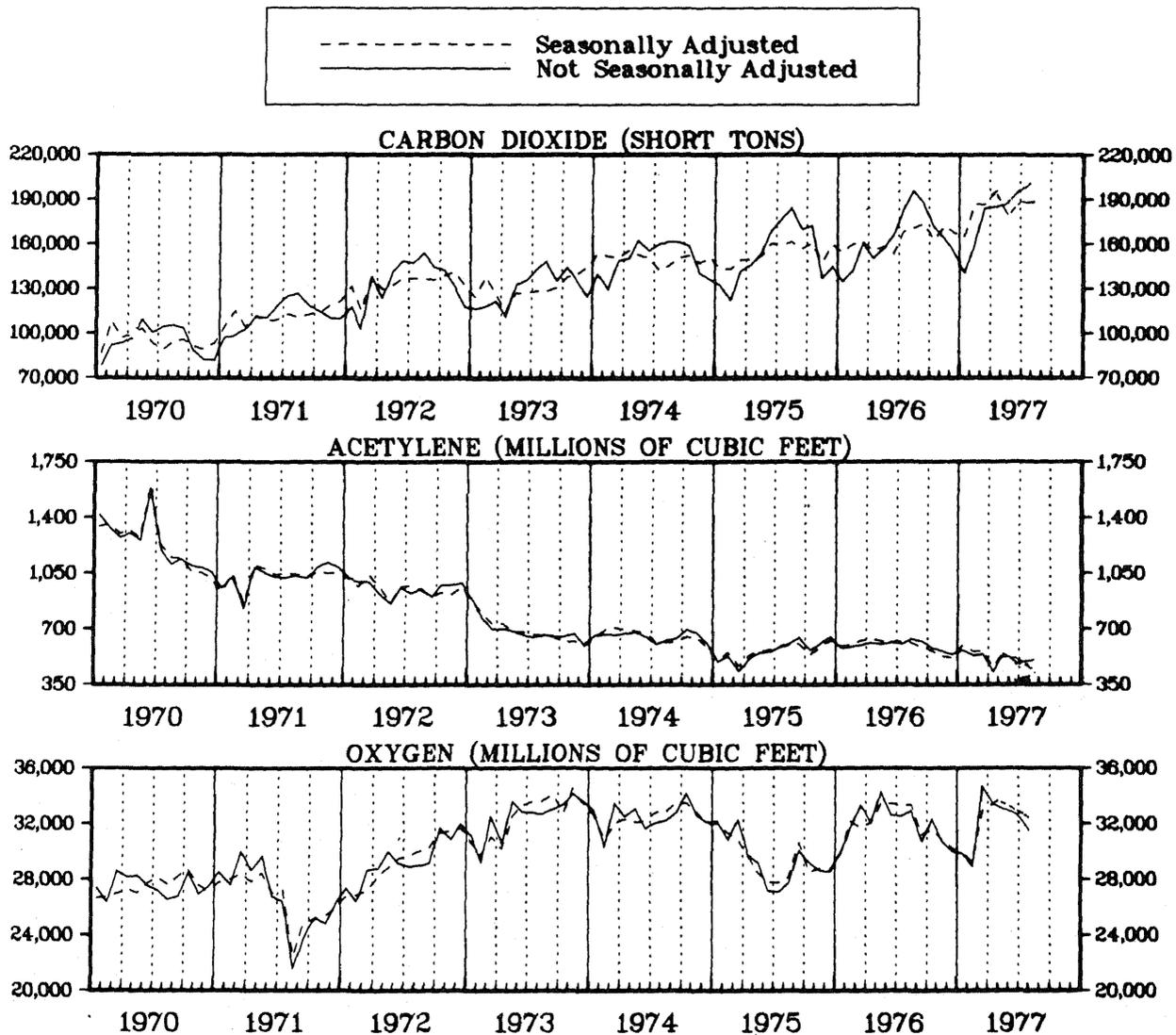
AUGUST 1977

M28C(77)-8
Issued October 1977

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(Seasonally adjusted)

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1977					
August.....	486	189,236	6,435	28,062	32,679
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
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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
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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
1975					
December.....	625	159,514	6,967	22,915	28,645
November.....	586	148,026	6,025	22,054	28,762
October.....	534	160,573	6,533	21,379	28,540
September.....	602	156,968	6,620	21,452	30,612
August.....	599	161,271	6,626	21,023	28,138

Table 1B.--SUMMARY OF PRODUCTION PRINCIPAL GASES: 1975 TO 1977

(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.)
1977						
August.....	505	180,150	36,715	7,374	28,876	32,287
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
1975						
December.....	649	116,687	28,096	7,099	22,983	28,530
November.....	604	113,540	23,438	6,085	21,395	28,618
October.....	564	141,715	30,779	6,879	21,913	29,196
September.....	641	138,568	31,441	6,759	21,710	30,061
August.....	607	148,610	35,510	6,633	21,401	27,716

TABLE 2.--PRIMARY PRODUCTION OF SPECIFIED INDUSTRIAL GASES

PRODUCT CODE	CHEMICAL AND BASIS	UNIT OF MEASURE	AUGUST 1977	JULY 1977	AUGUST 1976
			QUANTITY PRODUCED	QUANTITY PRODUCED	QUANTITY PRODUCED
2813200	ACETYLENE (1)	MIL.CU.FT	505	457	633
	PRODUCED FOR PIPELINE SHIPMENT (EXCLUDING THAT SHIPPED TO BE COMPRESSED)	DO	2398	2378	2530
	PRODUCED FOR COMPRESSION, INCLUDING CYLINDER AND PIPELINE	DO	107	79	103
	PRODUCED FOR CONSUMPTION IN THIS PLANT.	DO	(²)	(²)	(²)
2813415	ARGON, HIGH PURITY	DO	521	498	445
	PRODUCED FOR CYLINDER AND BULK DELIVERY SHIPMENT	DO	521	498	445
	PRODUCED FOR PIPELINE SHIPMENT.	DO			
	PRODUCED FOR CONSUMPTION IN THIS PLANT.	DO				(NA)
2813311	CARBON DIOXIDE:				
	LIQUID AND GAS (3)	S.TONS	180,150	168,856	156,005
2813331	SOLID (DRY ICE)	DO	36,715	34,980	39,895
2813420	HYDROGEN, TOTAL (4)	MIL.CU.FT	7,374	7,244	6,677
	PRODUCED FOR CYLINDER AND BULK DELIVERY SHIPMENT	DO	847	766	679
	LIQUID PRODUCED FOR CONVERSION TO GAS	DO			
	PRODUCED FOR PIPELINE SHIPMENT.	DO			
	LIQUID PRODUCED FOR GOVERNMENT USE.	DO			
	PRODUCED FOR CONSUMPTION IN THIS PLANT.	DO			
		2,337			
2813440	NITROGEN, TOTAL (5)	DO	28,876	27,342	25,042
	GAS:				
	PRODUCED FOR CYLINDER AND BULK DELIVERY SHIPMENT.	DO	19,959	17,131	14,834
	PRODUCED FOR PIPELINE SHIPMENT	DO			
	PRODUCED FOR CONSUMPTION IN THIS PLANT	DO				2,131	1,792	1,783
	LIQUID:				
	PRODUCED FOR CYLINDER AND BULK DELIVERY SHIPMENT.	DO	7,866	7,409	7,522
	PRODUCED FOR BULK SHIPMENT TO PIPELINES OR TO OTHER AIR SEPARATION PLANTS.	DO	589	718	653
	PRODUCED FOR CONSUMPTION IN THIS PLANT	DO	331	292	250
	2813450	OXYGEN, TOTAL.	DO	32,287	31,401	32,884
GAS:					
PRODUCED FOR CYLINDER AND BULK DELIVERY SHIPMENT.		DO	18	14	16
PRODUCED FOR PIPELINE SHIPMENT		DO	22,760	22,416	22,876
PRODUCED FOR CONSUMPTION IN THIS PLANT		DO	3,966	3,822	4,277
LIQUID:					
PRODUCED FOR CYLINDER AND BULK DELIVERY SHIPMENT.		DO	4,824	4,473	4,999
PRODUCED FOR BULK SHIPMENT TO PIPELINES OR TO OTHER AIR SEPARATION PLANTS.		DO	719	676	716
		(⁶)	(⁶)	(⁶)	

(NA) Not available.

¹ Revised by 5 percent or more from previously published figures.¹ Excludes quantities of acetylene produced and consumed by railroad shops, shipyards, and small establishments using portable generators.² Data for (acetylene) produced for consumption in this plant, combined with, produced for pipeline shipment (excluding that shipped to be compressed), to avoid disclosure.³ Excludes production of liquid and gas CO₂ converted to and reported as dry ice and also amounts converted from pure CO₂ (liquid or solid) purchased or received from other plants. Also excludes quantities produced and consumed in plants manufacturing soda ash or urea.⁴ 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.⁵ Excludes amounts produced and used in the manufacture of ammonia and ammonia derivatives.⁶ Data for oxygen (liquid), produced for consumption in this plant, combined with data for oxygen (gas) produced for consumption in this plant to avoid disclosure.

DESCRIPTION OF SURVEY

Scope of Survey—This survey includes 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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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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<i>Foreign Trade Reports</i>		
FT-410	Monthly	U.S. Exports
FT-135	Monthly	U.S. General Imports

CONTACTS FOR DATA USERS

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Bureau of Domestic Commerce	Chemicals Program (OBRA)	(202) 377-5496
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Industrial Gases



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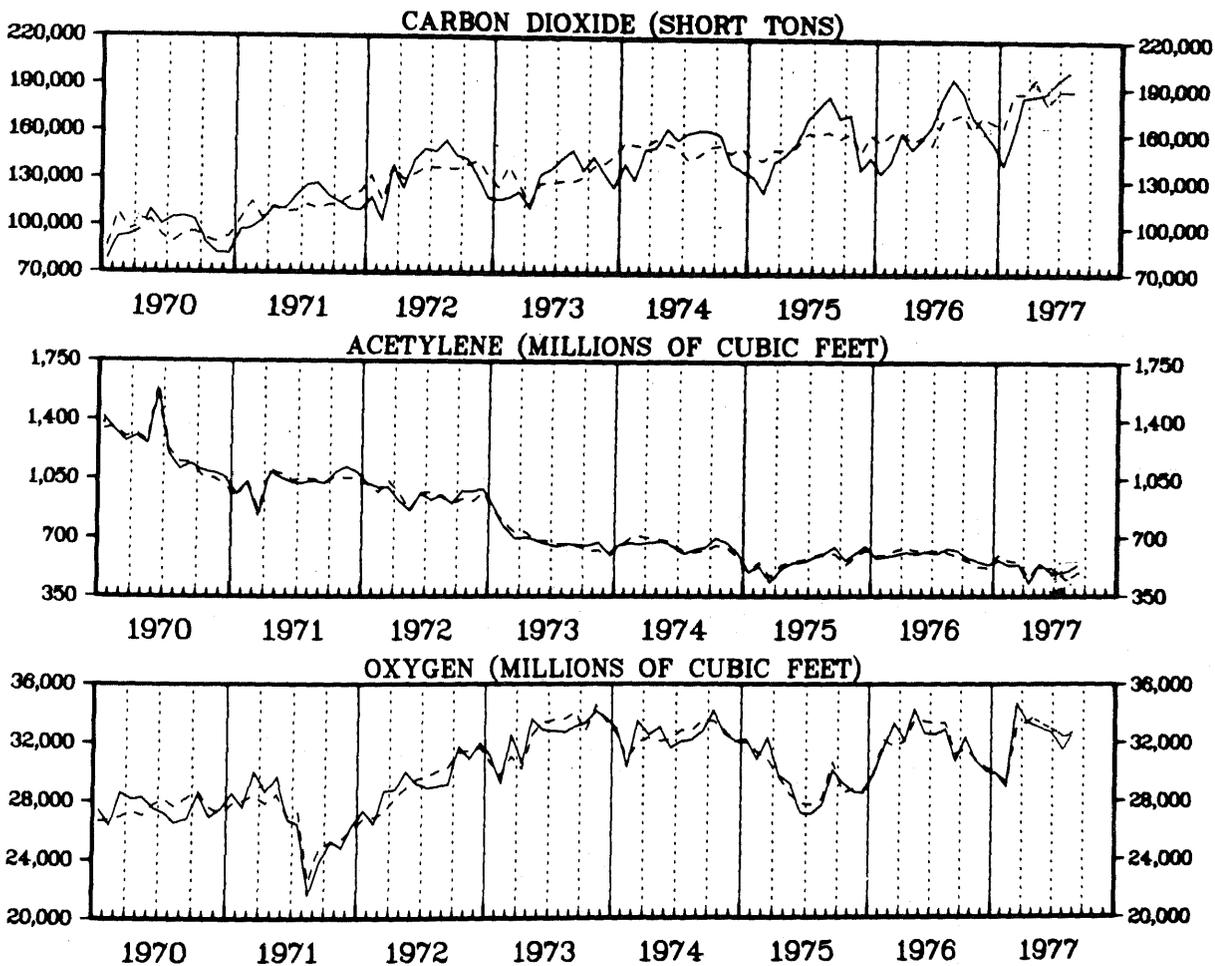
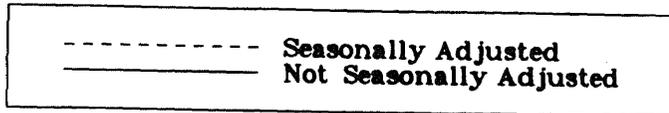
SEPTEMBER 1977

M28C(77)-9
Issued November 1977

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 1970 TO 1977



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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: 1975 TO 1977

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.)
1977					
September.....	437	184,277	6,707	29,124	30,908
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
1975					
December.....	625	159,514	6,967	22,915	28,645
November.....	586	146,026	6,025	22,054	28,762
October.....	534	160,573	6,533	21,379	28,540
September.....	602	156,968	6,620	21,452	30,612

Table IB.--SUMMARY OF PRODUCTION PRINCIPAL GASES: 1975 TO 1977

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.)
1977						
September.....	471	167,422	31,413	6,855	29,182	30,444
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
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1975						
December.....	649	116,687	28,096	7,099	22,983	28,530
November.....	604	113,540	23,438	6,085	21,395	28,618
October.....	564	141,715	30,779	6,879	21,913	29,196
September.....	641	138,568	31,441	6,759	21,710	30,061

TABLE 2.--PRIMARY PRODUCTION OF SPECIFIED INDUSTRIAL GASES

PRODUCT CODE	CHEMICAL AND BASIS	UNIT OF MEASURE	SEPTEMBER 1977	AUGUST 1977	SEPTEMBER 1976
2813200	ACETYLENE (1)	MIL.CU.FT	471	509	621
	PRODUCED FOR PIPELINE SHIPMENT (EXCLUDING THAT SHIPPED TO BE COMPRESSED)	DO	² 362	² 400	² 505
	PRODUCED FOR COMPRESSION, INCLUDING CYLINDER AND PIPELINE	DO	109	109	116
	PRODUCED FOR CONSUMPTION IN THIS PLANT.	DO	(²)	(²)	(²)
2813415	ARGON, HIGH PURITY	DO	467	520	397
	PRODUCED FOR CYLINDER AND BULK DELIVERY SHIPMENT	DO	467	520	397
	PRODUCED FOR PIPELINE SHIPMENT.	DO			
PRODUCED FOR CONSUMPTION IN THIS PLANT.	DO				
CARBON DIOXIDE:					
2813311	LIQUID AND GAS (3)	S.TONS	167,422	183,138	153,589
2813331	SOLID (DRY ICE)	DO	31,413	37,403	33,703
2813420	HYDROGEN, TOTAL (4)	MIL.CU.FT	6,855	7,346	6,818
	PRODUCED FOR CYLINDER AND BULK DELIVERY SHIPMENT	DO	695	847	806
	LIQUID PRODUCED FOR CONVERSION TO GAS	DO			
	PRODUCED FOR PIPELINE SHIPMENT.	DO			
	LIQUID PRODUCED FOR GOVERNMENT USE.	DO			
	PRODUCED FOR CONSUMPTION IN THIS PLANT.	DO			
		2,333			
2813440	NITROGEN, TOTAL (5)	DO	29,182	28,688	24,444
	GAS:		18,278	^r 17,957	15,010
	PRODUCED FOR CYLINDER AND BULK DELIVERY SHIPMENT.	DO			
	PRODUCED FOR PIPELINE SHIPMENT	DO			
	PRODUCED FOR CONSUMPTION IN THIS PLANT	DO	1,966	^r 1,946	1,461
	LIQUID:		8,090	7,866	7,214
	PRODUCED FOR CYLINDER AND BULK DELIVERY SHIPMENT.	DO			
	PRODUCED FOR BULK SHIPMENT TO PIPELINES OR TO OTHER AIR SEPARATION PLANTS.	DO			
	PRODUCED FOR CONSUMPTION IN THIS PLANT	DO			
			537	588	512
		311	331	247	
2813450	OXYGEN, TOTAL.	DO	30,444	32,304	30,691
	GAS:		20,911	22,754	21,027
	PRODUCED FOR CYLINDER AND BULK DELIVERY SHIPMENT.	DO			
	PRODUCED FOR PIPELINE SHIPMENT	DO			
	PRODUCED FOR CONSUMPTION IN THIS PLANT	DO	⁶ 3,694	⁶ 3,989	⁶ 4,220
	LIQUID:		5,215	4,824	4,816
	PRODUCED FOR CYLINDER AND BULK DELIVERY SHIPMENT.	DO			
	PRODUCED FOR BULK SHIPMENT TO PIPELINES OR TO OTHER AIR SEPARATION PLANTS.	DO			
	PRODUCED FOR CONSUMPTION IN THIS PLANT	DO			
			604	718	611
		(⁶)	(⁶)	(⁶)	

^rRevised by 5 percent or more from previously published figures.

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

²Data for (acetylene) produced for consumption in this plant, combined with, produced for pipeline shipment (excluding that shipped to be compressed), to avoid disclosure.

³Excludes production of liquid and gas CO₂ converted to and reported as dry ice and also amounts converted from pure CO₂ (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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⁵Excludes amounts produced and used in the manufacture of ammonia and ammonia derivatives.

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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.

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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.

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Bureau of Domestic Commerce	Chemicals Program (OBRA)	(202) 377-5496
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Industrial Gases



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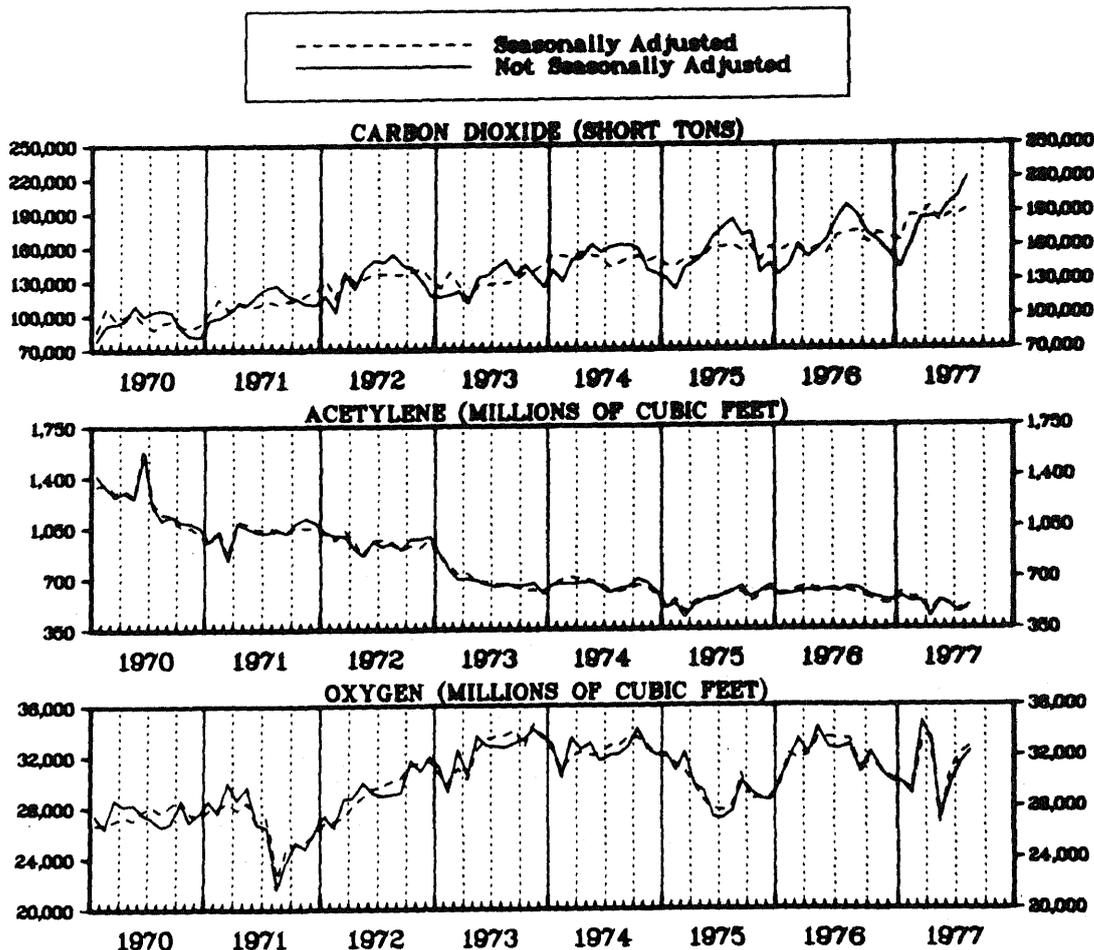
OCTOBER 1977

M28C (77)-10
Issued December 1977

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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 1970 TO 1977



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Table 1A.--SUMMARY OF PRODUCTION OF PRINCIPAL GASES: 1975 TO 1977

(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.)
1977					
October.....	439	185,329	6,888	30,342	30,871
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	6,788	21,790	29,811
1975					
December.....	625	159,514	6,967	22,915	28,645
November.....	586	148,026	6,025	22,054	28,762
October.....	534	160,573	6,533	21,379	28,540

Table 1B.--SUMMARY OF PRODUCTION PRINCIPAL GASES: 1975 TO 1977

(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.)
1977						
October.....	452	165,344	29,622	7,308	31,040	31,643
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
1975						
December.....	649	116,687	28,096	7,099	22,983	28,530
November.....	604	113,540	23,438	6,085	21,395	28,618
October.....	564	141,715	30,779	6,879	21,913	29,196

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

PRODUCT CODE	CHEMICAL AND BASIS	UNIT OF MEASURE	OCTOBER 1977	SEPTEMBER 1977	OCTOBER 1976
2813200	ACETYLENE (1)	MIL.CU.FT	452	467	577
	PRODUCED FOR PIPELINE SHIPMENT (EXCLUDING THAT SHIPPED TO BE COMPRESSED)	DO	² 340	² 358	² 454
	PRODUCED FOR COMPRESSION, INCLUDING CYLINDER AND PIPELINE	DO	112	109	123
	PRODUCED FOR CONSUMPTION IN THIS PLANT.	DO	(²)	(²)	(²)
2813415	ARGON, HIGH PURITY	DO	542	469	454
	PRODUCED FOR CYLINDER AND BULK DELIVERY SHIPMENT	DO	542	469	454
	PRODUCED FOR PIPELINE SHIPMENT.	DO			
PRODUCED FOR CONSUMPTION IN THIS PLANT.	DO				
2813311	CARBON DIOXIDE:	S.TONS	165,344	167,493	141,185
	LIQUID AND GAS (3)	DO	29,622	31,499	30,049
2813331	SOLID (DRY ICE)				
2813420	HYDROGEN, TOTAL (4)	MIL.CU.FT	7,308	6,831	6,999
	PRODUCED FOR CYLINDER AND BULK DELIVERY SHIPMENT	DO	814	695	857
	LIQUID PRODUCED FOR CONVERSION TO GAS	DO			
	PRODUCED FOR PIPELINE SHIPMENT.	DO			
	LIQUID PRODUCED FOR GOVERNMENT USE.	DO			
	PRODUCED FOR CONSUMPTION IN THIS PLANT.	DO			
		2,270			
2813440	NITROGEN, TOTAL (5)	DO	31,040	29,191	25,886
	GAS:				
	PRODUCED FOR CYLINDER AND BULK DELIVERY SHIPMENT	DO	19,706	18,296	16,254
	PRODUCED FOR PIPELINE SHIPMENT	DO			
	PRODUCED FOR CONSUMPTION IN THIS PLANT	DO			
	LIQUID:				
	PRODUCED FOR CYLINDER AND BULK DELIVERY SHIPMENT	DO	8,219	8,089	7,304
	PRODUCED FOR BULK SHIPMENT TO PIPELINES OR TO OTHER AIR SEPARATION PLANTS.	DO	598	537	519
	PRODUCED FOR CONSUMPTION IN THIS PLANT	DO	209	311	267
	2813450	OXYGEN, TOTAL	DO	31,643	30,446	32,312
GAS:					
PRODUCED FOR CYLINDER AND BULK DELIVERY SHIPMENT.		DO	14	20	12
PRODUCED FOR PIPELINE SHIPMENT		DO	22,130	20,909	21,818
PRODUCED FOR CONSUMPTION IN THIS PLANT		DO	⁶ 3,513	⁶ 3,693	⁶ 3,900
LIQUID:					
PRODUCED FOR CYLINDER AND BULK DELIVERY SHIPMENT.		DO	5,417	5,221	5,951
PRODUCED FOR BULK SHIPMENT TO PIPELINES OR TO OTHER AIR SEPARATION PLANTS.	DO	569	603	631	
		DO	(⁶)	(⁶)	(⁶)

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

²Data for (acetylene) produced for consumption in this plant, combined with produced for pipeline shipment (excluding that shipped to be compressed), to avoid disclosure.

³Excludes production of liquid and gas CO₂ converted to and reported as dry ice and also amounts converted from pure CO₂ (Liquid or solid) purchased or received from other plants. Also, excludes quantities produced and consumed in plants manufacturing soda ash or urea.

⁴Excludes 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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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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<i>Foreign Trade Reports</i>		
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FT-135	Monthly	U.S. General Imports

CONTACTS FOR DATA USERS

Subject Area	Contact	Phone Number
Current Industrial Report M28C	Melva Martin	(301) 763-7838
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Bureau of Domestic Commerce	Chemicals Program (OBRA)	(202) 377-5496
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Industrial Gases



U.S. Department of Commerce
BUREAU OF THE CENSUS

NOVEMBER 1977

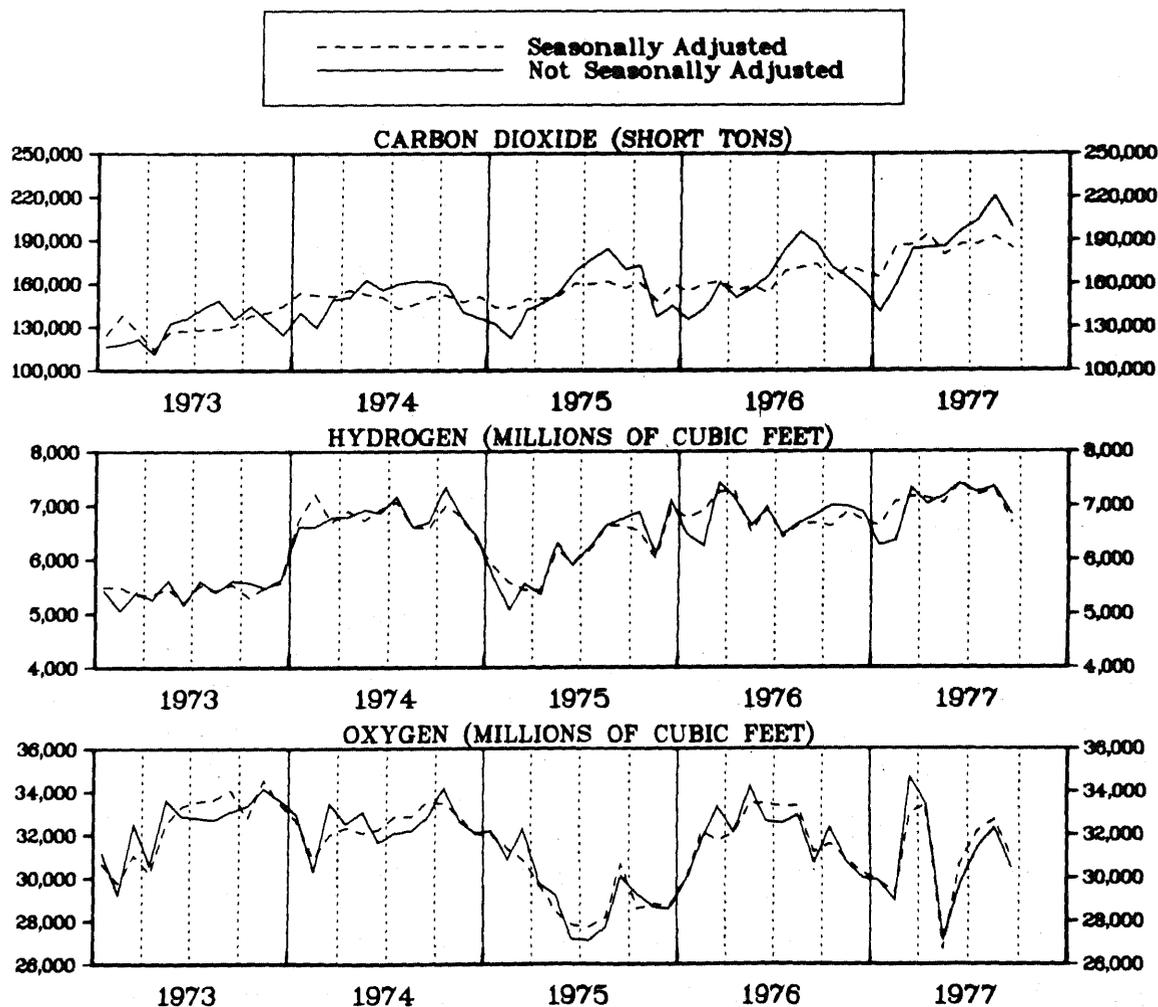
M28C(77)-11

Issued January 1978

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PRODUCTION OF SELECTED INDUSTRIAL GASES 1973 TO 1977



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) 763-7838.

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Table IA.--SUMMARY OF PRODUCTION OF PRINCIPAL GASES: 1975 TO 1977

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.)
1977					
November.....	427	183,349	6,901	29,700	31,404
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
1975					
December.....	625	159,514	6,967	22,915	28,645
November.....	586	148,026	6,025	22,054	28,762

Table IB.--SUMMARY OF PRODUCTION PRINCIPAL GASES: 1975 TO 1977

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.)
1977						
November.....	450	148,213	26,519	7,019	29,196	31,279
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						
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February.....	584	117,828	24,593	6,250	22,221	31,719
January.....	578	112,029	22,956	6,470	22,115	29,841
1975						
December.....	649	116,687	28,096	7,099	22,983	28,530
November.....	604	113,540	23,438	6,085	21,395	28,618

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

PRODUCT CODE	CHEMICAL AND BASIS	UNIT OF MEASURE	NOVEMBER 1977	OCTOBER 1977	NOVEMBER 1976
2813200	ACETYLENE (1)	MIL.CU.FT	450	458	557
	PRODUCED FOR PIPELINE SHIPMENT (EXCLUDING THAT SHIPPED TO BE COMPRESSED)	DO	2330	2338	2438
	PRODUCED FOR COMPRESSION, INCLUDING CYLINDER AND PIPELINE	DO	120	^r 120	119
	PRODUCED FOR CONSUMPTION IN THIS PLANT	DO	(²)	(²)	(²)
2813415	ARGON, HIGH PURITY	DO	518	526	431
	PRODUCED FOR CYLINDER AND BULK DELIVERY SHIPMENT	DO	518	526	431
	PRODUCED FOR PIPELINE SHIPMENT	DO			
	PRODUCED FOR CONSUMPTION IN THIS PLANT	DO			
2813311	CARBON DIOXIDE:				
	LIQUID AND GAS (3)	S.TONS	148,213	168,168	136,514
2813331	SOLID (DRY ICE)	DO	26,519	28,756	27,262
2813420	HYDROGEN, TOTAL (4)	MIL.CU.FT	7,019	7,328	6,958
	PRODUCED FOR CYLINDER AND BULK DELIVERY SHIPMENT	DO	860	817	584
	LIQUID PRODUCED FOR CONVERSION TO GAS	DO			
	PRODUCED FOR PIPELINE SHIPMENT	DO			
	LIQUID PRODUCED FOR GOVERNMENT USE	DO			
	PRODUCED FOR CONSUMPTION IN THIS PLANT	DO			
			2,265	2,276	2,104
			3,894	4,235	4,270
2813440	NITROGEN, TOTAL (5)	DO	29,196	29,466	25,568
	GAS:				
	PRODUCED FOR CYLINDER AND BULK DELIVERY SHIPMENT	DO	18,229	18,243	16,256
	PRODUCED FOR PIPELINE SHIPMENT	DO			
	PRODUCED FOR CONSUMPTION IN THIS PLANT	DO			
			2,706	2,307	1,703
	LIQUID:				
	PRODUCED FOR CYLINDER AND BULK DELIVERY SHIPMENT	DO	7,490	8,088	6,873
	PRODUCED FOR BULK SHIPMENT TO PIPELINES OR TO OTHER AIR SEPARATION PLANTS	DO	509	622	472
	PRODUCED FOR CONSUMPTION IN THIS PLANT	DO	262	206	264
2813450	OXYGEN, TOTAL	DO	31,279	33,072	30,729
	GAS:				
	PRODUCED FOR CYLINDER AND BULK DELIVERY SHIPMENT	DO	20	14	15
	PRODUCED FOR PIPELINE SHIPMENT	DO	21,011	22,996	20,763
	PRODUCED FOR CONSUMPTION IN THIS PLANT	DO	64,480	^r 64,042	4,224
	LIQUID:				
	PRODUCED FOR CYLINDER AND BULK DELIVERY SHIPMENT	DO	5,259	5,457	5,118
	PRODUCED FOR BULK SHIPMENT TO PIPELINES OR TO OTHER AIR SEPARATION PLANTS	DO	509	563	609
	PRODUCED FOR CONSUMPTION IN THIS PLANT	DO	(⁶)	(⁶)	(⁶)

^rRevised by 5 percent or more from previously published figures.

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

²Data for (acetylene) produced for consumption in this plant, combined with, produced for pipeline shipment (excluding that shipped to be compressed), to avoid disclosure.

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Industrial Gases



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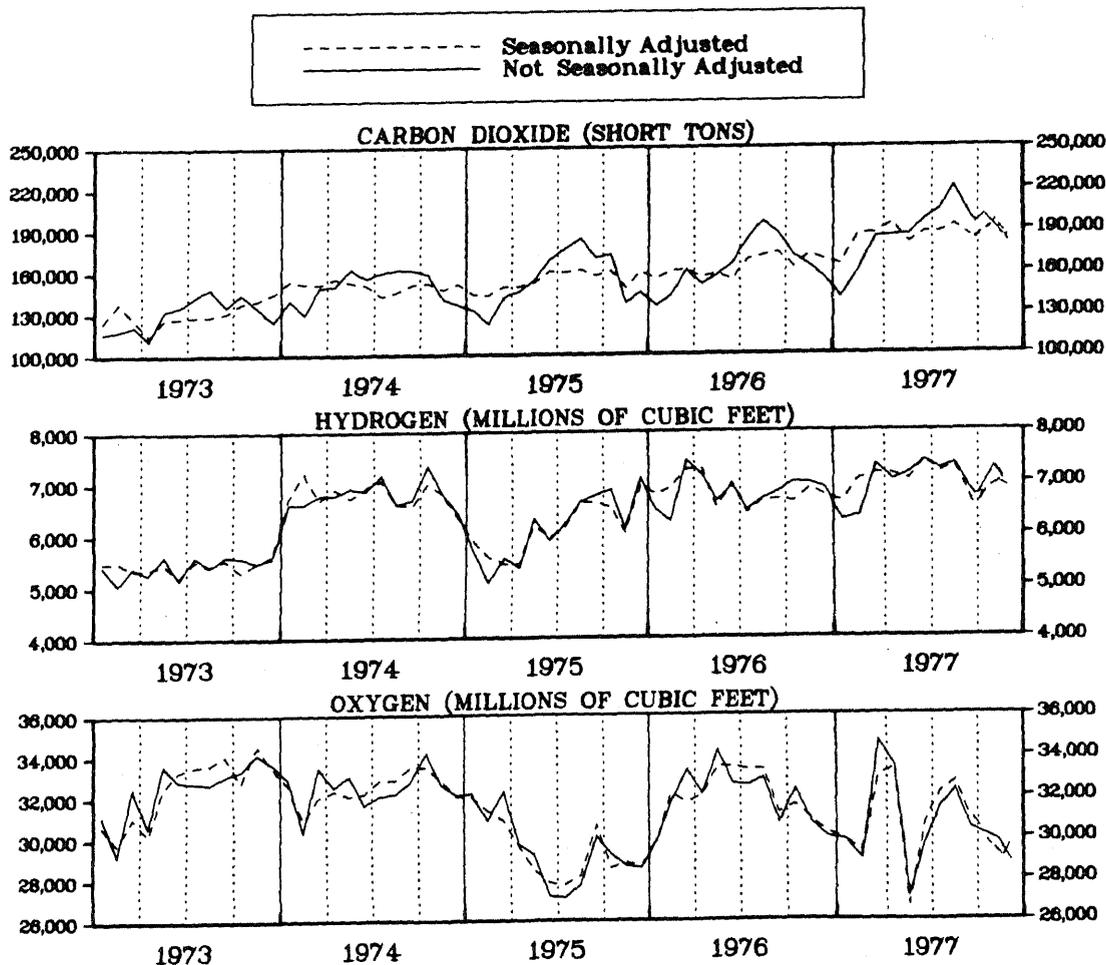
DECEMBER 1977

M28C(77)-12
Issued February 1978

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TABLE 1A.--SUMMARY OF PRODUCTION OF PRINCIPAL GASES: 1975 TO 1977

(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.)
1977					
December.....	443	195,029	6,894	30,960	31,900
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
1975					
December.....	625	159,514	6,967	22,915	28,645
November.....	586	148,026	6,025	22,054	28,762

TABLE 1B.--SUMMARY OF PRODUCTION PRINCIPAL GASES: 1975 TO 1977

(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.)
1977						
December.....	458	154,121	25,306	7,066	30,681	31,581
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
1975						
December.....	649	116,687	28,096	7,099	22,983	28,530
November.....	604	113,540	23,438	6,085	21,395	28,618

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

PRODUCT CODE	CHEMICAL AND BASIS	UNIT OF MEASURE	DECEMBER 1977	NOVEMBER 1977	DECEMBER 1976
2813200	ACETYLENE (1)	MIL.CU.FT	458	451	537
	PRODUCED FOR PIPELINE SHIPMENT (EXCLUDING THAT SHIPPED TO BE COMPRESSED)	DO	2336	2331	2414
	PRODUCED FOR COMPRESSION, INCLUDING CYLINDER AND PIPELINE	DO	122	120	123
	PRODUCED FOR CONSUMPTION IN THIS PLANT.	DO	(²)	(²)	(²)
2813415	ARGON, HIGH PURITY	DO	542	537	416
	PRODUCED FOR CYLINDER AND BULK DELIVERY SHIPMENT	DO	542	537	416
	PRODUCED FOR PIPELINE SHIPMENT.	DO			
	PRODUCED FOR CONSUMPTION IN THIS PLANT.	DO			
2813311	CARBON DIOXIDE: LIQUID AND GAS (3)	S.TONS	154,121	154,385	130,811
2813331	SOLID (DRY ICE)	DO	25,306	26,325	23,383
2813420	HYDROGEN, TOTAL (4)	MIL.CU.FT	7,066	7,117	6,876
	PRODUCED FOR CYLINDER AND BULK DELIVERY SHIPMENT	DO	844	856	823
	LIQUID PRODUCED FOR CONVERSION TO GAS	DO			
	PRODUCED FOR PIPELINE SHIPMENT.	DO			
	LIQUID PRODUCED FOR GOVERNMENT USE.	DO			
	PRODUCED FOR CONSUMPTION IN THIS PLANT.	DO			
2813440	NITROGEN, TOTAL (5)	DO	30,681	29,163	26,159
	GAS:				
	PRODUCED FOR CYLINDER AND BULK DELIVERY SHIPMENT.	DO	19,167	18,306	16,609
	PRODUCED FOR PIPELINE SHIPMENT	DO			
	PRODUCED FOR CONSUMPTION IN THIS PLANT	DO			
	LIQUID:				
	PRODUCED FOR CYLINDER AND BULK DELIVERY SHIPMENT.	DO	7,713	7,477	7,082
	PRODUCED FOR BULK SHIPMENT TO PIPELINES OR TO OTHER AIR SEPARATION PLANTS.	DO	531	508	472
	PRODUCED FOR CONSUMPTION IN THIS PLANT	DO	302	258	273
2813450	OXYGEN, TOTAL.	DO	31,581	30,415	29,989
	GAS:				
	PRODUCED FOR CYLINDER AND BULK DELIVERY SHIPMENT.	DO	18	19	19
	PRODUCED FOR PIPELINE SHIPMENT	DO	22,280	20,984	20,235
	PRODUCED FOR CONSUMPTION IN THIS PLANT	DO	63,429	63,456	64,382
	LIQUID:				
	PRODUCED FOR CYLINDER AND BULK DELIVERY SHIPMENT.	DO	5,206	5,268	4,739
	PRODUCED FOR BULK SHIPMENT TO PIPELINES OR TO OTHER AIR SEPARATION PLANTS.	DO	648	508	614
	PRODUCED FOR CONSUMPTION IN THIS PLANT	DO	(⁶)	(⁶)	(⁶)

¹Revised by 5 percent or more from previously published figures.

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

³Data for "acetylene produced for consumption in this plant" combined with "produced for pipeline shipment excluding that shipped to be compressed" to avoid disclosure.

⁴Excludes production of liquid and gas CO₂ converted to and reported as dry ice and also amounts converted from pure CO₂ (liquid or solid) purchased or received from other plants. Also excludes quantities produced and consumed in plants manufacturing soda ash or urea.

⁵Excludes 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.

⁶Excludes amounts produced and used in the manufacture of ammonia and ammonia derivatives.

⁷Data for "oxygen (liquid) produced for consumption in this plant" combined with data for "oxygen (gas) produced for consumption in this plant" to avoid disclosure.

⁸25 to 40 percent of this item is imputed.

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.

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.

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) 763-7838
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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CURRENT INDUSTRIAL REPORTS

Industrial Gases



U.S. Department of Commerce
BUREAU OF THE CENSUS

1977 (Preliminary)

M28C(77)-13
Issued June 1978

GENERAL

Annual data for 1977, shown in this release, are a compilation of the monthly figures which have been appearing in this series. The figures for 1977 should be considered as preliminary and subject to revision based on information collected on Form MA-28E.2, and published as M28C(77)-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. Melva R. Martin 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.

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

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PRIMARY PRODUCTION OF SPECIFIED INDUSTRIAL GASES

Census product code	Chemical and basis	Unit of measure	1977	1976
2813200	Acetylene ¹	Mil.cu.ft...	5,906	7,111
	Produced for pipeline shipment (excluding that shipped to be compressed).....	..do.....	² 4,594	} 7,111
	Produced for compression, including cylinder and pipeline..	..do.....	1,312	
	Produced for consumption in this plant.....	..do.....	(²)	
2813415	Argon, high purity.....	..do.....	5,927		5,107
	Produced for cylinder and bulk delivery shipment.....	..do.....	} 5,927	} 5,107
	Produced for pipeline shipment.....	..do.....		
	Produced for consumption in this plant.....	..do.....		
	Carbon dioxide:			
2813311	Liquid and gas ³	S.tons.....	1,886,135	1,610,854
2813331	Solid (dry ice).....	..do.....	346,746	355,873
2813420	Hydrogen, total ⁴	Mil.cu.ft...	84,539	81,641
	Produced for cylinder and bulk delivery shipment.....	..do.....	} 9,358	} 8,534
	Liquid produced for conversion to gas.....	..do.....		
	Produced for pipeline shipment.....	..do.....		
	Liquid produced for government use.....	..do.....	25,719	23,448
	Produced for consumption in this plant.....	..do.....	49,462	49,659
2813440	Nitrogen, total ⁵.....	..do.....	331,043	289,926
	Gas:			
	Produced for cylinder and bulk delivery shipment.....	..do.....	} 207,383	} 177,640
	Produced for pipeline shipment.....	..do.....		
	Produced for consumption in this plant.....	..do.....			23,634	20,159
	Liquid:			
	Produced for cylinder and bulk delivery shipment.....	..do.....	89,810	82,164
	Produced for bulk shipment to pipeline or to other air separation plants.....	..do.....	6,820	6,728
	Produced for consumption in this plant.....	..do.....	3,396	3,235
2813450	Oxygen, total.....	..do.....	384,119	382,914
	Gas:			
	Produced for cylinder and bulk delivery shipment.....	..do.....	231	191
	Produced for pipeline shipment.....	..do.....	267,641	263,938
	Produced for consumption in this plant.....	..do.....	⁶ 47,473	⁶ 52,480
	Liquid:			
	Produced for cylinder and bulk delivery shipment.....	..do.....	61,492	59,133
	Produced for bulk shipment to pipeline or to other air separation plants.....	..do.....	7,282	7,172
	Produced for consumption in this plant.....	..do.....	(⁶)	(⁶)

¹Excludes quantities of acetylene produced and consumed by railroad ships, shipyards, and small establishments using portable generators.

²Data for acetylene produced for consumption in this plant combined with acetylene produced for pipeline shipment (excluding that shipped to be compressed) to avoid disclosing figures for individual companies.

³Excludes production of liquid and gas CO₂ converted to and reported as dry ice and also amounts converted from pure manufacturing soda ash or urea.

⁴Excludes 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 refiners for captive use.

⁵Excludes amounts produced and used in the manufacture of ammonia and ammonia derivatives.

⁶Data for oxygen (gas) produced for consumption in this plant combined with data for oxygen (liquid) produced for consumption in this plant to avoid disclosing figures for individual companies.

Industrial Gases



U.S. Department of Commerce
BUREAU OF THE CENSUS

1977

M28C(77)-14
Issued September 1978

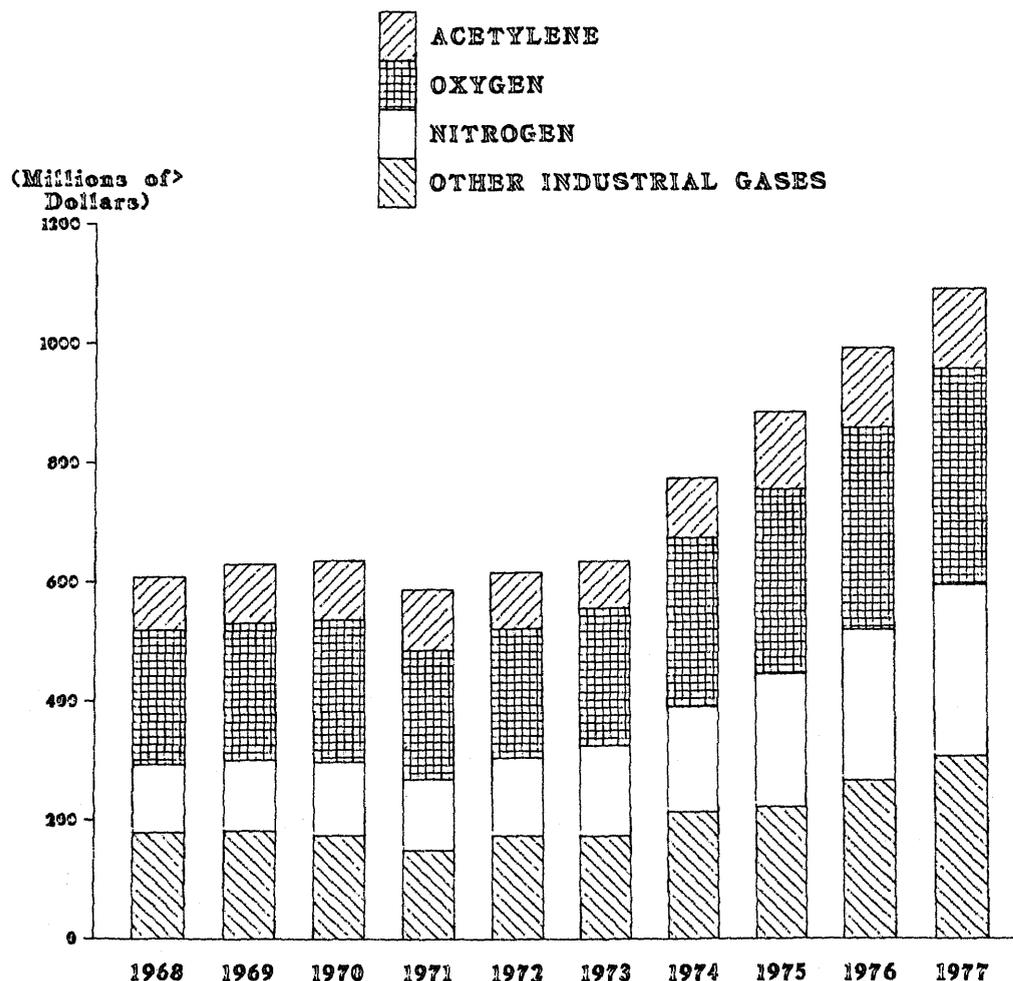
SUMMARY OF FINDINGS

Shipments of industrial gases by primary manufactures in 1977 totaled \$1,084 million, or about 11 percent more than the 1976 figure of \$986 million. The 1977 total is composed of \$133 million for acetylene; \$88 million for carbon dioxide; and \$863 million for the product grouping elemental gases and other industrial gases, n.e.c. Compared with 1976, the 1977 totals

showed about a 1 percent decrease for acetylene, an increase of 16 percent for carbon dioxide, and an increase of 10 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: 1968 TO 1977



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 1. VALUE OF SHIPMENTS OF SELECTED INDUSTRIAL GASES: 1977 AND 1976

Product code	Product	1977	1976	
			M28C	ASM
28132 --	Acetylene.....	133.3	133.4	132.1
28133 --	Carbon dioxide.....	88.3	74.1	71.8
28134 --	Elemental compressed, liquefied gases, n.e.c..	862.7	778.8	820.1

n.e.c. Not elsewhere classified.

ASM: Annual Survey of Manufactures, "Value of Product Shipments," 1976.

Table 2. ANNUAL PRODUCTION AND SHIPMENTS OF INDUSTRIAL GASES: 1973 TO 1977

Code	Product	Unit of measure	Year	Quantity produced for all purposes	Total shipments including transfers quantity	Total shipments including transfers value (\$1,000)
2813- --	Industrial gases, total.....		1977	(X)	(X)	¹ 1,084,296
			1976	(X)	(X)	¹ 986,289
			1975	(X)	(X)	¹ 879,590
			1974	(X)	(X)	¹ 769,395
			1973	(X)	(X)	¹ 631,225
28132 --	Acetylene ²	Mil. cu. ft.	1977	5,972	3,796	133,287
			1976	7,111	4,415	133,417
			1975	6,704	4,138	129,100
			1974	7,808	4,799	99,844
			1973	8,269	5,063	78,864
	Produced for pipeline shipment excluding that shipped to be compressed.....	..do.....	1977	³ 4,669	2,520	65,459
			1976	(D)	(D)	70,662
	Produced for compression, including cylinder and pipeline.....	..do.....	1977	1,302	1,276	67,828
			1976	(D)	(D)	62,755
	Produced for consumption in this plant.....	..do.....	1977	(³)	(X)	(X)
			1976	(D)	(X)	(X)
28133 --	Carbon dioxide, total.....	Short tons..	1977	2,255,814	2,090,258	88,325
			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
			1973	1,565,506	1,449,265	44,178
28133 11	Liquid and gas.....	..do.....	1977	⁴ 1,918,030	⁴ 1,752,474	58,438
			1976	⁴ 1,707,792	⁴ 1,561,697	46,644
			1975	⁴ 1,498,716	⁴ 1,376,592	41,099
			1974	⁴ 1,435,612	⁴ 1,305,481	37,566
			1973	⁴ 1,193,537	⁴ 1,077,300	25,424
28133 31	Solid (dry ice).....	..do.....	1977	337,784	337,784	29,887
			1976	355,873	355,882	28,440
			1975	351,602	351,664	24,784
			1974	368,639	368,635	22,400
			1973	371,969	371,965	18,754
28134 --	Elemental gases and other industrial gases, n.e.c., total.....		1977	(X)	(X)	862,684
			1976	(X)	(X)	778,788
			1975	(X)	(X)	684,607
			1974	(X)	(X)	609,585
			1973	(X)	(X)	508,183
28134 15	Argon, high purity, total.....	Mil. cu. ft.	1977	5,925	5,925	72,728
			1976	5,107	4,941	66,741
			1975	4,457	4,457	63,144
			1974	4,688	4,688	47,380
			1973	4,325	4,325	35,032
	Produced for cylinder and bulk delivery shipment.....	..do.....	1977	5,925	5,925	72,728
	Produced for pipeline shipment.....	..do.....	1976	5,107	4,941	66,741
	Helium ⁵.....	..do.....	1977	(NA)	(NA)	(NA)
			1976	1,339	580	(NA)
			1975	1,078	601	(NA)
			1974	883	570	(NA)
			1973	3,205	497	(NA)
28134 20	Hydrogen, total.....	..do.....	1977	⁶ 84,506	35,114	98,569
			1976	⁶ 82,100	32,357	80,794
			1975	⁶ 73,552	27,662	57,358
			1974	⁶ 81,536	29,327	74,878
			1973	⁶ 65,169	19,138	38,566
	Produced for cylinder and bulk delivery shipment.....	..do.....	1977	9,278	9,139	61,741
	Liquid produced for conversion to gas.....	..do.....	1976	8,473	8,473	51,436
	Produced for pipeline shipment.....	..do.....	1977	26,022	25,975	36,828
	Liquid produced for government use.....	..do.....	1976	23,905	23,884	29,358
	Produced for consumption in this plant.....	..do.....	1977	49,206	(X)	(X)
			1976	49,722	(X)	(X)
28134 40	Nitrogen, total ⁷.....	..do.....	1977	⁸ 331,545	⁸ 303,573	⁸ 285,852
			1976	⁸ 288,868	⁸ 265,473	⁸ 252,006
			1975	⁸ 252,368	⁸ 228,266	⁸ 222,157
			1974	⁸ 243,316	⁸ 219,271	⁸ 175,661
			1973	⁸ 227,160	⁸ 203,267	⁸ 150,746
	Gas:					
	Produced for cylinder and bulk delivery shipment.....	..do.....	1977	(⁹)	(⁹)	(⁹)
			1976	(⁹)	(⁹)	(⁹)
	Produced for pipeline shipment.....	..do.....	1977	⁹ 208,138	⁹ 207,214	⁹ 95,251
			1976	⁹ 178,092	⁹ 178,056	⁹ 75,913
	Produced for consumption in this plant.....	..do.....	1977	23,648	(X)	(X)
			1976	20,159	(X)	(X)

See footnotes at end of table.

Table 2. ANNUAL PRODUCTION AND SHIPMENTS OF INDUSTRIAL GASES: 1973 TO 1977--Continued

Code	Product	Unit of measure	Year	Quantity produced for all purposes	Total shipments including transfers quantity	Total shipments including transfers value (\$1,000)
	Elemental gases and other industrial gases, n.e.c.--Continued					
	Nitrogen ⁷ --Continued					
	Liquid:					
	Produced for cylinder and bulk delivery shipment.....	Mil. cu. ft.	1977	89,715	89,642	181,848
			1976	80,654	80,689	^r 167,275
	Produced for bulk shipment to pipelines or to other air separation plants.....	..do.....	1977	6,661	6,717	8,753
			1976	6,728	6,728	8,818
	Produced for consumption in this plant.....	..do.....	1977	3,383	(X)	(X)
			1976	3,235	(X)	(X)
28134 50	Oxygen, total ⁷.....	..do.....	1977	⁸ 392,984	^r ⁸ 341,530	⁸ 361,105
			1976	⁸ 388,446	⁸ 335,774	⁸ 337,394
			1975	⁸ 352,554	⁸ 306,289	⁸ 308,579
			1974	⁸ 389,628	⁸ 337,032	⁸ 282,421
			1973	⁸ 389,436	⁸ 331,327	⁸ 229,730
	Gas:					
	Produced for cylinder and bulk delivery shipment.....	..do.....	1977	224	155	3,588
			1976	190	144	3,772
	Produced for pipeline shipments.....	..do.....	1977	271,243	271,243	200,567
			1976	270,259	270,208	182,751
	Produced for consumption in this plant.....	..do.....	1977	¹⁰ 51,467	(X)	(X)
			1976	¹⁰ 52,568	(X)	(X)
	Liquid:					
	Produced for cylinder and bulk delivery shipments.....	..do.....	1977	62,561	62,643	145,335
			1976	58,256	58,249	139,335
	Produced for bulk shipment to pipeline or to other air separation plants.....	..do.....	1977	7,489	7,489	11,615
			1976	7,173	7,173	11,536
	Produced for consumption in this plant.....	..do.....	1977	(¹⁰)	(X)	(X)
			1976	(¹⁰)	(X)	(X)
28134 71	Nitrous oxide.....	1,000 gals.. (STP)	1977	(D)	(D)	¹¹ 44,430
			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
			1973	1,281,590	1,281,590	4,659
28134 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 ¹²		1977	(X)	(X)	(¹¹)
			1976	(X)	(X)	^r 32,361
			1975	(X)	(X)	^r 25,099
			1974	(X)	(X)	23,371
			1973	(X)	(X)	49,450

(D) Data withheld to avoid disclosing figures for individual companies. (NA) Not available. n.e.c. Not elsewhere classified. ^r Revised by 5 percent or more. (X) Not applicable.

¹Excludes value for helium produced in government owned plants.

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

³Data for acetylene produced for consumption in this plant, combined with produced for pipeline shipment (excluding that shipped to be compressed), to avoid disclosure.

⁴Excludes 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.

⁵Source: U. S. Department of Interior, Bureau of Mines.

⁶Excludes 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.

⁷Excludes amounts produced and consumed in the manufacture of synthetic ammonia or ammonia derivatives.

⁸Data for 1973 and 1972 include figures for high and lower purity gas.

⁹Data for nitrogen (gas), produced for cylinder and bulk delivery shipment combined with produced for pipeline shipment to avoid disclosing figures for individual companies.

¹⁰Data for oxygen (liquid), produced for consumption in this plant, combined with data for oxygen (gases), produced for consumption in this plant, to avoid disclosing figures for individual companies.

¹¹Data 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.

¹²Excludes 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: 1977

(Production and quantity in mil. cu. ft.; value in \$1,000)			
Production	Production	Total shipments including interplant transfers	
		Quantity	Value
United States, total ¹	5,971	3,796	133,287
Northeast Region and North Central Region.....	747	647	31,528
South Region.....	4,993	2,924	89,455
Mountain Division.....	93	87	4,542
Pacific Division.....	138	138	7,762

¹See table 10 for the number of establishments reporting production by State.

Table 4. PRODUCTION AND SHIPMENTS OF CARBON DIOXIDE, BY DIVISIONS: 1977

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, total ¹	2,255,814	2,090,258	88,325	1,918,030	1,752,474	58,438	337,784	337,784	29,887
New England and Middle Atlantic.....	113,585	107,940	10,553	52,302	46,657	1,153	61,283	61,283	9,400
East North Central.....	412,264	397,486	18,272	339,037	324,259	10,537	73,227	73,227	7,735
West North Central.....	274,909	268,321	11,285	252,393	245,805	9,593	22,516	22,516	1,692
South Atlantic and East South Central....	523,691	492,733	23,520	482,582	451,624	20,535	41,109	41,109	2,985
West South Central.....	597,516	498,811	16,382	564,249	465,544	13,479	33,267	33,267	2,903
Mountain.....	107,908	107,908	2,496	62,866	62,866	535	45,042	45,042	1,961
Pacific.....	225,941	217,059	5,817	164,601	155,719	2,606	61,340	61,340	3,211

¹See table 10 for the number of establishments reporting production by State.

Table 5. SHIPMENTS OF ARGON (HIGH PURITY) BY GEOGRAPHIC AREA: 1977

(Quantity in mil. cu. ft.; value in \$1,000)		
Geographic area	Total shipments including interplant transfers	
	Quantity	Value
United States, total ¹	5,925	72,728
Northeast Region.....	1,107	15,813
East North Central Division.....	2,359	23,959
Ohio.....	764	8,394
South Atlantic Division.....	779	11,683
East South Central Division.....	228	4,260
West South Central Division.....	755	8,582
West Region.....	697	8,431
California.....	538	5,792

¹See table 10 for the number of establishments reporting production by State.

Table 6. PRODUCTION AND SHIPMENTS OF HYDROGEN (TOTAL) BY GEOGRAPHIC AREA: 1977

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

Geographic area	Production	Total shipments including interplant transfers	
		Quantity	Value
United States, total ¹	84,507	35,114	98,569
Northeast Region.....	4,220	2,458	11,026
North Central Region.....	6,388	3,248	11,043
South Region and West Region.....	73,899	29,408	76,500
East South Central Division.....	5,178	2,050	4,544
West South Central Division.....	53,579	18,329	42,735

¹See table 10 for the number of establishments reporting production by State.

Table 7. PRODUCTION AND SHIPMENTS OF NITROGEN (TOTAL) BY GEOGRAPHIC AREA: 1977

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

Geographic area	Production	Total shipments including interplant transfers	
		Quantity	Value
United States, total ¹	331,546	303,573	285,781
New England Division.....	5,858	5,729	10,845
Middle Atlantic Division.....	36,048	34,229	47,000
New York.....	8,938	8,170	11,278
New Jersey.....	9,882	9,865	13,918
Pennsylvania.....	17,228	16,194	21,804
North Central Region.....	71,417	70,237	61,217
Ohio.....	14,848	14,451	15,395
Illinois.....	10,988	10,755	21,240
South Atlantic Division.....	43,678	37,321	29,628
West Virginia.....	17,240	10,948	6,957
East South Central Division.....	25,426	22,848	20,396
Tennessee.....	7,794	5,942	5,942
Alabama.....	14,594	14,463	13,107
West South Central Division.....	113,933	100,573	71,593
Texas.....	92,619	83,739	53,065
Mountain Division.....	4,590	4,571	7,384
Pacific Division.....	30,597	28,065	37,718
California.....	27,456	26,531	34,535

¹See table 10 for the number of establishments reporting production by State.

Table 8. PRODUCTION AND SHIPMENTS OF OXYGEN (TOTAL) BY GEOGRAPHIC AREAS: 1977

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

Geographic area	Production	Total shipments including interplant transfers	
		Quantity	Value
United States, total ¹	392,984	341,535	361,105
New England Division.....	1,774	1,748	4,302
Middle Atlantic Division.....	57,853	57,139	65,260
New York.....	13,028	12,995	16,659
New Jersey.....	2,576	2,560	5,584
Pennsylvania.....	42,249	41,584	43,017
North Central Region.....	152,759	133,769	133,698
Ohio.....	39,644	39,609	36,853
Michigan.....	22,712	12,898	13,785
South Atlantic Division.....	41,472	41,359	42,383
East South Central Division.....	30,447	30,446	32,164
West South Central Division.....	81,791	50,650	47,876
Texas.....	58,398	42,020	35,189
Mountain Division.....	9,878	9,498	10,465
Pacific Division.....	17,010	16,926	24,957
California.....	15,316	15,257	19,914

¹See table 10 for number of establishments reporting production by State.

Table 9. PRIMARY PRODUCTION OF SPECIFIED INDUSTRIAL GASES, BY MONTHS: 1977 AND 1976

Code	Product	Unit of measure	Year	Total	January	February	March	April	May	June	July	August	September	October	November	December		
28132 00	Acetylene..... Produced for pipeline shipment, excluding that produced to be compressed..... Produced for compression, including cylinder and pipeline..... Produced for consumption in this plant.....	ml. cu. ft. ..do..... ..do..... ..do.....	1977	5,972	571	537	544	432	550	515	463	515	472	463	456	454		
			1976	7,111	578	584	596	610	600	615	603	621	577	621	577	557	537	
			1977	14,669	1,461	1,428	1,421	1,329	1,446	1,410	1,384	1,407	1,344	1,364	1,344	1,336	1,339	
			1976	(D)	226	238	238	269	254	1,501	1,499	1,530	1,454	1,505	1,454	1,438	1,414	
28134 15	Argon, high purity, total..... Produced for cylinder and bulk delivery shipment..... Produced for pipeline shipment.....	..do..... ..do..... ..do.....	1977	1,302	110	109	122	103	104	105	79	108	108	108	119	120	115	
			1976	(D)	(2)	(2)	(2)	(2)	(2)	114	103	116	123	116	123	119	123	
			1977	5,925	381	450	503	536	483	484	498	484	498	469	469	454	431	540
			1976	5,107	367	456	475	398	442	418	408	445	397	454	397	454	431	416
28133 11	Carbon dioxide, total..... Liquid and gas..... Solid (dry ice).....	Short tons.. ..do..... ..do.....	1977	2,255,814	142,014	161,312	186,031	186,955	187,671	198,664	205,787	222,671	201,010	199,025	189,025	182,641	182,033	
			1976	2,063,665	141,726	149,511	168,768	157,858	164,619	173,404	192,167	205,289	196,536	179,731	171,990	171,990	171,990	162,066
			1977	1,918,030	119,718	137,876	138,964	161,420	159,609	166,837	171,711	186,235	170,325	171,012	156,996	156,996	157,327	157,327
			1976	1,707,792	118,770	124,918	140,118	132,091	136,361	138,384	155,394	162,833	149,682	144,728	138,683	138,683	138,683	138,683
28133 31	Hydrogen, total..... Produced for cylinder and bulk delivery shipment..... Produced for pipeline shipment.....	ml. cu. ft. ..do..... ..do.....	1977	84,459	6,245	6,330	7,309	7,165	7,149	7,383	7,223	7,326	6,815	6,815	7,309	7,098	7,107	
			1976	82,099	6,509	6,288	7,464	7,181	6,667	6,977	6,977	6,716	6,856	6,856	7,036	6,996	6,914	
			1977	9,278	757	744	684	915	713	708	755	835	685	685	806	806	844	832
			1976	8,472	732	562	732	613	688	749	664	674	800	851	851	851	851	818
28134 40	Nitrogen, total..... Gas: Produced for cylinder and bulk delivery shipment..... Produced for pipeline shipment..... Produced for consumption in this plant.....	..do..... ..do..... ..do..... ..do.....	1977	331,545	24,779	23,691	26,393	25,614	27,157	29,700	27,379	28,731	29,236	29,236	29,508	29,210	30,147	
			1976	288,867	21,957	22,143	24,352	23,035	24,141	23,051	23,551	24,970	24,570	24,570	25,812	25,494	25,985	
			1977	208,138	15,690	14,687	16,703	15,943	16,623	19,422	17,193	18,022	18,363	18,363	18,363	18,363	18,363	18,810
			1976	178,091	13,450	13,272	14,692	13,982	14,870	14,516	14,160	14,872	15,047	15,047	15,047	15,047	15,047	16,293
28134 40	Nitrogen, total..... Gas: Produced for cylinder and bulk delivery shipment..... Produced for pipeline shipment..... Produced for consumption in this plant.....	..do..... ..do..... ..do.....	1977	20,159	1,844	1,764	1,824	1,830	1,521	1,602	1,562	1,783	1,783	1,783	1,783	1,703	1,723	
			1976	1,844	1,521	1,521	1,521	1,521	1,521	1,521	1,521	1,521	1,521	1,521	1,521	1,521	1,521	
			1977	20,159	1,844	1,764	1,824	1,830	1,521	1,602	1,562	1,783	1,783	1,783	1,783	1,783	1,703	1,723
			1976	1,844	1,521	1,521	1,521	1,521	1,521	1,521	1,521	1,521	1,521	1,521	1,521	1,521	1,521	1,521

See footnotes at end of table.

Table 9. PRIMARY PRODUCTION OF SPECIFIED INDUSTRIAL GASES, BY MONTHS: 1977 AND 1976--Continued

Code	Product	Unit of measure	Year	Total	January	February	March	April	May	June	July	August	September	October	November	December		
28134 50	Nitrogen--Continued Liquid: Produced for cylinder and bulk delivery.. Produced for bulk shipment to pipelines or to other air separation plants..... Produced for consumption in this plant...	mil. cu. ft.	1977	89,715	6,583	6,810	7,584	7,044	7,700	7,425	7,401	7,858	8,080	8,079	7,469	7,682		
			1976	80,654	5,355	6,217	6,874	6,545	6,956	6,217	6,949	6,949	7,412	7,103	7,193	6,762	6,871	
				6,661	691	463	440	543	574	526	701	524	574	524	607	496	496	522
				6,728	822	660	660	418	495	465	653	512	465	519	472	519	472	472
				3,383	288	200	259	301	300	352	291	330	291	330	310	205	257	290
				3,235	286	276	302	260	299	251	260	250	260	250	247	267	264	273
				392,984	29,858	28,964	34,569	33,445	34,972	33,069	31,433	32,322	31,433	32,322	30,514	33,091	30,323	31,899
				388,446	29,629	31,360	32,935	31,730	33,886	32,247	32,162	32,526	31,333	32,526	31,333	31,955	30,373	29,633
				224	17	19	31	20	17	18	14	18	18	14	19	14	19	18
				191	15	15	19	15	17	18	13	16	18	13	17	12	15	19
	Gas: Produced for cylinder and bulk delivery shipment..... Produced for pipeline shipment..... Produced for consumption in this plant...	..do.....	1977	271,243	20,558	19,895	23,854	23,793	25,251	23,616	22,715	23,050	21,222	23,290	21,296	21,296	22,703	
			1976	270,259	20,944	21,997	23,581	23,312	24,373	22,791	23,325	23,319	22,470	22,470	22,261	21,207	21,207	20,679
				351,467	34,754	34,452	35,182	34,112	34,118	34,113	34,166	34,315	34,049	34,315	34,049	34,363	33,836	34,007
				352,568	34,540	34,707	34,599	34,094	34,704	34,651	34,231	34,284	34,227	34,284	34,227	33,909	34,232	34,390
				62,561	4,845	4,891	5,378	5,384	5,584	5,368	4,552	4,908	4,552	4,908	5,312	5,552	5,360	5,227
				58,256	4,231	4,795	4,992	4,612	4,943	4,843	4,642	4,914	4,642	4,914	4,731	5,866	5,033	4,654
				7,489	429	412	630	843	709	661	695	738	695	738	620	579	522	651
				7,172	622	569	467	420	572	667	674	716	674	716	611	631	609	614
				(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)
				Produced for consumption in this plant...	..do.....	1976	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)
	Produced for consumption in this plant...	..do.....	1976	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)			

Revised by 5 percent from previous publication.
 (D) Withheld to avoid disclosing figures for individual companies.
 Data for (acetylene) produced for consumption in this plant, combined with produced for pipeline shipment (excluding that shipped to be compressed), to avoid disclosure.
 1976 data for acetylene, produced for compression including cylinder and pipeline, combined with produced for consumption in this plant, to avoid disclosing figures for individual companies.
 Data for oxygen (liquid), produced for consumption in this plant, combined with data for oxygen (gas), produced for consumption in this plant, to avoid disclosing figures for individual companies.

Table 10. NUMBER OF ESTABLISHMENTS REPORTING THE PRODUCTION OF SELECTED INDUSTRIAL GASES, BY STATE: 1977

State	Acetylene	Carbon dioxide			Argon (refined)	Hydrogen	Nitrogen	Oxygen	Nitrous oxide
		Total ¹	Liquid or gas ²	Solid					
United States, total.....	195	81	63	43	86	117	288	185	7
New England.....	4	1	-	1	2	3	12	4	-
Maine.....	-	-	-	-	-	-	1	-	-
New Hampshire.....	-	-	-	-	-	-	-	-	-
Vermont.....	-	-	-	-	-	-	1	-	-
Massachusetts.....	2	1	-	1	1	1	5	3	-
Rhode Island.....	1	-	-	-	-	-	1	-	-
Connecticut.....	1	-	-	-	1	2	4	1	-
Middle Atlantic.....	18	6	3	3	13	9	42	28	-
New York.....	5	2	2	-	3	3	12	6	-
New Jersey.....	4	2	-	2	2	3	7	3	-
Pennsylvania.....	9	2	1	1	8	3	23	19	-
East North Central.....	36	11	9	5	18	27	53	42	1
Ohio.....	15	3	3	2	8	7	17	19	1
Indiana.....	6	2	2	-	4	3	9	6	-
Illinois.....	5	5	3	3	4	12	17	11	-
Michigan.....	6	-	-	-	2	5	8	5	-
Wisconsin.....	4	1	1	-	-	-	2	1	-
West North Central.....	19	10	7	7	-	4	14	6	1
Minnesota.....	3	2	1	1	-	-	1	2	-
Iowa.....	4	4	3	3	-	-	4	-	-
Missouri.....	5	1	-	1	-	2	7	3	-
North Dakota.....	-	-	-	-	-	-	-	-	-
South Dakota.....	3	-	-	-	-	-	1	1	-
Nebraska.....	-	-	-	-	-	1	-	-	-
Kansas.....	4	3	3	2	-	1	1	-	1
South Atlantic.....	25	10	7	6	10	12	47	20	1
Delaware.....	-	1	1	-	1	4	2	2	-
Maryland.....	2	-	-	-	1	-	5	2	-
District of Columbia.....	-	-	-	-	-	-	-	-	-
Virginia.....	3	1	1	1	1	2	3	2	-
West Virginia.....	3	1	1	1	2	4	12	5	-
North Carolina.....	3	1	1	-	1	-	8	2	-
South Carolina.....	1	-	-	-	1	-	6	2	-
Georgia.....	4	2	1	1	2	2	5	2	1
Florida.....	9	4	2	3	1	-	6	3	-
East South Central.....	15	6	6	1	6	17	31	17	2
Kentucky.....	3	2	2	-	-	4	7	5	-
Tennessee.....	7	4	4	1	3	8	15	4	1
Alabama.....	3	-	-	-	3	4	8	7	-
Mississippi.....	2	-	-	-	-	1	1	1	1
West South Central.....	36	18	15	5	19	26	48	36	-
Arkansas.....	2	1	1	-	1	-	1	1	-
Louisiana.....	6	3	2	1	3	7	15	10	-
Oklahoma.....	3	-	-	-	1	-	2	1	-
Texas.....	25	14	12	4	14	19	30	24	-
Mountain.....	20	8	7	8	4	2	10	11	-
Montana.....	3	-	-	-	-	-	-	1	-
Idaho.....	2	-	-	-	-	-	1	1	-
Wyoming.....	1	-	-	-	-	-	-	-	-
Colorado.....	4	2	1	2	1	1	3	3	-
New Mexico.....	2	2	2	2	1	-	1	1	-
Arizona.....	3	2	2	2	-	-	3	2	-
Utah.....	3	2	2	2	2	1	2	3	-
Nevada.....	2	-	-	-	-	-	-	-	-
Pacific.....	22	11	9	7	14	17	31	21	2
Washington.....	4	2	2	2	2	2	4	3	-
Oregon.....	4	-	-	-	1	1	2	1	-
California.....	11	6	4	4	11	11	22	14	2
Alaska.....	1	1	1	-	-	-	1	1	-
Hawaii.....	2	2	2	1	-	3	2	2	-

- Represents zero.

¹Unduplicated.²Excludes 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 (76)-14, Inorganic Chemicals.

Survey Description—The statistics in this publication were collected on Bureau of the Census annual reporting Form M28E.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—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.

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, 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.

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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 1976 monthly series are based on findings from the 1976 annual. These revisions are shown in table 9 of the annual report M28C-14.

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	Géoff Embrey	(301) 763-7837
Foreign Trade publications	Paul Finn	(301) 763-5140
Bureau of Domestic Commerce	Tom Gillett	(202) 377-5496
To order Census Bureau publication	Daisy Williams	(301) 763-7472
To order Census Bureau microfiche	Dorothy Dunham	(301) 763-5511

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