## Output of all major U.S. chemical segments increased slightly in 2012



NOTE: Seasonally adjusted. SOURCE: Federal Reserve Board



Percent increase in North American ouput of highdensity polyethylene in 2012: Ten-year average growth rate for methanol production in China:



## U.S. chemical manufacturing's capacity utilization dipped slightly in 2012



# LACKLUSTER YEAR FOR CHEMICAL OUTPUT

**PRODUCTION** stayed flat or dipped in most world regions in 2012

**STATISTICS** about the global chemical industry's output in 2012 came in all shapes and sizes but generally shared a resemblance to the anemic overall economic picture. In the U.S., the industry grew by a scant 0.1%. Germany, Europe's largest producer, saw declines in most organic chemicals but healthy growth in most inorganics. And Japan's output of most chemicals was down sharply.

U.S. chemical manufacturing did hold some bright spots, according to indexes from the Federal Reserve Board. For example, output of basic chemicals grew 4.7%, organic chemicals rose by 2.2%, and pharmaceuticals and medicines progressed at a 5.2% rate. The industry was helped along domestically by small but steady increases in consumer spending on durable goods. In addition, exports were \$207.3 billion, essentially even with the record year of 2011.

Industry data show that U.S. fiber production shrank by 5.2% for nylon but grew by 5.7% for olefin and 9.9% for polyester. Nitrogen fertilizers in the U.S. were also on a growth trajectory; the sector may already be seeing the impact of the increasing availability of natural gas from shale. Ammonia output increased by 3.6% compared with a historic decline of 2.1% per year over the past decade. In contrast, most plastics saw little to no growth.

In Germany, output figures varied. The

largest organic chemical markets saw volumes decline in 2012—in many cases by significantly more than the decade average. Output dipped by 3.7% for ethylene, 2.5% for propylene, and 1.7% for benzene. In contrast, output of the inorganic chemicals hydrochloric acid and hydrogen peroxide each jumped by more than 10%.

Figures for Japan show an industry in contraction. Most sectors saw moderate declines in line with historical averages. But plastics sank much more sharply than usual, with polyethylene output eroding 8.1%. In South Korea, the chemical industry is growing steadily, and that was true in 2012 as well. The country saw significant increases in output of all organics and plastics.

China's growth rate for basic chemicals was blistering in 2011 but slowed in 2012. Output of benzene and ethylene shrank slightly, while methanol production grew 18.6%, which is slower than the 2011 growth rate of 41.5%. Inorganics in China grew slowly but still had a solid year. Sodium hydroxide output increased the most, by 9.4% for the year.

#### **U.S. PRODUCTION INDEX**

Overall chemical production growth was slight, but basic chemicals grew 4.7% in 2012

PRODUCTION INDEX.					ANNUAL	CHANGE
2002 = 100	2002	2010	2011	2012	2011-12	2002-12
Total index	100.0	101.5	104.9	108.7	3.6%	0.8%
Manufacturing, total	100.0	102.3	102.5	103.7	1.1	0.4
Nondurable	100.0	91.6	91.6	91.7	0.1	-0.9
manufacturing						
Chemicals	100.0	100.5	98.7	98.8	0.1	-0.1
Basic chemicals	100.0	100.3	97.3	101.9	4.7	0.2
Basic inorganic chemicals	100.0	85.6	87.4	86.0	-1.6	-1.5
Alkalis & chlorine	100.0	95.7	86.1	92.7	7.6	-0.8
Synthetic dyes & pigments	100.0	85.3	84.1	86.9	3.3	-1.4
Other basic inorganic chemicals	100.0	90.9	89.8	88.1	-1.8	-1.3
Organic chemicals	100.0	123.1	117.7	120.3	2.2	1.9
Synthetic materials <sup>a</sup>	100.0	96.2	90.4	91.8	1.5	-0.9
Plastic materials & resins	100.0	101.9	107.7	112.2	4.2	1.2
Artificial & synthetic fibers	100.0	75.1	76.3	73.6	-3.5	-3.0
Pharmaceuticals & medicines	100.0	97.8	102.8	108.1	5.2	0.8
Soap, cleaning com- pounds & toiletries	100.0	107.5	108.0	117.6	9.0	1.6
Paint & coatings	100.0	89.1	83.8	81.2	-3.1	-2.1
Pesticides, fertilizers & other agricultural chemicals	100.0	103.1	97.0	93.9	-3.2	-0.6

a Includes synthetic rubber. SOURCE: Federal Reserve Board

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#### **ASIA PRODUCTION INDEXES**

Japan's chemical industry experienced a general decline last year

PRODUCTION INDEX.					ANNUAL	CHANGE
2002 = 100	2002	2010	2011	2012	2011-12	2002-12
JAPAN						
Mining & manufacturing	100.0	103.9	101.5	101.2	-0.3%	0.1%
All chemicals <sup>a</sup>	100.0	96.4	92.8	89.4	-3.7	-1.1
Petrochemicals	100.0	97.8	92.8	89.5	-3.6	-1.1
Aromatics	100.0	110.6	107.1	111.6	4.2	1.1
Soda-based chemicals	100.0	99.9	87.6	79.4	-9.3	-2.3
Inorganics, pigments & catalysts	100.0	87.6	81.9	81.1	-1.0	-2.1
Organic chemicals	100.0	98.5	92.7	86.5	-6.8	-1.4
Cyclic intermediates	100.0	89.0	80.9	75.0	-7.3	-2.8
Plastics	100.0	89.5	82.9	77.2	-6.9	-2.6
Synthetic rubber	100.0	104.5	105.5	106.2	0.7	0.6
Fertilizers	100.0	74.7	76.5	69.6	-9.0	-3.6
SOUTH KOREA						
All manufacturing	100.0	173.1	185.3	185.1	-0.1%	6.4%
Chemicals & chemical products	100.0	139.5	146.0	151.7	3.9	4.3
Rubber & plastic products	100.0	121.1	126.5	128.8	1.8	2.6
TAIWAN						
All manufacturing	100.0	162.8	170.4	169.9	-0.3%	5.4%
Chemicals	100.0	130.6	124.9	127.0	1.7	2.4
Basic chemicals	100.0	166.7	169.1	175.1	3.5	5.8
Petrochemicals	100.0	182.1	170.3	180.3	5.9	6.1
Fertilizers	100.0	115.1	115.5	110.4	-4.4	1.0
Man-made fibers	100.0	72.9	63.9	63.3	-1.0	-4.5
Plastics & resins	100.0	118.4	109.1	108.0	-1.0	0.8
Synthetic rubber	100.0	133.2	132.0	121.9	-7.7	2.0

#### a Excludes pharmaceuticals.

SOURCES: Japan's Ministry of Economy, Trade & Industry; Korea National Statistical Office, Republic of Korea; Taiwan's Ministry of Economic Affairs

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Percent change in chemical production in 2012

in Japan:





#### **ASIA ORGANICS**

Production expanded in Taiwan and South Korea, while it fell in Japan

THOUSANDS OF					ANNUAL	CHANGE
METRIC TONS	2002	2010	2011	2012	2011-12	2002-12
JAPAN						
Acetic acid	569	450	418	417	-0.2%	-3.1%
Acetone	472	521	471	470	-0.2	0.0
Acrylonitrile	708	663	733	554	-24.4	-2.4
Benzene <sup>a</sup>	4,313	4,764	4,413	4,214	-4.5	-0.2
Butadiene	993	977	934	905	-3.1	-0.9
Butanol	476	520	341	342	0.3	-3.3
Caprolactam	508	422	397	376	-5.3	-3.0
Cyclohexane	607	483	439	384	-12.5	-4.5
Ethylene	7,152	7,018	6,689	6,145	-8.1	-1.5
Ethylene dichloride	3,352	3,222	2,922	2,574	-11.9	-2.6
Ethylene glycol	733	596	581	639	10.0	-1.4
Ethylene oxide	868	845	820	847	3.3	-0.2
Octanol	302	286	259	249	-3.9	-1.9
Phenol	891	853	796	787	-1.1	-1.2
Phthalate plasticizers	377	212	194	191	-1.5	-6.6
Phthalic anhydride	262	159	146	160	9.6	-4.8
Polypropylene glycol	299	284	265	258	-2.6	-1.5
Propylene	5,309	5,986	5,625	5,239	-6.9	-0.1
Purified terephthalic acid	1,624	1,131	885	715	-19.2	-7.9
Styrene	3,016	2,939	2,739	2,392	-12.7	-2.3
Toluene <sup>a</sup>	1,548	1,393	1,340	1,391	3.8	-1.1
Xylene <sup>a</sup>	4,900	5,935	5,754	5,975	3.8	2.0
<i>p</i> -Xylene	2,920	3,177	3,202	3,597	12.3	2.1
SOUTH KOREA						
Benzene	2,852	4,417	4,462	4,741	6.3%	5.2%
Butadiene	816	1,161	1,210	1,346	11.2	5.1
Ethylene	5,636	7,290	7,419	8,075	8.8	3.7
Propylene	3,557	5,333	5,377	6,128	14.0	5.6
TAIWAN						
Acrylonitrile	339	458	416	443	6.5%	2.7%
Benzene	931	1708	1 554	1684	84	61
Butadiene	346	577	501	482	-3.8	3.4
Caprolactam	186	290	271	288	6.3	4.5
Ethylene	2.393	3.929	3.522	3.478	-1.2	3.8
Ethylene glycol	939	2,139	1,994	2,114	6.0	8.5
Propylene	1.462	2.976	2,601	2.697	3.7	6.3
Purified terephthalic	3.705	5.163	5.304	4.390	-17.2	1.7
acid	0,, 00	0,200	5,001	.,	17.00	2.7
Styrene	1,249	1,921	1,694	1,790	5.7	3.7
Toluene	42	167	23	27	17.4	-4.3
Vinyl chloride	1,557	1,758	1,685	1,817	7.8	1.6

a Petroleum and nonpetroleum sources. SOURCES: Japan's Ministry of Economy, Trade & Industry; Korea National Statistical Office, Republic of Korea; Petrochemical Industry Association of Taiwan

#### **GERMANY ORGANICS**

Production of most organic chemicals declined in 2012

THOUSANDS OF					ANNUAL	CHANGE
METRIC TONS	2002	2010	2011	2012	2011-12	2002-12
Adipic Acid	429	598	539	507	-5.9%	1.7%
Benzene	2,106	1,874	1,805	1,774	-1.7	-1.7
Butadiene	995	1,151	1,210	1,179	-2.6	1.7
Cumene	879	960	940	929	-1.2	0.6
Ethylene	4,666	5,063	5,083	4,897	-3.7	0.5
Ethylene glycol	239	216	234	217	-7.3	-1.0
Ethylene oxide	717	1,016	956	961	0.5	3.0
Formaldehyde	1,239	1,374	1,345	1,111	-17.4	-1.1
Phthalic anhydride	270	293	284	271	-4.6	0.0
Propylene	3,456	3,905	3,917	3,821	-2.5	1.0
Propylene glycol	300	381	382	396	3.7	2.8
Propylene oxide	777	814	752	807	7.3	0.4
Styrene	830	954	1,042	868	-16.7	0.4
Toluene	654	662	666	697	4.7	0.6
Vinyl chloride	2,189	1,829	1,506	1,480	-1.7	-3.8
p-Xylene	284	362	370	348	-5.9	2.1

SOURCE: Federal Statistical Office of Germany

#### **GERMANY INORGANICS**

Output of inorganic chemicals saw healthy growth in 2012

THOUSANDS OF					ANNUAL	CHANGE
METRIC TONS	2002	2010	2011	2012	2011-12	2002-12
Carbon black	339	684	908	923	1.7%	10.5%
Chlorine	3,717	4,029	3,858	3,981	3.2	0.7
Hydrochloric acid	2,002	2,326	1,898	2,137	12.6	0.7
Hydrogen fluoride	137	196	185	185	0.0	3.0
Hydrogen peroxide	219	na	208	230	10.6	0.5
Phosphoric acid (P <sub>2</sub> O <sub>5</sub> )	34	21	20	12	-40.0	-9.9
Sodium carbonate	na	2,539	2,668	2,627	-1.5	na
Sodium hydroxide	3,792	3,631	3,301	3,490	5.7	-0.8
Sulfuric acid	2,729	3,701	3,875	3,918	1.1	3.7
Titanium dioxide <sup>a</sup>	23	36	40	44	9.0	6.8

**a** As TiO<sub>2</sub> in pigments. **na** = not available. **SOURCE:** Federal Statistical Office of Germany

### **JAPAN INORGANICS**

Output of most inorganics dropped at an accelerated pace in 2012

THOUSANDS OF METRIC TONS UNLESS OTHER-					ANNUAL	CHANGE
WISE INDICATED	2002	2010	2011	2012	2011-12	2002-12
Ammonia	1,450	1,178	1,211	1,055	-12.9%	-3.1%
Ammonium sulfate <sup>a</sup>	1,564	1,336	1,298	1,245	-4.1	-2.3
Carbon black	755	729	681	638	-6.3	-1.7
Chlorine, liquid	754	468	462	443	-4.1	-5.2
Hydrochloric acid	2,317	2,272	2,180	2,250	3.2	-0.3
Hydrogen peroxide	167	216	181	184	1.7	1.0
Nitrogen (mcm)	10,455	13,612	13,670	13,865	1.4	2.9
Oxygen (mcm)	10,720	12,254	11,838	12,093	2.2	1.2
Sodium hydroxide	4,271	4,217	3,960	3,566	-9.9	-1.8
Sodium silicate	622	429	414	381	-8.0	-4.8
Sulfuric acid	6,763	7,037	6,416	6,711	4.6	-0.1
Titanium dioxide	240	208	214	185	-13.6	-2.6

a For agricultural and nonagricultural use. **mcm** = millions of cubic meters. **SOURCE:** Ministry of Economy, Trade & Industry

#### **CHINA BASIC CHEMICALS**

Growth in 2012 was less than in previous years

THOUSANDS OF					ANNUAL	CHANGE
METRIC TONS	2002	2010	2011	2012	2011-12	2002-12
ORGANICS						
Benzene (pure)	2,131	5,530	6,658	6,626	-0.5%	12.0%
Ethylene	5,414	14,188	15,274	14,868	-2.7	10.6
Methanol (refined)	2,110	15,740	22,267	26,405	18.6	28.7
INORGANICS						
Hydrochloric acid (31%)	4,926	8,390	8,410	8,764	4.2%	5.9%
Sodium carbonate	10,189	20,293	23,033	24,039	4.4	9.0
Sodium hydroxide	8,227	20,866	24,663	26,986	9.4	12.6
Sulfuric acid	29,674	70,601	74,166	76,366	3.0	9.9

SOURCE: China National Chemical Information Center

#### **U.S. PLASTICS** High-density polyethylene had the highest growth of polyethylenes last year

THOUSANDS OF					ANNUAL	CHANGE
METRIC TONS	2002	2010	2011	2012	2011-12	2002-12
Polyethylene <sup>a</sup>						
Low-density <sup>b</sup>	3,647	3,057	3,042	3,123	2.7%	-1.5%
Linear low-density <sup>b</sup>	5,139	6,255	6,089	6,098	0.1	1.7
High-density <sup>c</sup>	7,243	7,660	7,764	8,046	3.6	1.1
Polypropylene <sup>d</sup>	7,691	7,826	7,447	7,405	-0.6	-0.4
Polystyrene <sup>e</sup>	3,025	2,293	2,482	2,473	-0.4	-2.0
Polyvinyl chloride & copolymers <sup>d</sup>	6,939	6,358	6,547	6,944	6.1	0.0

a Data for all categories include Canada. b Density 0.940 g/mL and below.
c Density above 0.940 g/mL. d Data include Canada and Mexico. e Data include Canada and beginning in 2011 include Mexico. SOURCE: American Plastics Council

#### **GERMANY PLASTICS**

The economy weighed on Germany's plastics sector in 2012

THOUSANDS OF					ANNUAL	CHANGE
METRIC TONS	2002	2010	2011	2012	2011-12	2002-12
Epoxy resins	212	283	263	282	7.2%	2.9%
Polyamides	1,014	na	1,043	995	-4.6	-0.2
Polyethylene, high-density	1,590	1,723	1,761	1,834	4.1	1.4
Polyethylene terephthalate	na	245	259	231	-10.8	na
Polypropylene	1,755	na	1,973	1,672	-15.3	-0.5
Polystyrene, general purpose	381	438	448	368	-17.9	-0.3
Polystyrene, expandable	356	535	545	534	-2.0	4.1
Polyurethanes	827	1,194	1,221	1,158	-5.2	3.4
Polyvinyl chloride	1,529	1,578	1,744	1,680	-3.7	0.9

na = not available. SOURCE: Federal Statistical Office of Germany

## **ASIA PLASTICS**

Output declined in Japan and Taiwan but held steady in South Korea

THOUSANDS OF					ANNUAL CHANGE			
METRIC TONS	2002	2010	2011	2012	2011-12	2002-12		
JAPAN								
Polyethylene, all <sup>a</sup>	3,176	2,964	2,834	2,605	-8.1%	-2.0%		
Polyethylene, high-density <sup>b</sup>	1,181	1,015	935	928	-0.7	-2.4		
Polyethylene, low-density <sup>c</sup>	1,789	1,704	1,664	1,477	-11.2	-1.9		
Polyethylene terephthalate	1,211	912	833	720	-13.6	-5.1		
Polypropylene	2,641	2,709	2,448	2,390	-2.4	-1.0		
Polystyrene	1,837	1,385	1,275	1,168	-8.4	-4.4		
Polyvinyl chloride	2,225	1,749	1,529	1,332	-12.9	-5.0		
Epoxy resins	201	188	162	150	-7.4	-2.9		
Phenolic resins	242	284	276	275	-0.4	1.3		
Polycarbonate	386	369	301	317	5.3	-2.0		
Synthetic rubber	1,522	1,595	1,611	1,627	1.0	0.7		
SOUTH KOREA								
Acrylonitrile- butadiene-styrene	1,120	1,985	1,966	2,131	8.4%	6.6%		
Polyethylene, high-density	1,871	2,046	1,957	2,007	2.6	0.7		
Polyethylene, low-density	1,624	1,983	2,082	2,114	1.5	2.7		
Polypropylene	2,622	3,931	3,899	3,922	0.6	4.1		
Polystyrene	1,361	1,089	1,114	1,125	1.0	-1.9		
TAIWAN								
Acrylonitrile- butadiene-styrene	1,078	1,365	1,207	1,209	0.2%	1.2%		
Polyethylene, high-density	507	544	520	470	-9.6	-0.8		
Polyethylene, low-density	492	691	571	499	-12.6	0.1		
Polypropylene	830	1,215	1,080	1,049	-2.9	2.4		
Polystyrene	848	845	872	838	-3.9	-0.1		
Styrene-butadiene rubber	78	101	104	93	-10.6	1.8		
Polybutadiene rubber	52	59	56	52	-7.1	0.0		

 ${\bf a}$  Includes ethylene-vinyl copolymer.  ${\bf b}$  Density above 0.940 g/mL.  ${\bf c}$  Density 0.940 g/mL and below.

Sources: Japan's Ministry of Economy, Trade & Industry; Korea National Statistical Office, Republic of Korea; Petrochemical Industry Association of Taiwan

## **U.S. SYNTHETIC FIBERS**

Production of olefin and polyester rose among noncellulosic fibers in 2012

THOUSANDS OF					ANNUAL	CHANGE
METRIC TONS	2002	2010	2011	2012	2011-12	2002-12
NONCELLULOSIC FIBERS						
Nylon	1,112	616	592	562	-5.2%	-6.6%
Olefin	1,397	1,038	966	1,021	5.7	-3.1
Polyester	1,499	1,098	1,094	1,203	9.9	-2.2
CELLULOSIC FIBERS						
Acetate <sup>a</sup> & rayon	81	27	27	27	0.0%	-10.3%

a Includes diacetate and triacetate; excludes production for cigarette filters. **SOURCE:** Fiber Economics Bureau

### **JAPAN SYNTHETIC FIBERS**

Acrylic slumped, but nylon climbed

THOUSANDS OF					ANNUAL	CHANGE
METRIC TONS	2002	2010	2011	2012	2011-12	2002-12
Man-made	1,416	923	949	903	-4.8%	-4.4%
Polyester <sup>a</sup>	564	347	338	319	-5.6	-5.5
Acrylic <sup>b</sup>	358	141	152	140	-7.9	-9.0
Polypropylene <sup>a</sup>	114	114	121	121	0.0	0.6
Nylon <sup>c</sup>	126	93	95	98	3.2	-2.5

a Sum of staple and filament. b Staple only. c Filament only. SOURCE: Ministry of Economy, Trade & Industry

#### **GERMANY FERTILIZERS** Production shot up in 2012

THOUSANDS OF					ANNUAL CHANGE		
METRIC TONS	2002	2010	2011	2012	2011-12	2002-12	
Ammonium sulfate	na	174	165	201	21.8%	na	
Anhydrous ammonia	2,560	2,677	2,698	2,696	-0.1	0.5%	
Nitric acid	754	2,529	1,698	2,519	48.4	12.8	
Urea	na	717	432	424	-1.9	na	

na = not available. SOURCE: Federal Statistical Office of Germany

#### **U.S. FERTILIZERS**

Ammonium sulfate and urea production grew faster in 2012 than other fertilizers

THOUSANDS OF					ANNUAL CHANGE			
METRIC TONS	2002	2010	2011	2012	2011-12	2002-12		
NITROGEN PRODUCTS								
Ammonia	11,306	8,572	8,814	9,131	3.6%	-2.1%		
Ammonium nitrate	2,246	1,841	1,947	2,003	2.9	-1.1		
Ammonium sulfate	2,405	2,598	2,743	3,152	14.9	2.7		
Urea	4,477	2,320	2,260	2,475	9.5	-5.8		
Nitrogen solutions	7,985	8,353	8,834	8,864	0.4	1.1		
PHOSPHATE PRODUCTS								
Diammonium phosphate	10,825	7,419	6,845	6,482	-5.3%	-5.0%		
Monoammonium phosphate	4,175	4,300	4,732	4,672	-1.3	1.1		
Phosphate rock	29,183	26,118	25,196	26,908	6.8	-0.8		
Phosphoric acid (P <sub>2</sub> O <sub>5</sub> )	10,125	7,895	8,309	8,200	-1.3	-2.1		

**NOTE:** Fiscal years end on June 30. Figures are based on Fertilizer Institute surveys and may not represent the entire industry. **SOURCE:** Fertilizer Institute



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