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CHEMICAL & ENGINEERING  
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# Soviet Union faces major turning point

**U.S.S.R. is beset by critical problems, pressures for major changes in political, economic, industrial, military, and social spheres**

The Soviet Union is now at a major turning point in its history, comparable to the post-Lenin period in the 1920s and the post-Stalin period in the 1950s. Indeed, it faces critical problems and choices, and pressures for major changes, in almost every sphere—political, economic, industrial, military, energy, demographic, technological, intellectual, and social—according to a group of specialists who are preparing a study on trends and developments that will shape Soviet policies over the next decade.

The study, organized by Georgetown University's Center for Strategic & International Studies (CSIS) and chaired by Robert Byrnes of Indiana University, brings together experts in Soviet and East European studies from six private institutes and 20 universities. Thirty-four participants are from the U.S. and one from the U.K. The study covers seven disciplines and is aiming for publication of its findings by next spring. Members of the group outlined their conclusions to date at two public sessions in Washington, D.C., last month and in several interviews with C&EN.

In the political arena, notes Severyn Bialer of Columbia University, the U.S.S.R. in the next few years must replace not only President Leonid Brezhnev, but a whole core leadership group of a similar advanced age who have worked together for a long time. A whole agenda of problems and issues is left unresolved by the Brezhnev group, many qualitatively different from any faced in the past.

In the already ongoing struggle for the succession, points out George Breslauer of the University of California, Berkeley, there will be pressure for choice of a strong leader, such as former KGB head Yuri Andropov, to get the country—espe-

cially the economy—moving again, perhaps with bold proposals for change. Many officials, however, may prefer a figure threatening fewer changes and more amenable to collective leadership, such as Politburo member Konstantin Chernenko.

Soviet economic and industrial problems thus may become central issues in the succession struggle. One area of continuing crisis is agriculture and its accompanying serious food shortages (aggravated by four consecutive years of poor harvests).

The Soviet economy in general has slowed greatly from its once high annual growth rates of 5 to 6% in gross national product, points out Bialer. GNP grew only 2% in 1981. Industrial output rose just 2% in 1981 and 2.9% in 1980, compared to an average of 6.6% a year in 1961-65, 6.3% in 1966-70, 5.9% in 1971-75, and 3.5% in 1976-80, according to Central Intelligence Agency figures.

Chemical production has shown a similar decline, CIA finds, rising only 3.5% in 1981 (compared to a five-year plan goal of 5.5 to 6% a year in 1981-85). By contrast, chemical output rose 12% a year in 1961-65, 8.9% in 1966-70, 8.6% in 1971-75, and 3.8% in 1976-80.

As the economy stagnates, living standards are declining. Soviet authorities thus are endangering one of their major sources of mass support and legitimacy—their ability to deliver a rising standard of living. Furthermore, prospects have declined for social mobility (rising in the socioeconomic system), formerly a relatively easy matter.

Soviet leaders may be less able to cope with this challenge because of a progressive weakening of social control in Soviet society. There is a "decline in civic morale," notes Gail Lapidus of the University of California, Berkeley—a decline in optimism, and cynicism about the ability of leaders to deliver on their promises. Social disintegration is spreading—as expressed in accelerating incidences of alcoholism, absenteeism from work, crime, black marketeering, family breakdowns, and corruption. And, explains Sidney Monas of the University of Texas, several Soviet writers and other intellectuals express an increasing

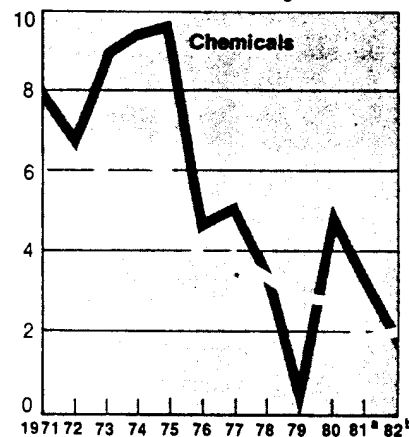
sense of despair and lack of purpose, of nothing to believe in or hope for in their society—a dramatic change from the common Soviet belief that life in the U.S.S.R. continually is progressing toward a glorious future.

Making things even more difficult are problems in the demographic sphere. Population growth has slowed greatly, leading to labor shortages. Moreover, the dominant ethnic Russians have a lower birth rate and probably will constitute less than half the Soviet population by the year 2000. Meanwhile, Moslem Central Asian groups—who are not well located or well qualified to supply industrial and military manpower—make up a growing proportion of the population (15 to 20% now) and show increasing ethnic nationalism.

As if this were not enough, the decline of the Soviet Union's East European "empire" will create many problems for the U.S.S.R. in the 1980s, according to Bialer and to Andrzej Korbonski of the University of California, Los Angeles. East Europe has changed from an economic and military asset to an increasing economic burden to the Soviets, and also will become a military burden, Bialer believes. Furthermore, most

## Soviet industrial, chemical growth has slowed

Production, % annual change



<sup>a</sup> Preliminary figures. <sup>b</sup> For four months, based on official Soviet statistics. Note: All figures except for 1982 are based on Central Intelligence Agency estimates, giving lower results than official Soviet statistics because of postulated upward bias in Soviet figures. Sources: Central Intelligence Agency, U.S. Department of Commerce

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of East Europe's leaders belong to the Brezhnev generation, and there will be several succession crises in the next few years.

The Soviets will try to limit the Polish damage and prevent similar outbreaks elsewhere by tightening controls, Korbonski believes. But it will be difficult since conditions similar to Poland's exist in other East European countries. All are suffering declining rates of growth, agricultural production problems, and have huge hard currency debts.

A basic feature of current Soviet economic difficulties, Bialer points out, is that in the past the U.S.S.R. possessed "an economy of mobilization," relying on massive inputs of capital, labor, resources, and land to increase production. Now this is no longer possible, and the Soviets must switch from an economy of extensive development to one of intensive development—focusing, for instance, on diffusion of technology and increases in productivity. They are totally unprepared to do this, he says. Indeed, productivity has been declining for several years.

A central result of slower Soviet economic growth, explains economist Robert Campbell of Indiana University, is creation of a conflict over allocation of the more limited resources among three claimants—consumer consumption, industrial investment, and military development. From the 1950s until recent years, the Soviets were able to maintain significant growth in all three areas. But now they have to choose which to cut back—guns or butter.

So far, at least, guns have kept top priority, with military spending continuing its historical rate of a 4% annual increase—absorbing 14 to 16% of all economic output. Investment and consumer living standards have been sacrificed.

However, Campbell points out, there are tremendous industrial investment needs—both for development of new energy and other resources in Siberia, and for dealing with aging industrial plants, outmoded technology, energy-wasting practices, inadequate infrastructure, and transportation and construction bottlenecks. Of investment resources, 16% already is going to development of energy resources, especially for gas development in Siberia, and this will rise to 21% by 1985.

Moreover, Bialer adds, there is a new military situation, unprecedented during Soviet transfers of power: The U.S.S.R. has achieved strategic parity with the U.S. and

military superiority in its own region. Therefore, in picking new leadership, there could be for the first time discussion of the priority for military spending, with the possibility of cutbacks to release money for consumer needs and industrial investment.

Imported technology and equipment have contributed heavily to Soviet industrial development—including the high-priority chemical industry—as shown in a study by the U.S. Census Bureau (C&EN, July 19, page 8). Soviet leaders express concern that reliance on foreign technology creates strong dependence on the West. They are therefore putting renewed emphasis on their own R&D.

However, technology innovation has been a weak link in Soviet industrial development. The system lacks incentives for application of research findings to industrial production; indeed it fosters resistance to innovation at the plant level. Therefore, it appears that the Soviets will continue to import western technology and equipment, despite growing hard currency restraints.

How will the Soviets go about solving all their problems? Bialer and Lapidus think the Soviets may apply more authoritarian social controls. But they rule out any return to the days of Stalinist mass terror.

In the economic arena, it is not clear what they will do. But Bialer and Campbell suggest what they need to do to overcome their problems: not tinker with the economy, but change the whole system; abolish rigid central planning and let prices establish their own levels on the basis of costs; allow individual managerial initiative; and apply managerial and worker incentives.

These steps have not been taken until now because they would mean a loss of political control. So Bialer doubts they'll be done. After all, he points out, "no government in the world makes decisions on the basis of economic logic." The U.S., too, bases economic policy more on politics than economics.

*Richard Seltzer, Washington*

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CHEMICAL & ENGINEERING NEWS  
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# Facts & Figures

## for the chemical industry

A year ago, the U.S. chemical industry appeared ready to shift into high gear. Output had labored upward to regain just about all the ground lost during the recession of 1980, and industry executives generally were confident that it soon would be climbing to new highs. Optimistic forecasts were widespread. The recession, though painful, also seemed to be happily brief.

Prospects were still clouded, to be sure. Demand remained weak in many key markets for chemicals, such as automobiles, home building, and appliances, as continuing high interest rates dampened consumer purchases. Export markets, too, were soft, reflecting a worldwide economic slump and the rising cost of U.S.-made products.

Nevertheless, at mid-1981 the consensus was that the year as a whole would shape up markedly better than 1980 and that 1982 would bring some further growth.

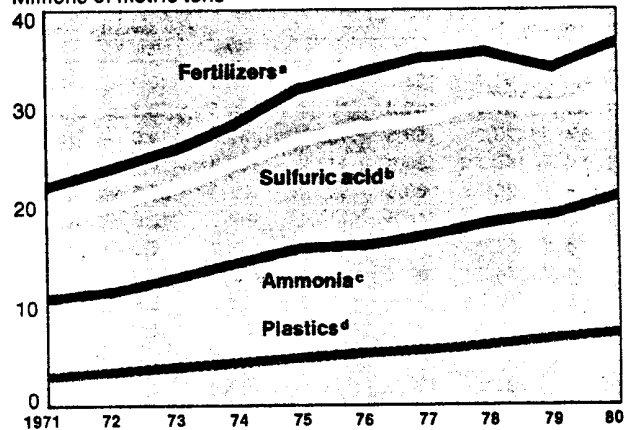
As it turned out, however, from midyear on it has been all down hill. The data spread across the following pages of Facts & Figures, C&EN's annual statistical review of the chemical industry, clearly show that 1981 proved to be little, if any, better than 1980. Moreover, as the 1982 edition of Facts & Figures goes to press, it is still by no means clear when the current business slump will bottom out.

Facts & Figures contains data gathered together from a broad assortment of sources, including government agencies, trade associations, international organizations, and the companies themselves that make up the multifaceted chemical industry. These data have been treated by the C&EN staff, in many cases, to develop analytical measures and comparisons in order to add perspective to the recent performance of the chemical industry.

In 1981, economic growth continued to decelerate in Eastern Europe as a whole, as it has since 1977, generally falling short even of the lower targets set under current five-year plans. Industrial output for the U.S.S.R. and its six East European allies was up just 2% (the target was 4%). Bulgaria, East Germany, and Hungary increased production more than in 1980, but the area's average was lowered especially by Poland's chaotic economy, where production was down 13%. Excluding Poland, area production was up 3%. The chemical and rubber industries performed strongest in Bulgaria (up 11%) and the Soviet Union (up 5%), where both were exactly on target.

### Chemical production in Eastern Europe speeded up in 1980

Millions of metric tons



<sup>a</sup> As N, P<sub>2</sub>O<sub>5</sub>, and K<sub>2</sub>O. <sup>b</sup> 100% H<sub>2</sub>SO<sub>4</sub>. <sup>c</sup> Nitrogen content. <sup>d</sup> Including resins for man-made fibers in U.S.S.R. Note: Data for U.S.S.R., Bulgaria, Czechoslovakia, East Germany, Hungary, Poland, and Romania.  
Source: Central Intelligence Agency

### MAN-MADE FIBERS: Results mixed in 1981

Production, millions of lb	1981 <sup>a</sup>	1980	1979	1978	Change 1980-81
<b>NONCELLULOSIC FIBERS<sup>b</sup></b>					
Bulgaria	117	110	106	102	6%
Czechoslovakia	183	168	159	163	9
East Germany	330	306	292	281	8
Hungary	48	39	40	41	23
Poland	262	348	338	335	-25
Romania	320	300	309	287	7
U.S.S.R.	1345	1213	1049	1047	11
<b>TOTAL</b>	<b>2605</b>	<b>2484</b>	<b>2293</b>	<b>2256</b>	<b>5%</b>
<b>CELLULOSIC FIBERS</b>					
Bulgaria	86	80	73	68	8%
Czechoslovakia	116	121	128	156	-4
East Germany	373	372	364	360	0
Hungary	17	18	19	20	-6
Poland	141	190	185	206	-26
Romania	174	140	143	138	24
U.S.S.R.	1475	1433	1400	1400	3
<b>TOTAL</b>	<b>2382</b>	<b>2354</b>	<b>2312</b>	<b>2348</b>	<b>1%</b>

<sup>a</sup> Preliminary figures. <sup>b</sup> Excluding olefins and textile glass. Source: Textile Economics Bureau

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**PRODUCTION GROWTH: Slowdown persists**

% annual change in gross output	1981	1980	1979	1978	1977
<b>U.S.S.R. and East Europe</b>					
All industry	2.1%	3.4%	3.7%	5.1%	6.1%
<b>Bulgaria</b>					
All industry	5.6	4.0	5.4	6.9	6.8
Chemicals and rubber	11.1	11.1	9.1	10.0	12.4
<b>Czechoslovakia</b>					
All industry	2.0	3.3	3.7	5.0	5.5
Chemicals and rubber	0.1	4.8	3.3	na	na
<b>East Germany</b>					
All industry <sup>a</sup>	5.1	4.7	4.8	3.7	5.4
Chemicals and rubber	na	3.8	4.0	6.0	4.3
<b>Hungary</b>					
All industry	2.3	-2.1	3.0	4.9	6.6
Chemicals and rubber	2.0	-2.1	6.1	10.7	6.9
<b>Poland</b>					
All industry	-12.6 <sup>b</sup>	0.0	2.7	4.9	6.9
Chemicals and rubber	na	0.4	2.3	3.9	4.4
<b>Romania</b>					
All industry	2.6	6.1	8.0	9.6	12.5
Chemicals and rubber	4.0	6.8	1.4	10.6	13.9
<b>U.S.S.R.</b>					
All industry <sup>c</sup>	3.4	3.6	3.4	4.8	5.7
Chemicals and rubber <sup>c</sup>	5.0	5.6	2.3	6.0	6.5
All industry <sup>d</sup>	na	2.9 <sup>e</sup>	3.0	3.5	4.0
Chemicals and rubber <sup>d</sup>	na	5.2 <sup>e</sup>	0.2	3.6	5.2

<sup>a</sup> Industrial commodity production. <sup>b</sup> Sales at current prices. <sup>c</sup> Figures based on official Soviet statistics. <sup>d</sup> Figures based on Central Intelligence Agency estimates, giving lower results because of postulated upward bias in official figures. <sup>e</sup> Preliminary figure. na = not available. Sources: United Nations Economic Commission for Europe, based on official national statistics, Central Intelligence Agency

**AGRICULTURAL CHEMICALS: Output off in Poland, Czechoslovakia, Bulgaria**

Thousands of metric tons	1981	1980	1979	1978	1977
<b>Bulgaria</b>					
Fertilizer supply <sup>a</sup>	733 <sup>b</sup>	830	820	738	742
Pesticide supply	na	40.0	34.8	35.3	26.3
<b>Czechoslovakia</b>					
Fertilizer supply <sup>a</sup>	1,700	1,730	1,745	1,748	1,633
<b>East Germany</b>					
Fertilizer supply <sup>a</sup>	na	1,637	1,713	1,670	1,670
Pesticide supply	na	27.0	26.7	25.3	24.5
<b>Hungary</b>					
Fertilizer supply <sup>a</sup>	na	1,399	1,502	1,539	1,511
<b>Poland</b>					
Fertilizer supply <sup>a</sup>	3,490 <sup>b</sup>	3,635	3,567	3,606	3,586
Pesticide supply	na	na	44.7	49.8	57.1
<b>Romania</b>					
Fertilizer supply <sup>a</sup>	1,600	1,185	1,431	1,480	1,128
<b>U.S.S.R.</b>					
Fertilizer supply <sup>a</sup>	19,169 <sup>b</sup>	18,763	17,365	18,420	18,034
Pesticide supply	na	512	na	na	na

<sup>a</sup> Nutrient content. <sup>b</sup> Estimated. na = not available. Sources: United Nations Economic Commission for Europe, based on official national statistics, Department of Agriculture

**SHIPMENTS: Petroleum sets the pace but growth in chemicals is a bit above average**

\$ Millions (Canadian)	Shipments, monthly average										Average annual change		
	1981	1980	1979	1978	1977	1976	1975	1974	1973	1972	1971	1980-81	1971-81
All manufacturing	\$15,691.3	\$13,913.2	\$12,520.7	\$10,743.7	\$9,070.6	\$8,190.4	\$7,371.6	\$6,871.2	\$5,563.1	\$4,687.2	\$4,189.5	12.7%	14.1%
Chemicals and chemical products	1,056.7	929.7	791.9	663.3	535.6	475.3	425.6	383.9	291.9	246.2	231.8	13.7	16.4
Petroleum and coal products	1,597.7	1,206.7	1,003.0	837.9	711.0	576.8	496.1	432.1	256.1	203.4	176.2	32.4	24.5
Rubber and plastics products	370.7	334.7	300.3	250.1	211.0	192.7	162.9	152.8	131.4	109.7	97.0	10.8	14.2
Paper and allied products	1,265.4	1,185.5	1,032.0	839.5	744.8	685.7	594.2	639.7	439.2	367.8	333.4	6.7	14.2

Source: Statistics Canada

**PRICES: Increases for industrial chemicals are greater than for industrial products as a whole**

Industry selling price indexes, 1971 = 100	Annual average										Annual change	
	1981	1980	1979	1978	1977	1976	1975	1974	1973	1980-81	1971-81	
All manufacturing industries	272.2	247.2	217.8	190.4	174.3	161.6	153.7	138.1	116.1	10.1%	11.0%	
Chemicals and chemical products	286.2	251.6	214.8	189.3	175.9	167.2	160.3	137.1	106.5	13.8	11.4	
Industrial chemicals—inorganic	313.9	275.3	234.1	204.1	188.4	179.7	169.5	133.5	107.7	14.0	11.8	
Acetylene, compressed	266.3	232.9	213.2	191.2	170.7	163.7	150.6	116.2	102.9	14.3	9.9	
Caustic soda	383.8	281.0	240.1	221.4	210.7	195.7	169.5	120.2	107.0	36.6	14.4	
Chlorine	274.8	248.4	207.9	189.2	180.5	163.3	144.4	114.1	104.3	10.6	10.9	
Oxygen, gas and liquid	215.6	202.4	191.8	174.6	156.8	152.1	136.0	121.2	108.3	6.5	7.2	
Industrial chemicals—organic	410.2	354.7	289.0	249.8	228.1	214.2	201.2	170.0	107.8	15.6	13.9	
Plastics and synthetic resins	294.7	274.4	239.7	206.4	193.3	187.4	181.6	156.0	104.2	7.4	9.4	
Alkyd	196.5	176.9	158.4	137.5	129.4	131.4	135.1	134.8	109.4	11.1	8.4	
Phenol formaldehyde	337.6	332.8	300.9	233.6	232.1	235.6	240.9	214.1	111.4	1.4	7.5	
Polyethylene	326.9	315.3	268.9	223.2	220.3	221.6	213.2	166.3	103.2	3.7	8.1	
Fertilizers, mixed	290.5	280.3	229.1	191.0	180.2	176.9	204.0	167.5	117.2	3.6	10.4	
Drugs	189.7	169.5	153.1	140.4	131.4	127.0	121.1	109.9	103.5	11.9	8.3	
Paint and varnish	280.3	239.8	202.3	183.0	172.8	161.9	153.9	131.9	108.2	16.9	11.6	
Pigments and dry colors	304.4	260.0	219.6	189.7	175.3	164.9	153.4	136.0	103.7	17.1	13.1	
Soaps and cleansing compounds	209.7	189.1	169.5	151.2	141.1	134.5	132.1	118.0	105.3	10.9	9.2	

Source: Statistics Canada

**CHEMICAL IMPORTS: Big gains for most**

\$ Millions (Canadian) <sup>a</sup>				Change
	1981	1980	1979	1980-81
Inorganic chemicals	\$ 401.1	\$ 344.1	\$ 353.2	17%
Organic chemicals	1087.3	930.1	895.3	17
Fertilizers and fertilizer materials	158.9	134.9	135.1	18
Synthetic and reclaimed rubber	159.8	126.3	118.9	27
Plastics materials	605.1	537.2	564.4	13
Plastic film and sheet	242.1	192.2	181.7	26
Other plastics basic shapes and forms	154.2	128.5	135.5	20
Dyes, except dyeing intermediates	76.0	79.8	81.7	-5
Pigments, lakes, and toners	64.4	53.5	62.1	20
Paints and related products	98.4	86.2	94.9	14
Other chemical products	763.3	741.4	617.5	3
<b>TOTAL</b>	<b>\$3810.7</b>	<b>\$3354.2</b>	<b>\$3240.3</b>	<b>14%</b>

<sup>a</sup> Values as established for duty purposes. Source: Statistics Canada**CHEMICAL EXPORTS: Organics up sharply**

\$ Millions (Canadian) <sup>a</sup>				Change
	1981	1980	1979	1980-81
Chemical elements	\$ 181.0	\$ 160.4	\$ 146.0	13%
Other inorganic chemicals	1052.4	947.3	839.7	11
Organic chemicals	1185.9	923.9	704.8	28
Fertilizers and fertilizer materials	1345.6	1253.8	987.3	7
Synthetic rubber and plastic materials	514.6	467.0	367.3	10
Plastics basic shapes and forms	149.0	123.5	119.3	21
Other chemical products	205.6	178.9	157.6	15
<b>TOTAL</b>	<b>\$4634.0</b>	<b>\$4054.7</b>	<b>\$3321.8</b>	<b>14%</b>

<sup>a</sup> Domestic exports only. Values as declared on export documents; may include shipping costs. Source: Statistics Canada

## PRODUCTION: Growth continues for fertilizers and plastics in Eastern Europe

Thousands of metric tons, unless otherwise noted	1981 <sup>a</sup>	1980	1979	1978	1977
<b>U.S.S.R.</b>					
Sulfuric acid, 100%	24,100	23,030	22,364	22,411	21,104
Mineral fertilizers (gross weight)	108,000	103,858	94,523	97,976	96,752
Mineral fertilizers <sup>b</sup>	26,000	24,774	22,137	23,653	23,493
Nitrogen <sup>b</sup>	na	10,239	9,151	9,299	9,114
Phosphate <sup>b,c</sup>	na	6,471	6,344	6,153	6,024
Potassium <sup>b</sup>	na	8,064	6,635	8,193	8,347
Synthetic ammonia <sup>d</sup>	na	13,764	12,278	11,462	10,744
Sodium carbonate, 100%	na	4,800	4,782	4,858	4,876
Plastics <sup>e</sup>	4,100	3,638	3,478	3,516	3,309
Sodium hydroxide, 100%	2,800	2,755	2,680	2,763	2,658
Synthetic rubber <sup>f</sup>	na	1,880	1,867	1,795	1,700
Rubber tires <sup>g</sup> (thousands of units)	60,500	60,100	59,981	59,018	57,400
Pesticides	504	470	475	491	487

<b>BULGARIA</b>					
Sulfuric acid, 100%	na	859	998	974	860
Mineral fertilizers <sup>b</sup>	na	947	959	968	984
Nitrogen <sup>b</sup>	na	730	677	685	705
Phosphate <sup>b</sup>	na	217	282	283	279
Synthetic ammonia <sup>d</sup>	na	1,026	951	960	995
Plastics	na	250	200	178	169
Sodium hydroxide, 100%	na	161	107	102	96
Synthetic rubber	na	30	30	25	25
Rubber tires <sup>g</sup> (thousands of units)	na	1,982	1,752	1,734	1,830

<b>CZECHOSLOVAKIA</b>					
Sulfuric acid, 100%	na	1,284	1,253	1,195	1,276
Mineral fertilizers <sup>b</sup>	na	1,182	1,140	1,176	1,178
Nitrogen <sup>b</sup>	na	618	591	625	605
Phosphate <sup>b,c</sup>	na	361	358	367	389
Potassium <sup>b,h</sup>	na	203	199	191	184
Synthetic ammonia <sup>d</sup>	na	841	804	812	791
Plastics	913	894	853	810	738
Sodium hydroxide, 100%	na	326	312	311	312
Synthetic rubber	na	59	60	59	59
Rubber tires <sup>g</sup> (thousands of units)	na	6,714	6,581	6,439	6,341

<b>EAST GERMANY</b>					
Sulfuric acid, 100%	na	950	952	971	972
Mineral fertilizers <sup>b</sup>	na	4,773	4,740	4,628	4,470
Nitrogen <sup>b</sup>	na	940	875	892	838

a Approximate figures. b Nutrient content basis, as N, P<sub>2</sub>O<sub>5</sub>, or K<sub>2</sub>O. c Including production of ground phosphate rock for direct applications and phosphate animal feeds. d Nitrogen content. e Including resins for man-made fibers. f Estimated. g For all motor vehicle tires, excluding aircraft and bicycle tires. h Imported potash added to domestically produced nitrogen

Thousands of metric tons, unless otherwise noted	1981 <sup>a</sup>	1980	1979	1978	1977
Phosphate <sup>b,c</sup>	na	411	411	413	403
Potassium <sup>b</sup>	na	3,422	3,395	3,323	3,229
Synthetic ammonia <sup>d</sup>	na	1,159	1,079	1,137	1,130
Plastics	na	800	779	762	734
Sodium hydroxide, 100%	na	626	548	415	423
Synthetic rubber	na	170	165	145	147
Rubber tires <sup>g</sup> (thousands of units)	na	7,068	6,890	6,728	6,652

<b>HUNGARY</b>					
Sulfuric acid, 100%	na	614	613	690	678
Mineral fertilizers <sup>b</sup>	na	894	850	855	788
Nitrogen <sup>b</sup>	na	599	550	534	514
Phosphate <sup>b</sup>	na	150	165	185	165
Potassium <sup>b,h</sup>	na	145	143	136	109
Synthetic ammonia <sup>d</sup>	na	900	803	746	729
Plastics	311	328	294	213	148
Sodium hydroxide, 100% <sup>i</sup>	na	188	194	146	97
Rubber tires <sup>g</sup> (thousands of units)	na	870	750	773	814

<b>POLAND</b>					
Sulfuric acid, 100%	na	2,964	2,983	3,172	3,268
Mineral fertilizers <sup>b</sup>	na	2,239	2,431	2,621	2,610
Nitrogen <sup>b</sup>	na	1,295	1,376	1,470	1,521
Phosphate <sup>b</sup>	na	842	931	1,026	966
Potassium <sup>b,h</sup>	na	105	110	125	123
Synthetic ammonia <sup>d</sup>	na	1,438	1,530	1,616	1,665
Plastics	na	549	440	467	463
Sodium hydroxide 100%	na	415	436	469	440
Synthetic rubber	na	118	130	126	119
Rubber tires <sup>g</sup> (thousands of units)	na	8,743	8,500	7,852	7,457

<b>ROMANIA</b>					
Sulfuric acid, 100%	na	1,850	1,750	1,655	1,523
Mineral fertilizers <sup>b</sup>	2,640	2,451	2,522	2,461	1,981
Nitrogen <sup>b</sup>	na	1,689	1,738	1,723	1,381
Phosphate <sup>b</sup>	na	689	709	660	548
Potassium <sup>b,h</sup>	na	73	75	78	52
Synthetic ammonia <sup>d</sup>	na	2,267	2,333	2,259	1,793
Plastics	na	579	516	552	543
Sodium hydroxide, 100%	na	705	704	725	735
Synthetic rubber	na	150	149	148	136
Rubber tires <sup>g</sup> (thousands of units)	na	5,060	4,691	4,690	4,372

and phosphate to form multinutrient fertilizer. i Including regenerated NaOH. na = not available. Sources: Central Intelligence Agency, Department of Commerce, Department of Agriculture, United Nations Economic Commission for Europe (based on official national statistics)

## SOVIET FOREIGN TRADE: After steady growth, exports and imports of chemicals turn down

\$ Millions	1981	1980	1979	1978	1977	1976	1975	1974	1973	1972	1971
Exports <sup>a</sup>	\$79,377	\$76,470	\$64,913	\$52,395	\$45,227	\$37,269	\$33,401	\$27,374	\$21,332	\$15,409	\$13,792
Imports <sup>a</sup>	73,158	68,477	57,961	50,795	40,926	38,212	37,070	24,861	20,980	16,104	12,467
Trade balance	6,219	7,993	6,952	1,600	4,301	-943	-3,669	2,513	352	-695	1,325
Chemical exports <sup>a</sup>	na	1,119	1,606	1,284	1,063	939	1,027	887	549	439	396
Chemical imports <sup>a</sup>	na	1,822	2,803	2,188	1,850	1,668	1,747	1,448	954	868	702
Chemical trade balance	na	-703	-1,197	-904	-787	-729	-720	-561	-405	-429	-306

a Free on board. na = not available. Sources: Central Intelligence Agency, Department of Commerce, based on official Soviet statistics and exchange rates

# 6 Western Pacific

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## CHINA

### PRODUCTION: Slower growth in 1981 for most major products

Thousands of metric tons	1981	1980	1979	1978	Change 1980-81
Ammonia <sup>a</sup>	11,990	12,150	10,727	9287	-1.3%
Fertilizer <sup>b</sup>	12,390	12,320	10,654	8691	0.6
Nitrogen (N)	9,860	9,990	8,821	7637	-1.3
Phosphate (P <sub>2</sub> O <sub>5</sub> ) <sup>c</sup>	2,510	2,310	1,817	1033	8.7
Potash (K <sub>2</sub> O)	20	20	16	21	0
Sulfuric acid	7,810	7,640	7,000	6610	2.2
Sodium hydroxide	1,923	1,923	1,826	1640	0
Sodium carbonate	1,652	1,613	1,486	1329	2.4

<sup>a</sup> Nitrogen content of ammonia produced for fertilizer. <sup>b</sup> Nutrient content. <sup>c</sup> Including production of ground phosphate rock for direct application and phosphate animal feeds. Sources: State

Thousands of metric tons	1981	1980	1979	1978	Change 1980-81
Calcium carbide	1,510	1,520	1,407	1237	-0.7
Plastics	916	898	793	679	2.0
Insecticides	484	537	537	533	-9.9
Ethylene	500	490	435	380	2.0
Synthetic detergents	478	393	397	324	21.6
Man-made fibers	527	450	326	285	17.1
Pharmaceuticals	37	40	42	41	-7.5

Statistical Bureau of the People's Republic of China. Central Intelligence Agency

### CHEMICAL IMPORTS: Fertilizers are biggest

\$ Millions <sup>a</sup>	1980	1979	1978	Change 1979-80
Fertilizers <sup>b</sup>	\$ 821	\$ 594	\$ 465	38%
Nitrogenous fertilizer	501	496	354	1
Chemical elements and compounds	546	411	382	33
Organic chemicals	394	258	265	53
Plastic materials, resins	378	158	137	139
Dyeing, tanning, and coloring materials	79	88	70	-10
Medicinal products	19	13	9	46
Essential oils, perfume, and cleansing materials	9	10	10	-9
Mineral tar and crude chemicals <sup>c</sup>	0	11	12	-99
Other chemicals <sup>d</sup>	179	159	100	13
<b>TOTAL</b>	<b>\$2031</b>	<b>\$1444</b>	<b>\$1185</b>	<b>41%</b>

<sup>a</sup> Free on board. <sup>b</sup> Manufactured. <sup>c</sup> From coal, oil, and natural gas. <sup>d</sup> Includes explosives and pyrotechnic products, and chemical materials and products not elsewhere specified. Source: Central Intelligence Agency, estimated from data reported by China's trade partners

### CHEMICAL EXPORTS: Top \$1 billion

\$ Millions <sup>a</sup>	1980	1979	1978	Change 1979-80
Chemical elements and compounds	\$ 488	\$276	\$141	77%
Organic chemicals	281	168	85	67
Medicinal products	186	114	79	63
Essential oils, perfume, and cleansing materials	104	82	67	27
Explosives and pyrotechnic products	95	72	49	32
Plastic materials, resins	77	50	12	54
Dyeing, tanning, and coloring materials	66	46	35	45
Mineral tar and crude chemicals <sup>b</sup>	28	9	3	208
Fertilizers <sup>c</sup>	2	1	1	42
Other chemical products	184	129	84	43
<b>TOTAL</b>	<b>\$1230</b>	<b>\$779</b>	<b>\$471</b>	<b>58%</b>

<sup>a</sup> Free on board. <sup>b</sup> From coal, oil, and natural gas. <sup>c</sup> Manufactured. Source: Central Intelligence Agency, estimated from data reported by China's trade partners

## TAIWAN

### INDUSTRY TRENDS: Chemical growth slows

Industrial production indexes, 1976 = 100	1981	1980	1979	1978	Change 1980-81
All manufacturing	169.3	163.2	153.0	142.8	4%
Chemical materials	205.1	201.2	189.1	165.3	2
Basic chemicals	152.5	150.2	148.5	126.1	2
Petrochemicals	262.3	254.4	242.0	194.1	3
Fertilizers	124.0	134.6	127.9	125.9	-8
Synthetic fibers	197.4	187.7	174.5	159.7	5
Plastics and resins	210.4	214.5	197.5	176.6	-2
Chemical products	176.7	163.9	161.0	139.2	8

Source: Council for Economic Planning & Development, Taiwan

### FOREIGN TRADE: Big gains for chemicals

\$ Millions	1981 <sup>a</sup>	1980	1979	1978
Exports <sup>b</sup>	\$22,611	\$19,811	\$16,103	12,687
Imports <sup>c</sup>	21,200	19,733	14,774	11,027
Trade balance	1,411	78	1,330	1,660
Chemical exports <sup>b</sup>	981	494	356	275
Chemical imports <sup>c</sup>	2,725	2,024	1,817	1,305
Chemical trade balance	-1,744	-1,530	-1,461	-1,030

<sup>a</sup> Estimated. <sup>b</sup> Free on board. <sup>c</sup> Includes cost, insurance, and freight. Source: Council for Economic Planning & Development, Taiwan

### PRODUCTION: Lower for several chemicals

Thousands of metric tons, unless otherwise noted	1981	1980	1979	1978	Change 1980-81
Fertilizers <sup>a</sup>	na	2,092	1,979	1,959	na
Man-made fibers	687	633	587	540	9%
Polyvinyl chloride	456	454	407	389	0
Synthetic detergents	94	104	105	86	-9
Benzene <sup>b</sup>	137	145	153	129	-5
Ethylene	443	458	445	366	-3
Ethylene glycol	156	133	118	51	18
Propylene	204	213	205	164	-4
Toluene <sup>b</sup>	172	153	134	95	12
Vinyl chloride	411	405	317	320	2
Xylene <sup>b</sup>	277	311	285	131	-11
Ammonia, anhydrous	494	504	476	534	-2
Ammonium sulfate	504	539	556	541	-6
Calcium superphosphate	226	207	208	175	9
Hydrochloric acid	184	179	180	180	3
Oxygen <sup>c</sup>	174	159	141	107	9
Sodium hydroxide	357	400	420	362	-11
Sulfuric acid	819	769	777	685	6
Urea	285	343	312	366	-17

<sup>a</sup> In terms of 20% N, 18% P<sub>2</sub>O<sub>5</sub>, and 50% K<sub>2</sub>O fertilizer. <sup>b</sup> Millions of liters. <sup>c</sup> Millions of cubic meters. na = not available. Source: Council for Economic Planning & Development, Taiwan