C History and economic profile of the industry

This appendix provides background information on the chemicals and plastics industry. It begins with a history of the industry, including past tariff protection. It then examines some data, including output, employment, trade and global production.

C.1 History of the industry

The chemicals and plastics industry in Australia has its origins in meeting the needs of the agriculture and mining sectors. The earliest manufacture of fertiliser for agricultural production was at Yarraville in Melbourne by Cuming Smith and Company in 1878. Other plants were built by the Adelaide Chemical Works Company at Torrensville near Adelaide in 1883, and by CSR at Balmain in Sydney in 1886.

Mining was the other main driver of the early importation and manufacture of chemicals in Australia. The discovery of precious and base metals in Queensland, gold in Kalgoorlie and Victoria, and lead, zinc and silver in Broken Hill all increased demand for explosives. Black powder, an early explosive, was imported as early as the 1820s. A fuse factory was established in 1867, a black powder factory in Victoria in 1873 and by 1876 there were at least five producers in Australia. Later, dynamite came into more common use and manufacture began in 1874, assisted by Victorian Government policy — aimed at supporting local manufacture — which imposed a significant duty on imported dynamite.

The production of industrial chemicals had its origins in pharmaceutical houses, which provided the financial basis for manufacturers to diversify into the production of other chemicals, such as ‘colonial-made ink’, mineral acids, superphosphate, soap, sulphuric acid and nitric acid (AATSE 2001).

Plastic manufacture began in Australia in 1927, when the Australian Moulding Corporation (which later became Nylex) began importing moulding powders and making simple plastic products. Rubber bicycle tyres were first imported into

Australia in 1889, and in 1902 a tyre factory was established at Port Melbourne (AATSE 2001).

C.2 Border protection

The protection granted by the Victorian Government to dynamite manufacturing preceded protection provided by the Commonwealth Government for Australian industry, including chemicals and plastics. In the 1930s, tariff barriers were substantially increased across all industries. Tariffs tended to be imposed in a piecemeal manner, without assessment. When the Industries Assistance Commission (IAC) conducted its inquiry into the chemicals and plastics industry in 1986, it found:

> There are 17 different general rates of duty that apply to imports of chemicals and plastics. These range from free to 45 per cent. In addition, specific rates of duty apply to 10 tariff items covered by the reference. In a number of instances, the differences between rates of duty are 2.5 percentage points or less. (IAC 1986, p. 5)

Non-tariff protection, such as anti-dumping provisions, also served to prevent or impede imports. The IAC found that:

> The chemicals and plastics industries as a group account for a large number of the goods subject to anti-dumping duties. At the end of November 1985, 32 commodities under reference in this inquiry were subject to anti-dumping actions. In some cases, these actions applied to most of the countries from which imports were sourced. (IAC 1986, p. 143)

Protection also came via the deferral of the requirements of the Australia/New Zealand Closer Economic Relations Trade Agreement. It was considered that the Australian plastics industry would be disadvantaged by New Zealand's ability to source raw materials (in this case, resins) at world prices not inflated by tariffs, known as 'prejudicial intermediate goods situations' (IAC 1986). This protection was to be removed by 1989 at the latest.

Since the early 1970s, Australia's average tariff levels have been reduced, both through a series of across-the-board measures and as the result of inquiries into particular industries and commodities. Border protection changes were the catalyst for significant industry restructuring. Manufacturing facilities that had hidden behind border protection and were no longer viable were closed, or restructured to increase scales of production. In some cases, domestic demand was sufficient to justify production (for example, ammonium nitrate for the mining industry). In other cases, other barriers, such as transport issues (for example, transport of hazardous or unstable chemicals) became a natural barrier to imports that justified domestic production.

C.3 The chemicals and plastics life cycle

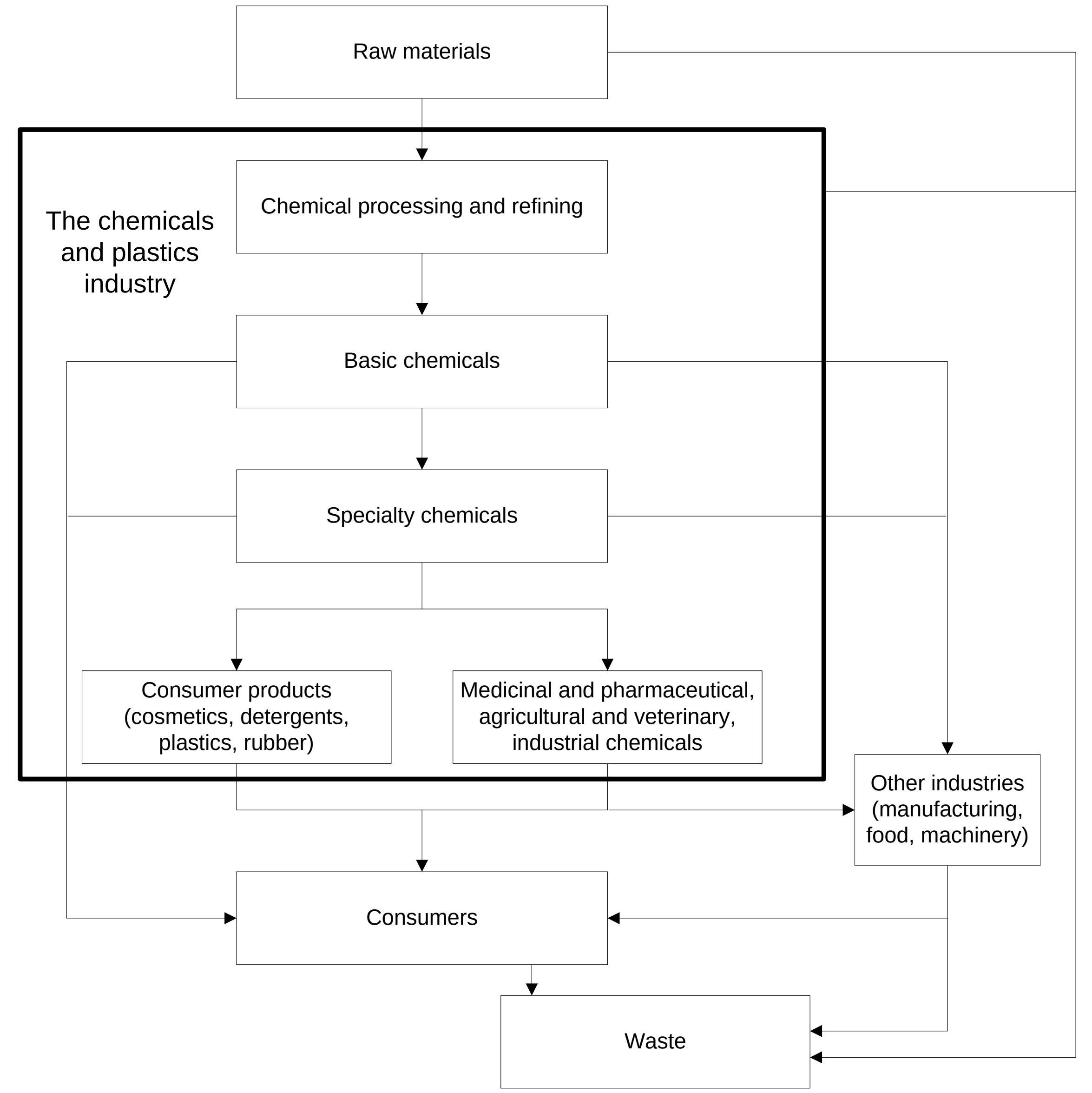
The life cycle of products in the chemicals and plastics industry begins with the transformation of raw materials such as water, minerals, oil, gas, wood, coal and air, into basic chemicals. Some basic chemicals are used in final consumption (such as chlorine for swimming pools and ammonia for cleaning). Others are used to make more complex chemicals and plastics, and in turn other products which are then consumed. Chemicals and plastics, and the products made from them, are later disposed (either to landfill or incineration) or recycled. This life cycle is set out in figure C.1.

C.4 The chemicals and plastics manufacturing industry

The chemicals manufacturing industry is characterised by considerable diversity, such that it is not possible to generalise about typical firms or typical products. This diversity also makes it difficult to generalise about long term trends at anything but an aggregated level. Output of the industry, as measured by industry value added (IVA)[1], was around $9 billion in 2005-06. This represented around 9 per cent of total manufacturing output and 0.9 per cent of GDP (ABS 2007a, 2007b). Of this output, around 62 per cent was chemical production (total basic chemicals plus total other chemicals), 32 per cent plastics and 6 per cent rubber (table).

1 IVA is the industry's contribution to GDP.

Figure C.1 **Life cycle of chemicals and plastics**



Source: Adapted from OECD (2001b).

Table C.1 **Chemicals and plastics industry, industry value added, 2005-06**[a]

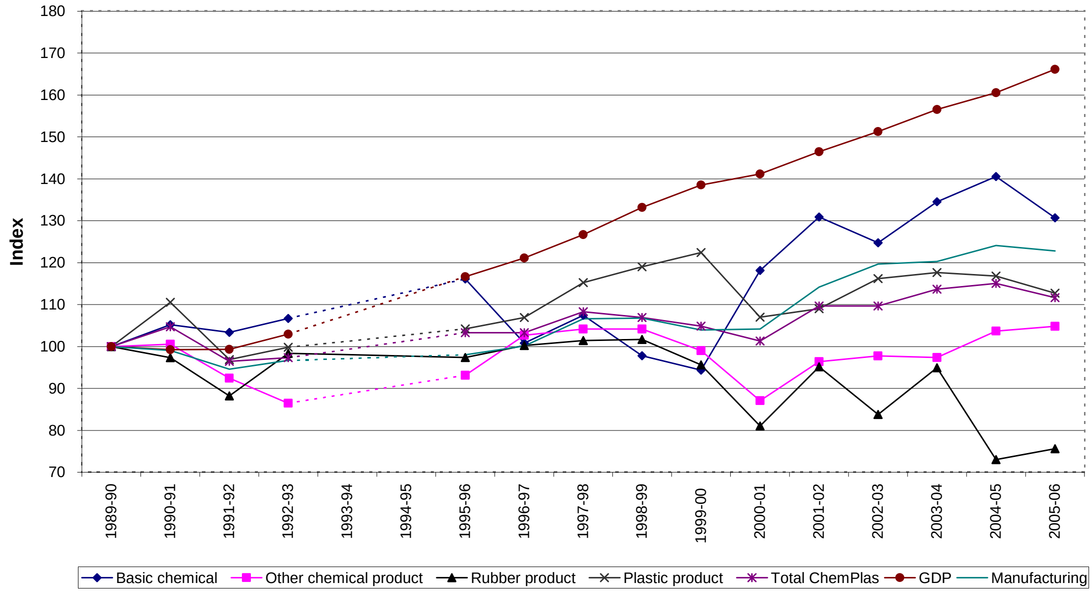
Industry sectors	*Industry value added*	*Proportion of industry*
	$m	%
Fertiliser	**np**	**np**
Industrial gas	**np**	**np**
Synthetic resin	757	8.4
Organic industrial chemical, **nec**	165	1.8
Inorganic industrial chemical, **nec**	930	10.3
Total basic chemical	**2 880**	**31.9**
Explosive	**np**	**np**
Paint	715	7.9
Pesticide	215	2.4
Soap and other detergent	604	6.7
Cosmetic and toiletry preparation	218	2.4
Ink	**np**	**np**
Chemical product, **nec**	408	4.5
Total other chemical	**2 703**	**29.9**
Rubber tyre	169	1.9
Rubber product, **nec**	395	4.4
Total rubber product	**564**	**6.2**
Plastic blow moulded product	386	4.3
Plastic extruded product	437	4.8
Plastic bag and film	676	7.5
Plastic product rigid fibre reinforced	395	4.4
Plastic foam product	171	1.9
Plastic injection moulded product	829	9.2
Total plastics	**2 893**	**32.0**
Total chemicals and plastics	**9 040**	**100.0**

a Excluding medicinal and pharmaceutical products. **np** Not published. **nec** Not elsewhere classified.

Source: ABS (*Manufacturing Industry, Australia*, Cat. no. 8221.0).

Between 1989-90 and 2005-06, chemicals and plastics industry output grew by around 12 per cent. (This compares to growth of 66 per cent for GDP and 22 per cent for manufacturing (figure C.2).) When broken down into product groups, growth rates have varied. For example, between 1989-90 and 2005-06, basic chemical manufacturing output grew by 31 per cent, plastics by 13 per cent, other chemicals increased by 5 per cent while rubber products manufacturing declined by 24 per cent (figure C.2). Output also tended to fluctuate significantly over this period for all types of products.

Figure C.2 **Industry value added (1989-90 = 100)[a, b]**

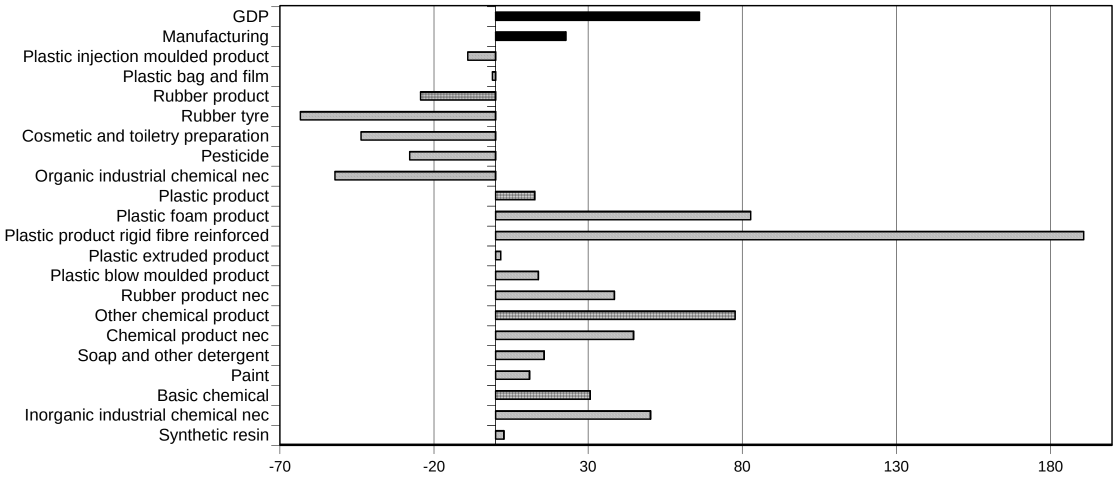


a This chart shows the real change (2005-06 dollars) in industry value added (IVA) between 1989-90 and 2005-06, using 1989-90 as the base year. **b** IVA is used between 1997-98 and 2005-06, industry gross product for 1995-96 and 1996-97, and gross product at factor cost between 1989-90 and 1992-93. Data were not available for 1993-94 and 1994-95.

Data sources: ABS *(Manufacturing Industry, Australia*, Cat. no. 8221.0 various years; *Australian System of National Accounts, 2006-07*, Cat. no. 5204.0).

Even within these product groupings, however, growth rates differed (figure C.3). Between 1989-90 and 2005-06 some product classes, such as rigid fibre reinforced plastic product, had very high rates of growth, while other product classes declined.

Figure C.3 **Real growth in industry value added between 1989-90 and 2005-06[a]**



a 1989-90 is the first year industry value added by class is available for plastics. **nec** Not elsewhere classified.

Data sources: ABS *(Manufacturing Industry, Australia*, Cat. no. 8221.0 various years; *Australian System of National Accounts, 2006-07*, Cat. no. 5204.0).

C.5 The use of chemicals and plastics

The use[2] of chemicals and plastics in the economy also varies significantly across the various products. Overall, 72 per cent of all chemical products are used as intermediate goods, 19 per cent are used as final consumption and 9 per cent are exported. However, this varies significantly across products (table C.2). For example, while 93 per cent of paints[3] are used as intermediate goods, only 27 per cent of cosmetics and toiletries are used in this way.

2 Data on the use of chemicals and plastics is from ABS input-output tables, which classify industries differently from ANZSIC 1993. Data on use includes medicinal and pharmaceutical products, unless otherwise specified.

3 The proportion of paint that is used as final consumption (1 per cent) rather that intermediate use is estimated using information from various ABS surveys, including the Household Expenditure Survey.

Table C.2 **Use of chemicals and plastics, 2001-02**

Description	*Intermediate use*	*Final consumption*[a]	*Exports*
	% total supply	% total supply	% total supply
Basic chemicals	84	5	11
Paints	93	1	6
Medicinal and pharmaceutical products, pesticides	47	40	13
Soap and detergents	50	43	7
Cosmetics and toiletry preparations	27	62	11
Other chemical products	89	3	8
Rubber products	78	18	4
Plastic products	86	10	4
Total	**72**	**19**	**9**

a Includes household consumption, government consumption, gross fixed capital accumulation and changes in inventories.

Source: ABS (*Australian National Accounts: Input-Output Tables – Electronic Publication 2001-02*, Cat. no. 5209.0.55.001).

Chemicals and plastics are used as inputs into most industries. In 2001-02, the largest user was the manufacturing industry, which used 35 per cent of the total supply of chemicals and plastics. Other large users include the construction industry, which used 6 per cent, and the agriculture, forestry and fishing industries which between them also used 6 per cent (ABS 2006b).

Of the 35 per cent of chemicals and plastics used as intermediate inputs by the manufacturing sector in 2001-02, 11 per cent were used in the food, beverage and tobacco industry, 8 per cent in the printing industry and 9 per cent in the machinery and equipment industry (ABS 2006b).

The chemicals and plastics life cycle is characterised by transformation of raw materials into chemicals, which are themselves used as intermediate inputs. In 2001-02, nearly half of chemicals and plastics output was used to manufacture more specialised chemicals and plastic products (ABS 2006b). Consistent with this, the OECD noted that 'the chemicals industry is its own best customer' (OECD 2001b, p. 23).

Industries other than manufacturing used large quantities of particular products in 2001-02. For example:

- 24 per cent of paints are used in the construction industry
- 17 per cent of rubber is used in government business and defence, and 11 per cent is used in the transport and storage industry
- 17 per cent of soap and detergents are used in property and business services
- 13 per cent of other chemicals and plastics (which includes explosives) are used in the mining industry
- 10 per cent of basic chemicals (which includes fertiliser) is used in the agriculture industry (ABS 2006b).

This broad use of chemicals and plastics demonstrates the economy-wide implications of their regulation, and reinforces the importance of effective and efficient regulations.

C.6 Employment

There were around 80 500 people employed in manufacturing chemicals and plastics in 2005-06, comprising around 8 per cent of employment in manufacturing and 0.8 per cent of total employment. Of these, 22 per cent were employed in basic chemical manufacturing, 29 per cent in other chemical manufacturing, 8 per cent in rubber manufacturing and 41 per cent in plastics manufacturing (ABS 2007b).

Between 1989-90 and 2005-06, employment in the chemicals and plastics industry decreased marginally by 0.1 per cent. This compares to an increase of about 4 per cent in the manufacturing industry as a whole, and 30 per cent economy-wide. Employment growth in sections of the chemicals and plastics industry varied significantly. Employment grew by 12 per cent in basic chemicals manufacture, 5.4 per cent in other chemical products and by only 0.3 per cent in plastics. Employment in rubber manufacturing declined by 50 per cent over the period (ABS 2007b).

C.7 Location of activity

Data on the chemicals and plastics industry across states and territories is often limited for confidentiality reasons: a small number of businesses can account for most or all of a particular sector's output. Most of the activity takes place in NSW, Victoria and to a lesser extent, Queensland (table C.3). Compared to manufacturing and GDP, Victoria appears to have a relatively high proportion of chemicals and plastics manufacturing.

Table C.3 **Industry value added by state and territory, 2001-02**

	NSW	*Vic*	*Qld*	*WA*	*SA*	*Tas*	*ACT*	*NT*
	%	%	%	%	%	%	%	%
Basic chemicals	27	**np**	**np**	**np**	5	1	**np**	**np**
Other chemicals	39	38	12	6	4	2	–	**np**
Rubber	**np**	46	9	5	**np**	**np**	**np**	**np**
Plastic	32	44	11	5	7	1	–	**np**
Total manufacturing	**31.6**	**31.8**	**15.1**	**9.7**	**8.2**	**2.3**	**0.4**	**0.8**
GDP	**35.3**	**25.2**	**16.9**	**10.9**	**6.9**	**1.7**	**2.0**	**1.2**

– Nil or rounded to zero. **np** Not published.

Source: ABS *(Manufacturing Industry, Australia*, Cat. no. 8221.0; *Australian National Accounts*, Cat. no. 5220.0).

C.8 Imports and exports

Imports

Imports comprise a significant proportion of the supply of chemicals and plastics in Australia. In 2001-02, around $18 billion[4] of chemical and plastics products, including medicinal and pharmaceutical products, were imported. This was 37 per cent of the supply of chemicals and plastics products. This was higher than for the manufacturing sector more generally (29 per cent) and for the total economy (9 per cent). Import penetration varied across the sectors. For example, 10 per cent of paints were imported, while 56 per cent of rubber products were imported (table C.4).

4 This is different from the ABS International Trade in Goods and Services figure of $14.5 billion on the next page. The difference is explained by the use of data from different years, and the fact that the 2001-02 figure includes medicinal and pharmaceutical products.

Table C.4 **Proportion of supply of chemicals and plastics that is imported, 2001-02**

Description	*Intermediate use*	*Final consumption*	*Total supply*
	%	%	%
Basic chemicals	50	34	44
Paints	11	19	10
Medicinal and pharmaceutical products, pesticides	49	48	42
Soap and detergents	23	23	21
Cosmetics and toiletry preparations	44	53	44
Other chemical products	28	21	26
Rubber products	59	57	56
Plastic products	29	20	27
Total chemicals and plastics	**40**	**43**	**37**
Total manufacturing	**29**	**42**	**29**
Total imports	**11**	**9**	**9**

Source: ABS (*Australian National Accounts: Input-Output Tables – Electronic Publication 2001-02*, Cat. no. 5209.0.55.001).

Some industries import chemicals and plastics to a greater extent than others. Of the largest users in 2001-02, the agriculture, forestry and fishing industry imported 72 per cent of its chemicals and plastics, the manufacturing industry 39 per cent and the construction industry 30 per cent. Other industries that use chemicals and plastics also vary in the extent to which they import. For example, the transport industry imported 70 per cent of the chemicals and plastics it used, while the mining industry imported only 29 per cent, and the accommodation industry 27 per cent (ABS 2006b).

Other data on imports are available from the Australian Bureau of Statistics' (ABS) International Trade in Goods and Services (ITGS) series. The ITGS series reports data under the Standard International Trade Classification (SITC) and has different disaggregation of imports and exports to manufacturing data. According to ITGS data from 2006-07, Australia imported around $14.5 billion of chemicals and plastics products (table C.5). This figure excludes medicinal and pharmaceutical products.

Table C.5 **Imports of chemicals and plastics, 2006-07**

Description	*Import value*	*Change since 1988-89*
	$m	%
Organic chemicals	3 341	188.0
Inorganic chemicals	1 066	56.5
Dyeing, tanning and colouring materials	593	174.5
Essential oils and resinoids and perfume materials; toilet, polishing and cleansing preparations	1 579	442.6
Fertilisers (excluding crude)	760	255.1
Plastics in primary forms	1 664	131.8
Plastics in non-primary forms	1 293	190.6
Chemical materials and products, **nes**	1 776	214.3
Rubber manufactures, **nes**	2 465	262.5
Total	**14 537**	**192.5**

nes Not elsewhere specified.

Source: ABS *(International Trade in Goods and Services, Australia 2008*, Cat. no. 5368.0) .

Exports

Australia produces a modest amount of chemicals and plastics for export. In 2001-02, 9 per cent of chemicals and plastics that were produced were exported — with a value added of $4.4 billion[5]. This compares to 15 per cent for the manufacturing industry and around 9 per cent for the total economy (table C.6).

5 This is different from the ABS ITGS figure of $3.9 billion below. The difference is explained by the use of data from a different year, and the fact that the 2001-02 figure includes medicinal and pharmaceutical products.

Table C.6 **Exports of chemicals and plastics, 2001-02**

Description	*Exports as a proportion of total supply*
	%
Basic chemicals	10.9
Paints	6.0
Medicinal and pharmaceutical products, pesticides	12.9
Soap and detergents	6.8
Cosmetics and toiletry preparations	11.2
Other chemical products	7.7
Rubber products	4.1
Plastic products	4.3
Total chemicals and plastics	**9.0**
Total manufacturing	**15.1**
Total exports	**9.4**

Source: ABS (*Australian National Accounts: Input-Output Tables – Electronic Publication 2001-02*, Cat. no. 5209.0.55.001).

International Trade in Goods and Services data on exports show that around $3.9 billion in chemicals and plastics products were exported in 2006-07. Fertiliser exports have increased dramatically since 1988-89 (although from a low base) (table C.7).

Table C.7 **Exports of chemicals and plastics, 2006-07**

Description	*Export value*	*Change since 1988-89*
	$m	%
Organic chemicals	108	17.4
Inorganic chemicals	775	770.8
Dyeing, tanning and colouring materials	623	323.8
Essential oils and resinoids and perfume materials; toilet, polishing and cleansing preparations	469	416.7
Fertilisers (excluding crude)	153	1 812.5
Plastics in primary forms	338	123.8
Plastics in non-primary forms	365	498.4
Chemical materials and products, **nes**	801	310.8
Rubber manufactures, **nes**	218	246.0
Total	**3 877**	**329.8**

nes Not elsewhere specified.

Source: ABS (*International Trade in Goods and Services, Australia 2008*, Cat. no. 5368.0).

C.9 The global industry

The OECD estimated that the global chemicals industry[6] had output of around US $1500 billion in 1998, and accounted for around 9 per cent of international trade (OECD 2001a). Australia accounts for around 0.9 per cent of the world's chemical industry output. This compares to 1.6 per cent of world GDP (World Bank 2008).

The bulk of world chemical production is in industrialised countries, with around 80 per cent of world production being produced by 16 countries[7] (OECD 2001a). OECD countries accounted for 78 per cent of world output in 1998, down from 83 per cent in 1970.

Data are available from the OECD on the chemicals industry since 1970. In the period between 1970 and 1998, the industry experienced rapid growth, from US $171 billion in 1970 to US $1500 billion in 1998.

The use of chemicals is highest in developed[8] countries, demonstrating a correlation between GDP and chemical consumption per person (OECD 2001b). The OECD also predicts that the use of chemicals will grow more rapidly in developing countries than in industrialised countries over the next 20 years, and that by 2020, the developing world may account for 33 per cent of world chemical demand, compared with 23 per cent in 1995.

6 The definition used for output in the global chemicals industry includes pharmaceuticals and excludes rubber.

7 The United States of America, Japan, Germany, China, France, the United Kingdom, Italy, Korea, Brazil, Belgium/Luxemburg, Spain, the Netherlands, Taiwan, Switzerland and Russia.

8 The OECD includes Japan, the United States of America, Canada, Western Europe, Australia and New Zealand as developed countries (OECD 2001b).