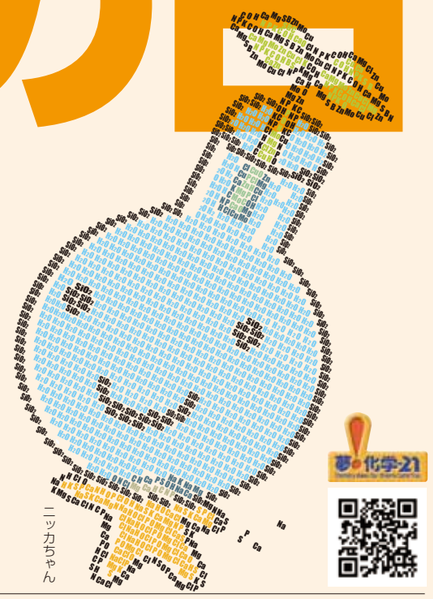
この数にピンときたら

化学の日

全ては化学でできている

化学とは物質の学問です。そして世の中に存在する物質はすべてとても小さなツブツブ（粒子）からできています。例えば、水はH_2Oという粒子（分子）の集まりで、その分子量は18です。この分子量にgをつけた量が1モルとなります。つまり、水18gは1モルとなります。また1モルの物質中には粒子が6.02×10^{23}個集まっており、これを**「アボガドロ定数」**とよびます。化学では物質をくっつけたり、離したりするので、モルという単位はとても便利な物質量として使われています。
日本では2013年に、公益社団法人日本化学会、公益社団法人化学工学会、公益社団法人新化学技術推進協会、一般社団法人日本化学工業協会の4団体が、**10月23日を「化学の日」、10月23日を含む週（月～日）を「化学週間」と制定しました。**海外でもアメリカはじめ多くの国が、この日を“モル”を記念する日として祝っています。



一般社団法人 日本化学工業協会
〒104-0033 東京都中央区新川1丁目4番1号 住友不動産六甲ビル7階
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15.07.DEN1000

Chemical Industry of Japan 2015

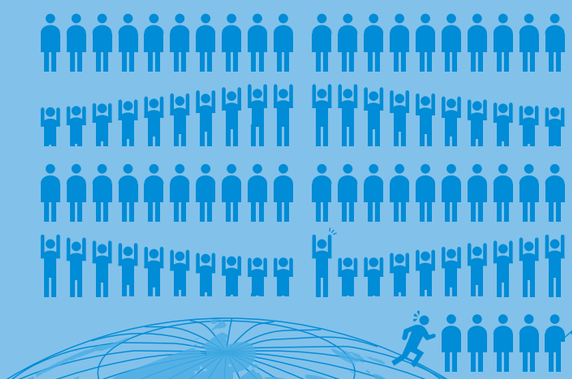
Value of shipments

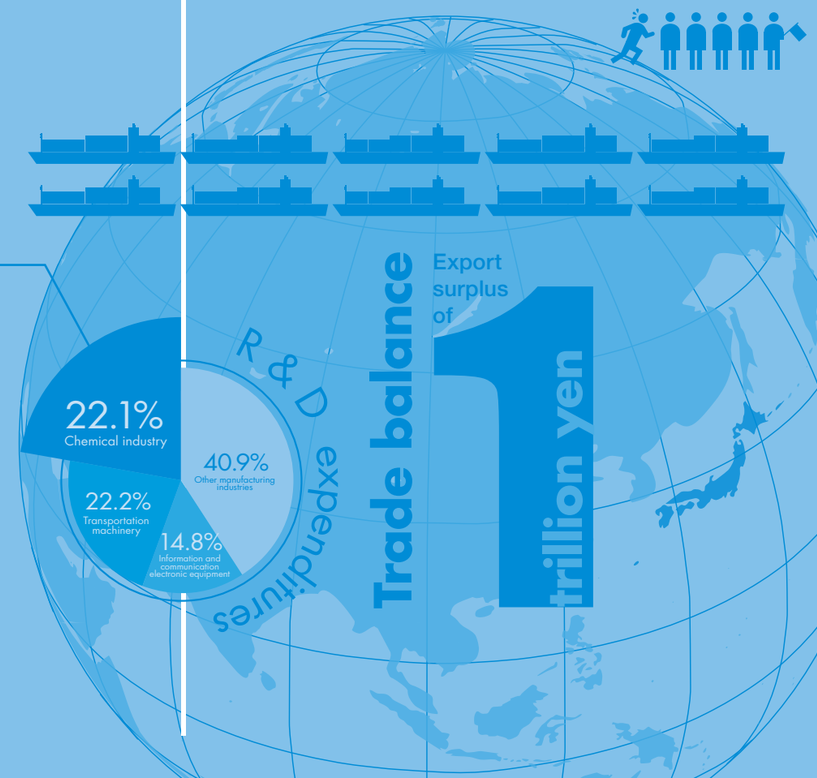
42 trillion yen

The chemical industry including plastic and rubber products ships goods approximately amounting to 42 trillion yen, the 2nd largest in manufacturing industry.

300.3 billion dollars
Japan's chemical industry ranks 3rd in global chemical shipments.

Number of employees **860** thousand people





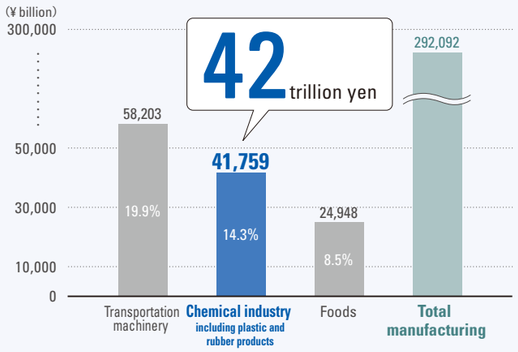
2.5 trillion yen

R&D expenditures of chemical industry including plastic and rubber products amounted to 2.5 trillion yen.

Japan's chemical industry viewed by figures and graphs

Value of shipments (2013)

Source:METI [Census of Manufactures]



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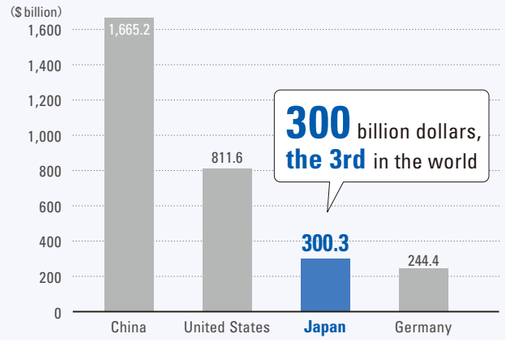
Global chemical shipments (2013)

Source:ACC [Guide to the Business of Chemistry 2014]



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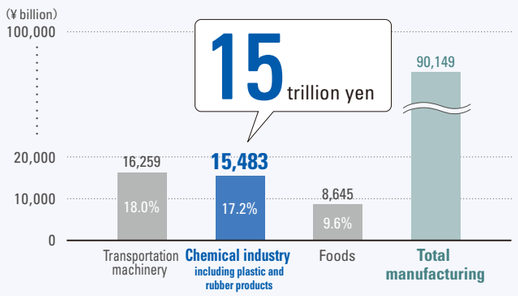
Amount of value added (2013)

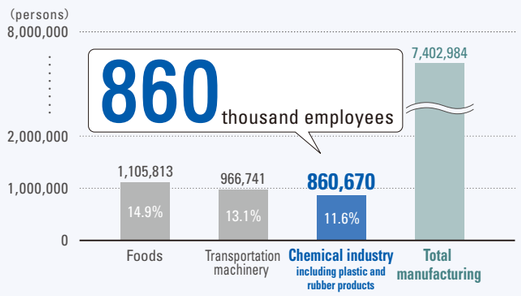
Source:METI [Census of Manufactures]



Note: Value added = Production amount – Cost for using raw materials – Domestic consumption tax – Depreciation cost, etc.

Number of employees (2013)

Source:METI [Census of Manufactures]



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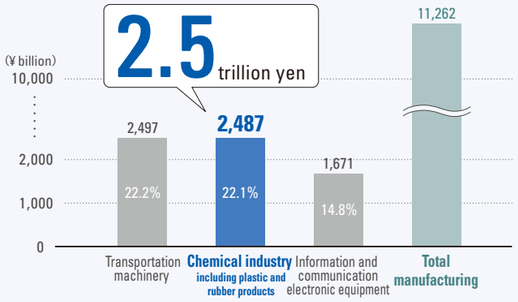
R&D expenditures (FY2013)

Source:MIC [Survey of Research and Development]



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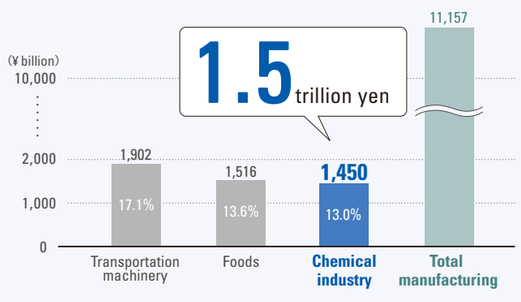
Capital investment (FY2013)

Source:MOF [Financial Statements Statistics of Corporations by Industry]



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Japan's chemical industry supports people's lives and other industries

Japan's chemical industry not only contributes to the improvement of the quality of daily life by supplying products and materials that make our lives affluent and pleasant but also supports other manufacturing industries of Japan. In addition, it also makes contribution to the resolution of such various issues as global warming, energy, natural resources, and food etc.

The total shipments and amount of value added of "chemical industry including plastic and rubber products" amounted to Yen 42 trillion and Yen 15 trillion, respectively, in 2013, ranking those as the second biggest industry that contributes to the Japanese economy following the transportation machinery. The number of employees is more than 860,000. Thus, the industry significantly supports the people's lives also in employment.

Although it may be difficult for people to understand overall chemical industry because it manufactures diverse products*, we introduce the industry with data and graphs in this "Chemical Industry of Japan".

* Since the chemical industry is vast, with a wide range and scope of work, content may vary depending on different classifications. Therefore, in this brochure, we have conformed to Japan Standard Industrial Classification (second classification: chemical industry). Detail of the content is described on Page 5. When the standard differs, we have provided footnotes.

Chemical industry supports people's lives and other industries

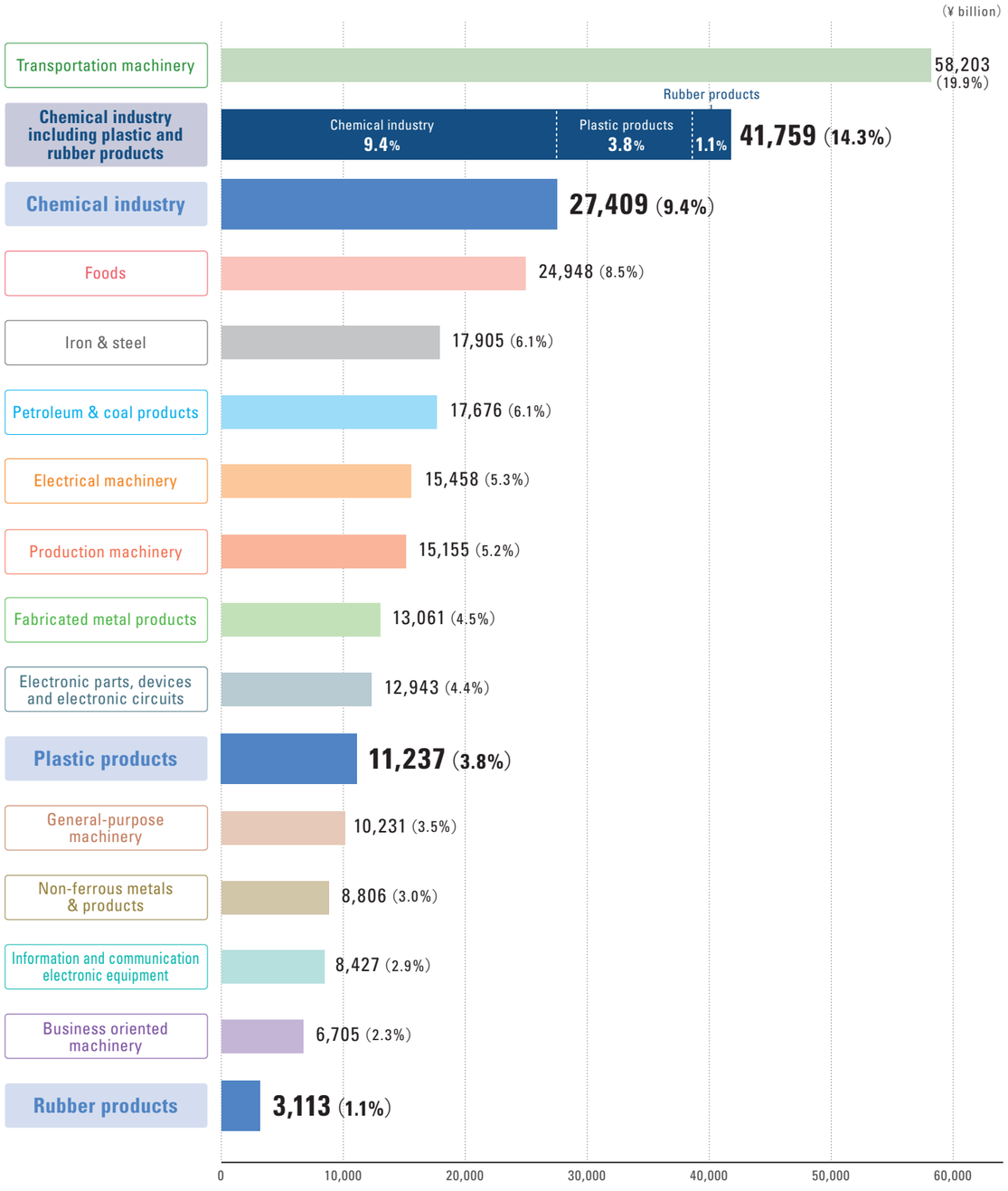
Raw materials	Intermediates	Primary products
Water	Hydrogen	Pigments
	Soda ash	Dyes
	Propylene	Surfactants
Air	Nitrogen	Industrial gas
	Hydrochloric acid	Fertilizers
	Butylene	Agricultural chemicals
Salt	Oxygen	Printing ink
	Nitric acid	Paints
	Butadiene	Petrochemicals
Animals and plants	Chlorine	Synthetic fiber
	Sulfuric acid	Synthetic rubbers
	Benzene	Plastics
Oil (Naphtha)	Carbon dioxide	Cosmetics
	Phosphoric acid	Toothpaste
	Toluene	Pharmaceuticals
Natural gas	Carbon monoxide	Solvents
	Methanol	Fuel
	Xylene	Disinfectant
Coal	Inactive gas	Bleach
	Ethanol	Adhesives
Ore	Styrene	Synthetic detergents
	Caustic soda	Oil and fat products
	Ethylene	Photo-sensitive chemicals

CONTENTS

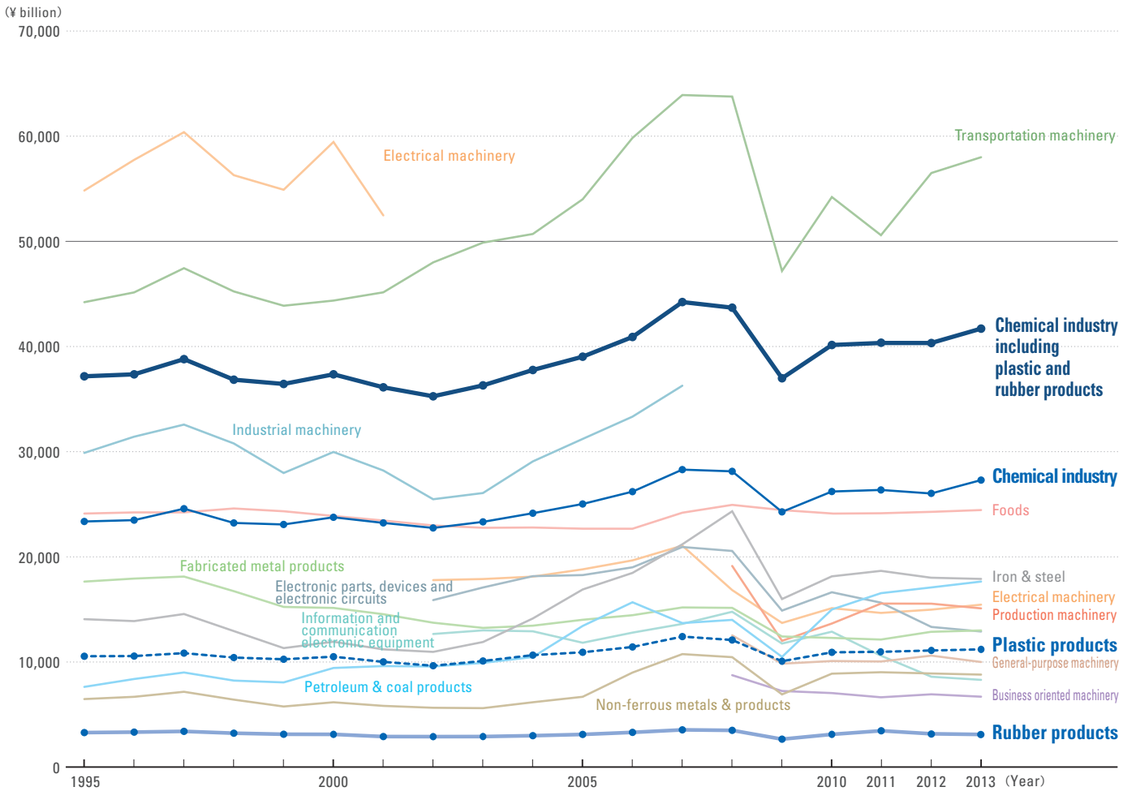
1 Shipments

Total shipment value of chemical industry ranks 2nd in manufacturing industries amounting to 42 trillion yen.

Value of shipments by manufacturing industry in 2013



Trend in shipment value



(¥ billion)

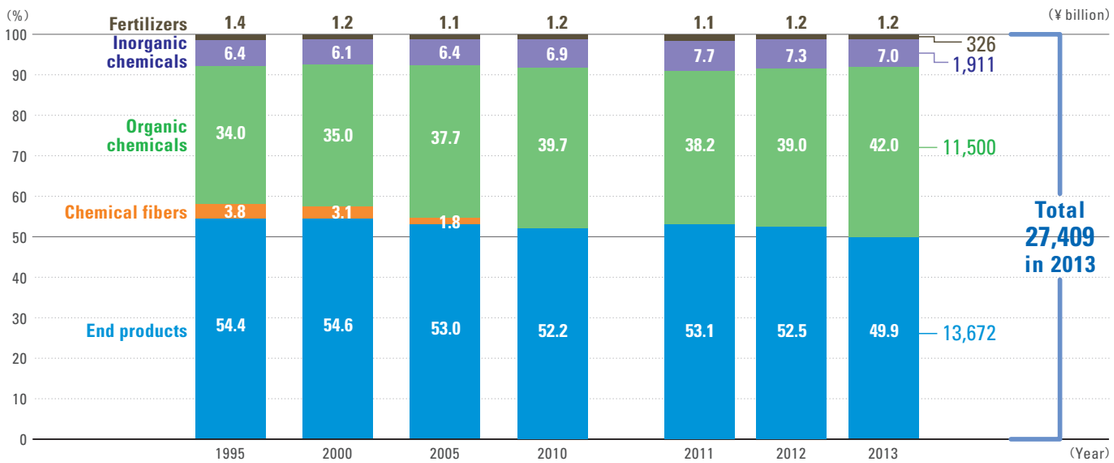
Industry \ Year	Every 5th year				Recent three years			
	1995	2000	2005	2010	2011	2012	2013	
Chemical industry	23,363	23,762	25,027	26,212	26,351	26,038	27,409	9.4%
Plastic products	10,530	10,486	10,906	10,903	10,970	11,106	11,237	3.8%
Rubber products	3,275	3,107	3,099	3,029	3,066	3,177	3,113	1.1%
Chemical industry including plastic and rubber products	37,168	37,356	39,032	40,144	40,388	40,321	41,759	14.3%
Foods	24,117	23,888	22,678	24,114	24,145	24,302	24,948	8.5%
Petroleum & coal products	7,635	9,434	13,429	14,992	16,546	17,077	17,676	6.1%
Iron & steel	14,073	11,927	16,896	18,146	18,666	18,012	17,905	6.1%
Non-ferrous metals & products	6,496	6,191	6,712	8,911	9,023	8,923	8,806	3.0%
Fabricated metal products	17,646	15,143	14,016	12,292	12,128	12,861	13,061	4.5%
Industrial machinery	29,884	29,972	31,211	–	–	–	–	–
General-purpose machinery	–	–	–	10,100	10,048	10,624	10,231	3.5%
Production machinery	–	–	–	13,646	15,556	15,539	15,155	5.2%
Business oriented machinery	–	–	–	6,873	6,645	6,919	6,705	2.3%
Electrical machinery	54,831	59,449	18,812	15,120	14,668	14,983	15,458	5.3%
Information and communication electronic equipment	–	–	11,534	12,585	10,069	8,622	8,427	2.9%
Electronic parts, devices and electronic circuits	–	–	18,265	16,633	15,642	13,338	12,943	4.4%
Transportation machinery	44,215	44,367	54,000	54,214	50,587	56,486	58,203	19.9%
Others	69,965	62,752	48,760	41,391	40,859	40,722	40,815	14,0%
Total manufacturing	306,030	300,478	295,346	289,108	284,969	288,728	292,092	100.0%

(Source) Ministry of Economy, Trade and Industry [Census of Manufactures]
(Note) 1. Electrical machinery was divided into electrical machinery, information and communication electronic equipment, and electronic parts and devices in 2002.
Industrial machinery was divided into general-purpose machinery, production machinery, and business oriented machinery in 2008.
2. Because "other revenues" have been added to the amount of total shipment since the survey conducted in 2007,
the total shipment amount cannot be compared with that in 2006.
3. Electronic circuits have been added to electronic parts and devices since 2011.

2 Shipment by products/Major indices

Chemical products meet the needs of various fields.

Trend of shipments composition in chemical industry

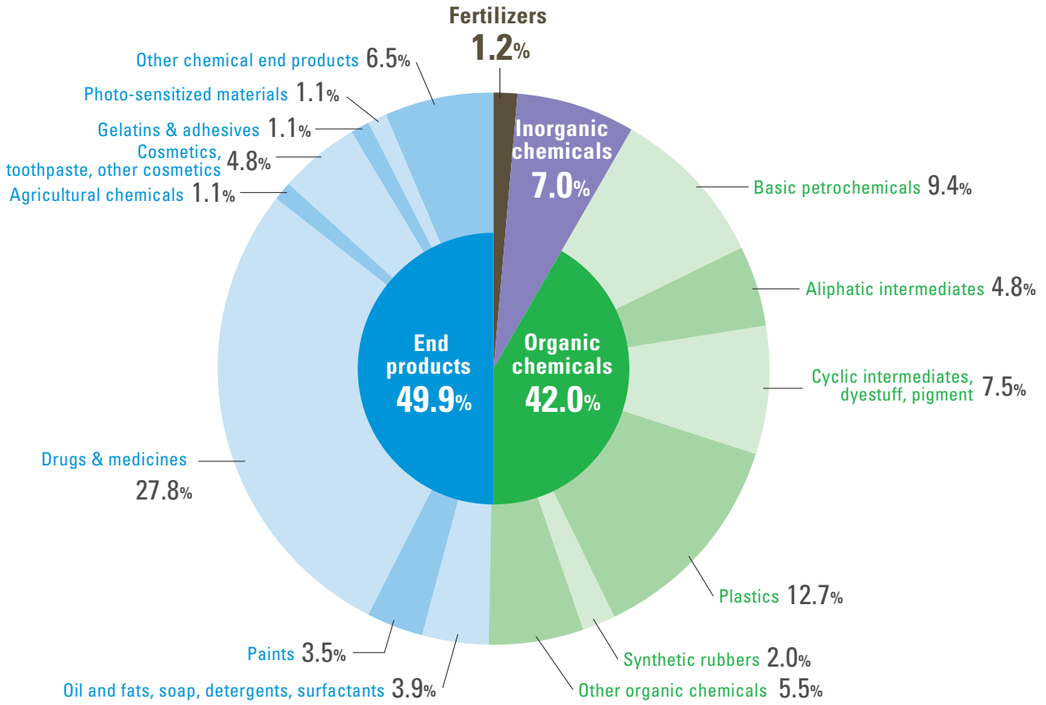


%

Industry \ Year	Every 5th year				Recent three years		
	1995	2000	2005	2010	2011	2012	2013
Fertilizers	1.4	1.2	1.1	1.2	1.1	1.2	1.2
Inorganic chemicals	6.4	6.1	6.4	6.9	7.7	7.3	7.0
Organic chemicals	34.0	35.0	37.7	39.7	38.2	39.0	42.0
▶ Basic petrochemicals	2.6	2.9	6.3	6.6	6.8	7.0	9.4
▶ Aliphatic intermediates	5.5	7.1	6.1	5.9	4.2	4.1	4.8
▶ Cyclic intermediates, dyestuff, pigment	6.9	6.1	7.6	6.8	N.A.	7.5	7.5
▶ Plastics	14.0	13.6	11.0	13.2	14.1	12.7	12.7
▶ Synthetic rubbers	1.7	1.5	2.0	1.6	2.0	1.9	2.0
▶ Other organic chemicals	3.3	3.8	4.7	5.5	N.A.	5.8	5.5
Chemical fibers	3.8	3.1	1.8	–	–	–	–
End products	54.4	54.6	53.0	52.2	53.1	52.5	49.9
▶ Oil and fats, soap, detergents, surfactants	4.0	3.5	4.1	4.2	4.0	3.8	3.9
▶ Paints	4.6	4.1	3.7	4.0	3.9	3.6	3.5
▶ Drugs & medicines	25.7	27.0	28.0	28.1	29.9	29.7	27.8
▶ Agricultural chemicals	1.6	1.4	1.1	1.0	1.0	1.1	1.1
▶ Cosmetics, toothpaste, other cosmetics	6.4	6.0	5.6	5.3	4.9	5.0	4.8
▶ Gelatins & adhesives	1.0	1.0	1.0	1.2	1.0	1.2	1.1
▶ Photo-sensitized materials	4.6	4.4	2.5	1.7	1.2	1.1	1.1
▶ Other chemical end products	6.6	7.2	7.0	6.8	7.1	7.1	6.5
Chemical industry	**100**	**100**	**100**	**100**	**100**	**100**	**100**
Chemical industry	62.9	63.6	64.1	65.3	65.2	64.6	65.6
Plastic products	28.3	28.1	27.9	27.2	27.2	27.5	26.9
Rubber products	8.8	8.3	7.9	7.5	7.6	7.9	7.5
Chemical industry in a broad sense (including palstic and rubber products)	100	100	100	100	100	100	100

(Source) Ministry of Economy, Trade and Industry〔Census of Manufactures〕
(Note) 1. Chemical fibers have been moved to textile industry since 2008.
2. N.A. means "not available".

Composition of chemical products shipped in 2013



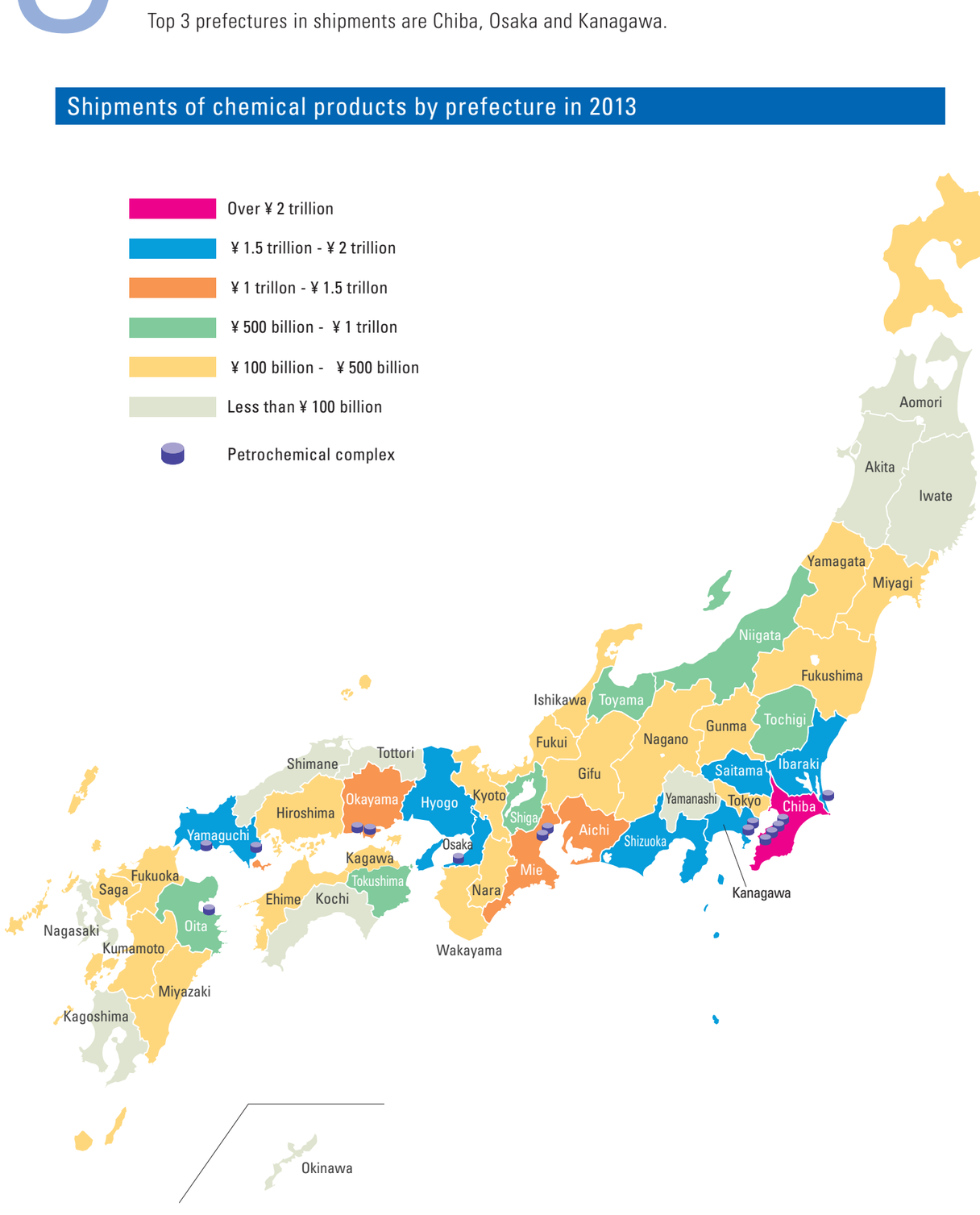
Major chemical industry indices with breakdown by product in 2013

Industry	Major indices, Composition							
	Number of facilities	%	Number of employees	%	Value of shipments (¥ billion)	%	Amount of value added (¥ billion)	%
Fertilizers	160	3.4	4,482	1.3	326	1.2	85	0.8
Inorganic chemicals	824	17.5	32,207	9.5	1,911	7.0	583	5.8
Organic chemicals	761	16.1	90,318	26.6	11,500	42.0	2,743	27.1
▶ Basic petrochemicals	12	0.3	5,835	1.7	2,575	9.4	279	2.8
▶ Aliphatic intermediates	62	1.3	8,763	2.6	1,328	4.8	452	4.5
▶ Cyclic intermediates, dyestuff, pigment	144	3.1	14,190	4.2	2,054	7.5	498	4.9
▶ Plastics	241	5.1	32,580	9.6	3,491	12.7	909	9.0
▶ Synthetic rubbers	16	0.3	5,907	1.7	545	2.0	152	1.5
▶ Other organic chemicals	286	6.1	23,043	6.8	1,507	5.5	453	4.5
End products	2,975	63.0	212,701	62.6	13,672	49.9	6,723	66.3
▶ Oil and fats, soap, detergents, surfactants	278	5.9	14,919	4.4	1,079	3.9	489	4.8
▶ Paints	379	8.0	15,587	4.6	963	3.5	361	3.6
▶ Drugs & medicines	781	16.5	94,232	27.7	7,625	27.8	4,193	41.4
▶ Agricultural chemicals	69	1.5	4,534	1.3	314	1.1	136	1.3
▶ Cosmetics, toothpaste, other cosmetics	467	9.9	31,685	9.3	1,312	4.8	738	7.3
▶ Gelatins & adhesives	142	3.0	5,565	1.6	310	1.1	86	0.8
▶ Photo-sensitized materials	50	1.1	8,768	2.6	295	1.1	123	1.2
▶ Other chemical end products	809	17.1	37,411	11.0	1,774	6.5	598	5.9
Chemical industry	**4,720**	**100.0**	**339,708**	**100.0**	**27,409**	**100.0**	**10,135**	**100.0**
Chemical industry	4,720	23.0	339,708	39.5	27,409	65.6	10,135	65.5
Plastic products	13,245	64.4	409,136	47.5	11,237	26.9	4,090	26.4
Rubber products	2,586	12.6	111,826	13.0	3,113	7.5	1,259	8.1
Chemical industry in a broad sense (including palstic and rubber products)	20,551	100.0	860,670	100.0	41,759	100.0	15,483	100.0

3 Shipment, number of employed workers and number of facilities by prefecture

Top 3 prefectures in shipments are Chiba, Osaka and Kanagawa.

Shipments of chemical products by prefecture in 2013



Shipment, number of employed workers and number of facilities by prefecture in 2013

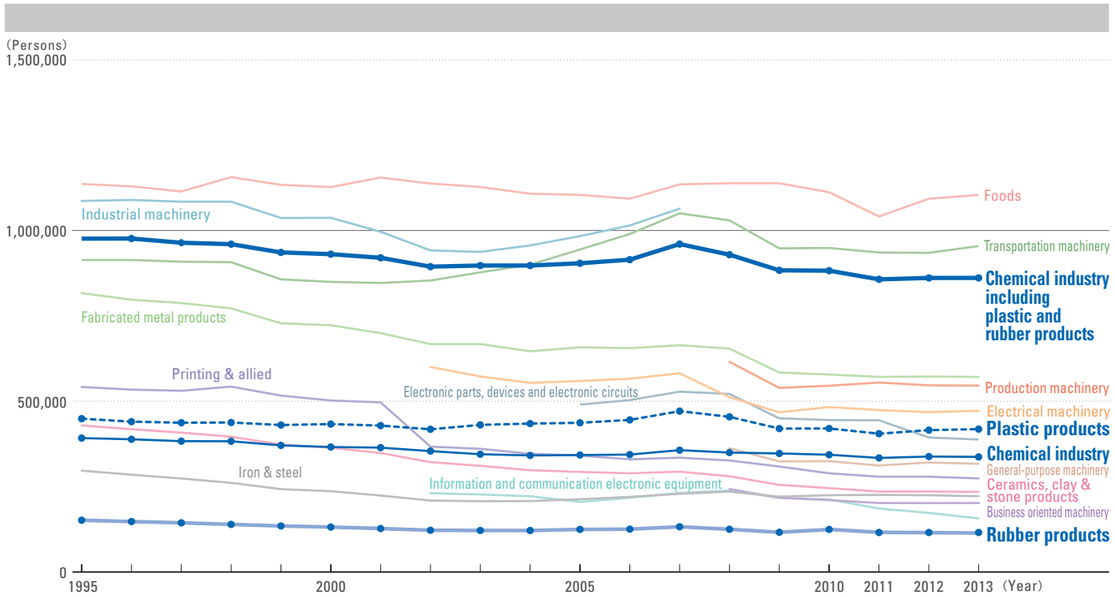
	Prefecture	Value of shipments (¥100 million)	Change from 2012	Number of employees	Number of facilities
1	**Chiba**	**30,165**	**112.8%**	**20,281**	**250**
2	**Osaka**	19,875	100.5%	31,206	558
3	**Kanagawa**	17,534	101.8%	21,273	256
4	**Saitama**	16,368	96.4%	20,698	335
5	**Shizuoka**	16,327	103.6%	22,282	187
6	**Yamaguchi**	16,103	108.5%	14,528	92
7	**Hyogo**	15,851	93.0%	20,596	304
8	**Ibaraki**	15,116	117.0%	14,248	189
9	**Mie**	12,973	105.5%	13,487	112
10	**Okayama**	12,562	109.4%	10,334	116
11	**Aichi**	11,047	117.9%	12,790	221
12	**Shiga**	7,770	104.7%	6,858	107
13	**Oita**	6,257	129.2%	3,090	35
14	**Tochigi**	5,743	105.9%	5,443	84
15	**Tokushima**	5,608	103.7%	5,687	42
16	**Niigata**	5,529	105.3%	7,889	75
17	**Toyama**	5,466	101.0%	13,164	106
18	**Gunma**	4,989	106.8%	7,087	81
19	**Fukuoka**	4,964	107.1%	8,458	142
20	**Fukushima**	4,337	104.3%	7,595	101
21	**Tokyo**	3,870	104.2%	11,141	236
22	**Ehime**	3,803	102.9%	3,470	49
23	**Hiroshima**	3,756	99.1%	5,640	91
24	**Wakayama**	3,231	103.2%	4,871	74
25	**Gifu**	3,001	103.2%	5,664	85
26	**Fukui**	2,895	97.9%	3,862	60
27	**Yamagata**	1,964	115.8%	2,547	31
28	**Hokkaido**	1,870	98.3%	3,324	98
29	**Kyoto**	1,863	114.8%	5,090	106
30	**Saga**	1,624	104.9%	2,153	34
31	**Kagawa**	1,559	102.7%	2,974	42
32	**Kumamoto**	1,540	100.8%	4,474	46
33	**Miyazaki**	1,449	113.9%	1,701	22
34	**Nagano**	1,285	91.7%	2,186	43
35	**Ishikawa**	1,264	125.4%	1,680	26
36	**Nara**	1,005	100.8%	3,427	83
37	**Miyagi**	876	76.8%	1,774	45
38	**Akita**	712	97.3%	1,370	15
39	**Iwate**	519	89.7%	1,567	20
40	**Yamanashi**	327	73.5%	892	19
41	**Aomori**	299	107.9%	541	16
42	**Shimane**	270	–	692	6
43	**Kagoshima**	230	100.3%	439	20
44	**Okinawa**	125	104.4%	704	31
45	**Nagasaki**	85	78.7%	270	14
46	**Kochi**	64	96.1%	213	12
47	**Tottori**	23	–	48	3
	Total	**274,092**	**105.3%**	**339,708**	**4,720**

(Source) Ministry of Economy, Trade and Industry [Census of Manufactures]

4 Number of employed workers

Over 860,000 workers are employed making the industry to rank 3rd among manufacturing industries.

Changes in the number of employees by manufacturing industry



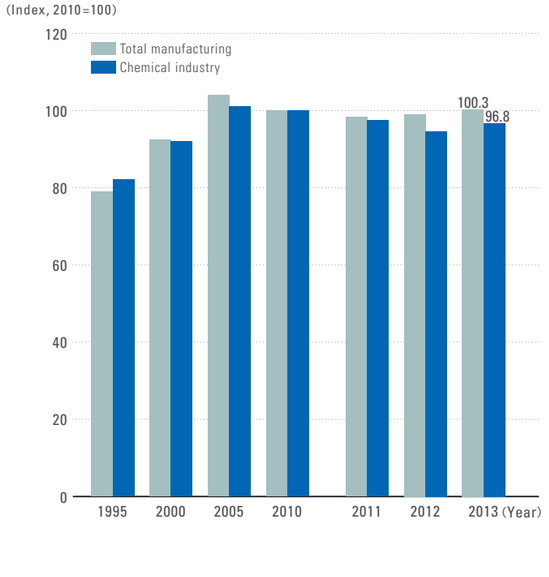
persons

Industry \ Year	Every 5th year				Recent three years			
	1995	2000	2005	2010	2011	2012	2013	
Chemical industry	392,109	365,953	342,481	344,968	335,790	338,327	339,708	4.6%
Plastic products	448,939	433,177	436,897	420,179	405,512	412,189	409,136	5.5%
Rubber products	151,601	131,532	124,613	117,176	116,785	111,743	111,826	1.5%
Chemical industry including plastic and rubber products	**992,649**	**930,662**	**903,991**	**882,323**	**858,087**	**862,259**	**860,670**	**11.6%**
Foods	1,136,236	1,127,177	1,104,292	1,122,817	1,041,765	1,092,789	1,105,813	14.9%
Printing & allied	541,688	502,184	340,890	299,038	286,590	281,104	276,620	3.7%
Ceramics, clay & stone products	429,023	363,997	293,013	250,001	245,146	241,997	240,177	3.2%
Iron & steel	296,824	236,525	213,056	219,983	220,335	219,044	216,280	2.9%
Fabricated metal products	816,694	722,425	657,942	578,559	571,135	572,631	571,976	7.7%
Industrial machinery	1,086,575	1,037,079	983,449	–	–	–	–	–
General-purpose machinery	–	–	–	324,636	310,437	319,554	315,928	4.3%
Production machinery	–	–	–	543,070	552,073	544,213	543,449	7.3%
Business oriented machinery	–	–	–	211,834	202,405	202,708	202,652	2.7%
Electrical machinery	1,750,103	1,573,683	559,413	483,979	474,257	468,807	472,547	6.4%
Information and communication electronic equipment	–	–	205,331	212,466	194,105	173,516	157,425	2.1%
Electronic parts, devices and electronic circuits	–	–	490,140	452,169	444,256	394,488	388,209	5.2%
Transportation machinery	913,535	849,517	944,352	948,824	946,723	945,164	966,741	13.1%
Others	2,357,256	1,840,584	1,461,123	1,134,148	1,124,797	1,107,065	1,084,497	14.6%
Total manufacturing	10,320,583	9,183,833	8,156,992	7,663,847	7,472,111	7,425,339	7,402,984	100.0%

(Source) Ministry of Economy, Trade and Industry [Census of Manufactures]
(Note) 1. Statistics of facilities with four or more employees.
2. Electrical machinery was divided into electrical machinery, information and communication electronic equipment, and electronic parts and devices in 2002. Industrial machinery was divided into general-purpose machinery, production machinery, and business oriented machinery in 2008.
3. Electronic circuits have been added to electronic parts and devices since 2011.

5 Labor productivity/Working hours

Index of physical labor productivity

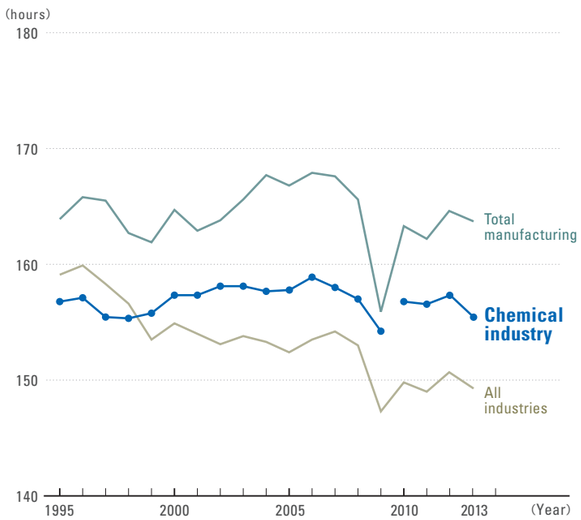


(Index, 2010=100)

Year \ Industry		Total manufacturing		Chemical industry	
		Index	Increase rate	Index	Increase rate
Every 5th year	1995	79.8	4.5%	80.2	8.1%
	2000	92.4	6.7%	92	2.1%
	2005	104.1	2.0%	100.9	▲0.5%
	2010	100	11.4%	100	7.2%
Recent three years	2011	98.3	▲1.7%	97.5	▲2.5%
	2012	99.0	0.7%	94.6	▲3.0%
	2013	100.3	1.3%	96.8	2.3%

(Source) Japan Productivity Center
(Note) 1.Since 2010, petrochemical and coal product manufactures have been included in the chemical industry.
2.We had reviewed and changed the period for collecting the data. Therefore, although the years for collecting the data are same as last year, indices differ from last year since we have changed the base year.

Working hours(monthly average of total net working hours)



(hours)

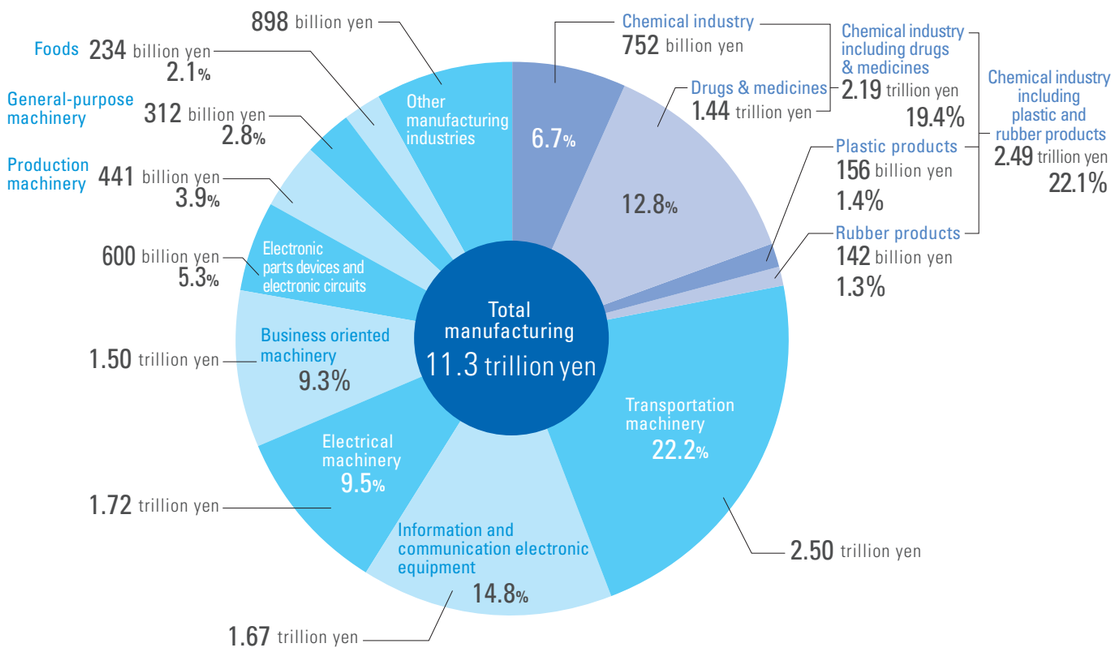
Year \ Industry		All industries	Total manufacturing	Chemical industry
Every 5th year	1995	159.1	163.9	156.1
	2000	154.9	164.7	156.6
	2005	152.4	166.8	157.0
	2010	149.8	163.3	156.1
Recent three years	2011	149.0	162.2	155.9
	2012	150.7	164.6	156.6
	2013	149.3	163.7	154.9

(Source) Ministry of Health, Labour and Welfare [Monthly Labour Survey]
(Note) 1.Since 2010, petrochemical and coal product manufactures have been included in the chemical industry.
2.Since we have reviewed and change the period for collecting the data, we published the same data as last year.

6 Research and development expenditures

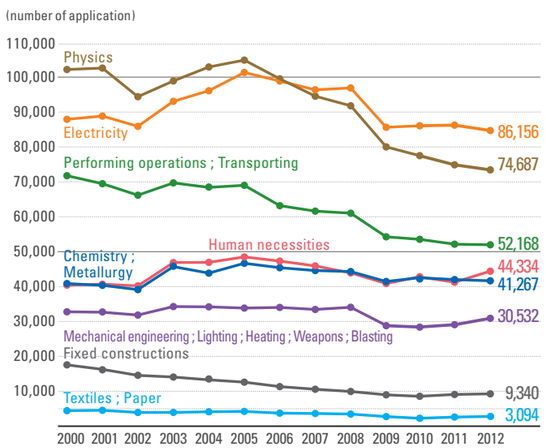
R&D expenditures of chemical industry amounted to 2.5 trillion yen.

Ratio of R&D expenditures by manufacturing industry in FY 2013



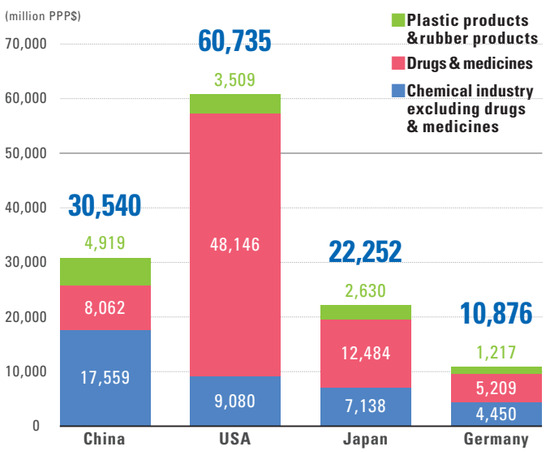
(Source) Ministry of Internal Affairs and Communications
[Survey of Research and Development]

Trend of number of applications for patents by classification



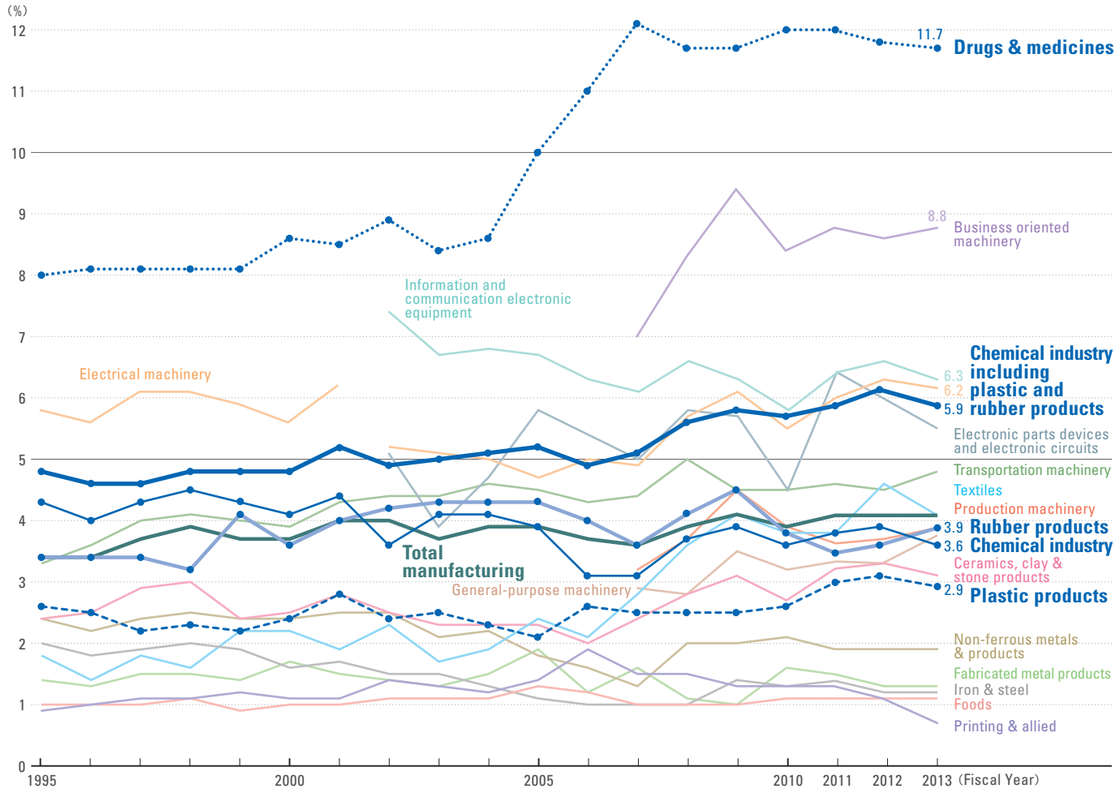
(Source) Japan Patent Office

R&D expenditures of chemical industry in the top four countries in shipment (2012)



(Source) OECD.Stat Extracts as of May 2015
(Note) PPP(Purchasing Power Parity)

Ratio of R&D expenditures to sales by manufacturing industry



%

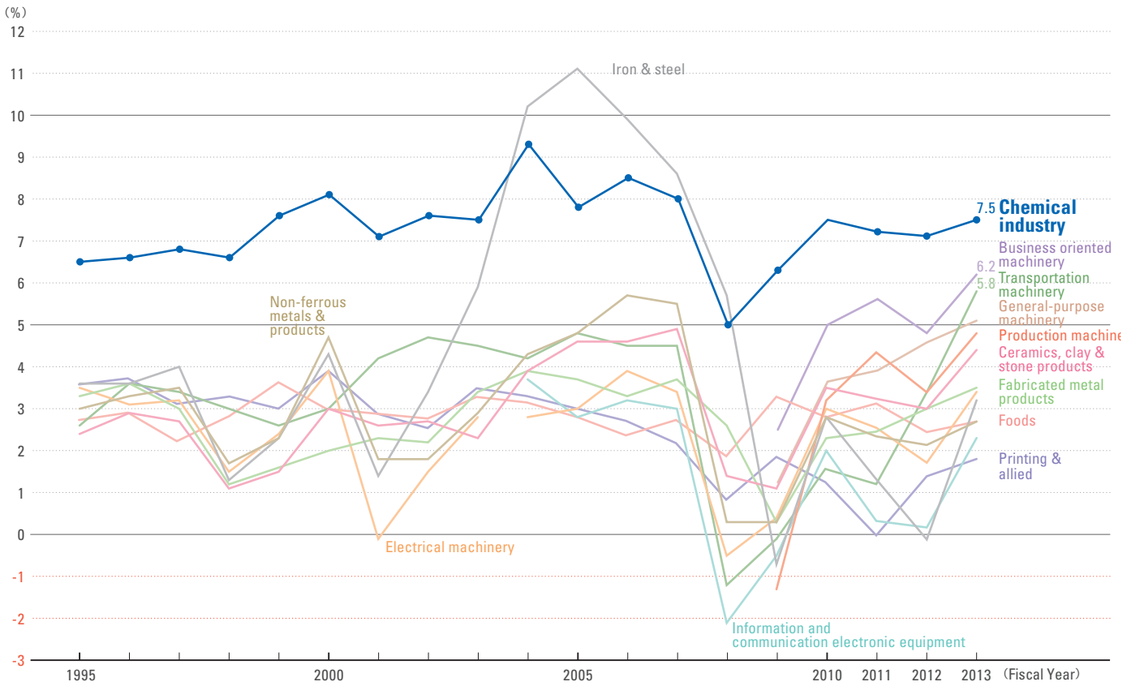
Industry \ Fiscal year	Every 5th year				Recent three years		
	1995	2000	2005	2010	2011	2012	2013
Chemical industry	4.3	4.1	3.9	3.6	3.8	3.9	3.6
Drugs & medicines	8.0	8.6	10.0	12.0	12.0	11.8	11.7
Chemical industry including drugs & medicines	**5.3**	**5.4**	**5.9**	**6.4**	**6.6**	**6.8**	**6.6**
Plastic products	2.6	2.4	2.1	2.6	3.0	3.1	2.9
Rubber products	3.4	3.6	4.3	3.8	3.5	3.7	3.9
Chemical industry including plastic and rubber products	**4.8**	**4.8**	**5.2**	**5.7**	**5.9**	**6.1**	**5.9**
Foods	1.0	1.0	1.3	1.1	1.1	1.1	1.1
Textiles	1.8	2.2	2.4	3.8	3.8	4.6	4.1
Printing & allied	0.9	1.1	1.4	1.3	1.3	1.1	0.7
Ceramics, clay & stone products	2.4	2.5	2.3	2.7	3.2	3.3	3.1
Iron & steel	2.0	1.6	1.1	1.3	1.4	1.2	1.2
Non-ferrous metals & products	2.4	2.4	1.8	2.1	1.9	1.9	1.9
Fabricated metal products	1.4	1.7	1.9	1.6	1.5	1.3	1.3
General-purpose machinery	–	–	–	3.2	3.4	3.3	3.8
Production machinery	–	–	–	3.9	3.6	3.8	3.9
Business oriented machinery	–	–	–	8.4	8.8	8.6	8.8
Electrical machinery	5.8	5.6	4.7	5.5	6.0	6.3	6.2
Information and communication electronic equipment	–	–	6.7	5.8	6.4	6.6	6.3
Electronic parts devices and electronic circuits	–	–	5.8	4.5	6.4	5.9	5.5
Transportation machinery	3.3	3.9	4.5	4.5	4.6	4.5	4.8
Total manufacturing	3.4	3.7	3.9	3.9	4.1	4.1	4.1

(Source) Ministry of Internal Affairs and Communications [Survey of Research and Development]
(Note) Drugs & medicines are excluded from the chemical industry.

7 Operating profit margin

Chemical industry is the No.1 in operating profit margin.

Trend of operating profit margin by manufacturing industry



%

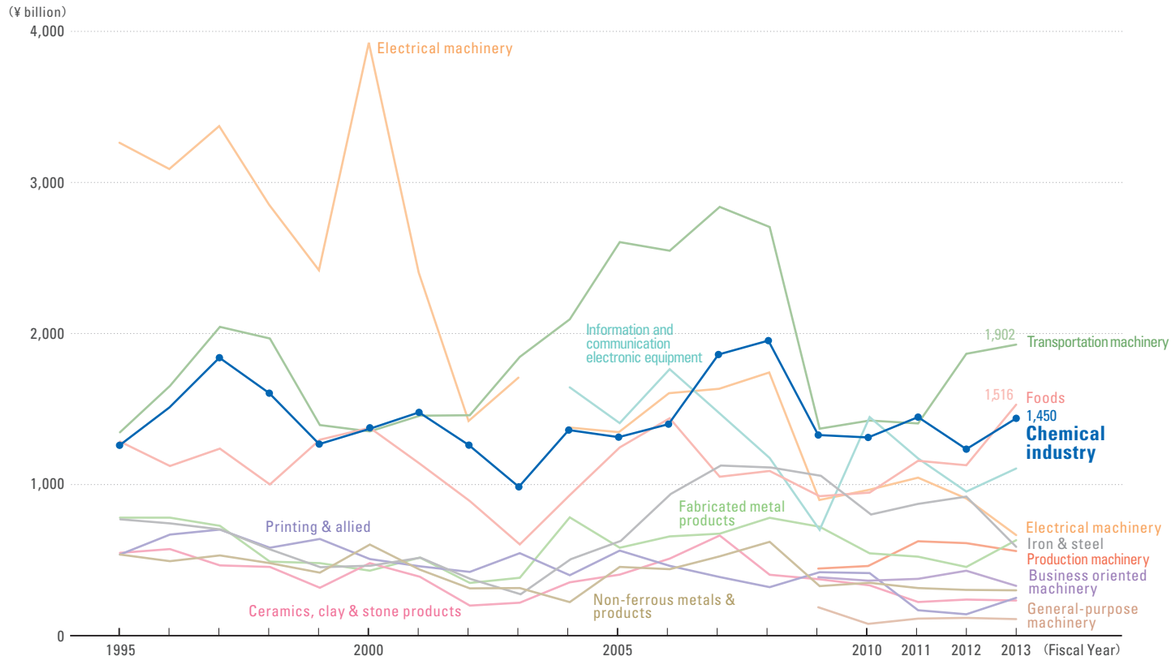
Industry \ Fiscal year	Every 5th year				Recent three years		
	1995	2000	2005	2010	2011	2012	2013
Chemical industry	**6.5**	**8.1**	**7.8**	**7.5**	**7.2**	**7.1**	**7.5**
Foods	2.8	3.0	2.8	2.8	3.1	2.4	2.7
Printing & allied	3.6	3.9	3.0	1.2	0.0	1.4	1.8
Ceramics, clay & stone products	2.4	3.0	4.6	3.5	3.2	3.0	4.4
Iron & steel	3.6	4.3	11.1	2.8	1.3	-0.1	3.2
Non-ferrous metals & products	3.0	4.7	4.8	2.8	2.3	2.2	2.7
Fabricated metal products	3.3	2.0	3.7	2.3	2.4	3.0	3.5
General-purpose machinery	–	–	–	3.5	3.9	4.6	5.1
Production machinery	3.1	4.0	5.2	3.2	4.4	3.4	4.8
Business oriented machinery	5.1	6.0	7.6	5.0	5.6	4.7	6.2
Electrical machinery	3.5	3.9	3.0	3.0	2.5	1.8	3.4
Information and communication electronic equipment	–	–	2.8	2.0	0.4	0.2	2.3
Transportation machinery	2.6	3.0	4.8	1.6	1.1	3.4	5.8
Total manufacturing	3.3	3.8	4.5	3.2	2.8	2.9	4.1

(Source) Ministry of Finance [Financial Statements Statistics of Corporations by Industry]
(Note) Rubber & plastic products are excluded from the chemical industry.

8 Amount of capital investment

Capital investment of chemical industry amounted to 1.5 trillion yen making it ranked 3rd in manufacturing industries.

Trend of capital investment by manufacturing industry



¥ billion

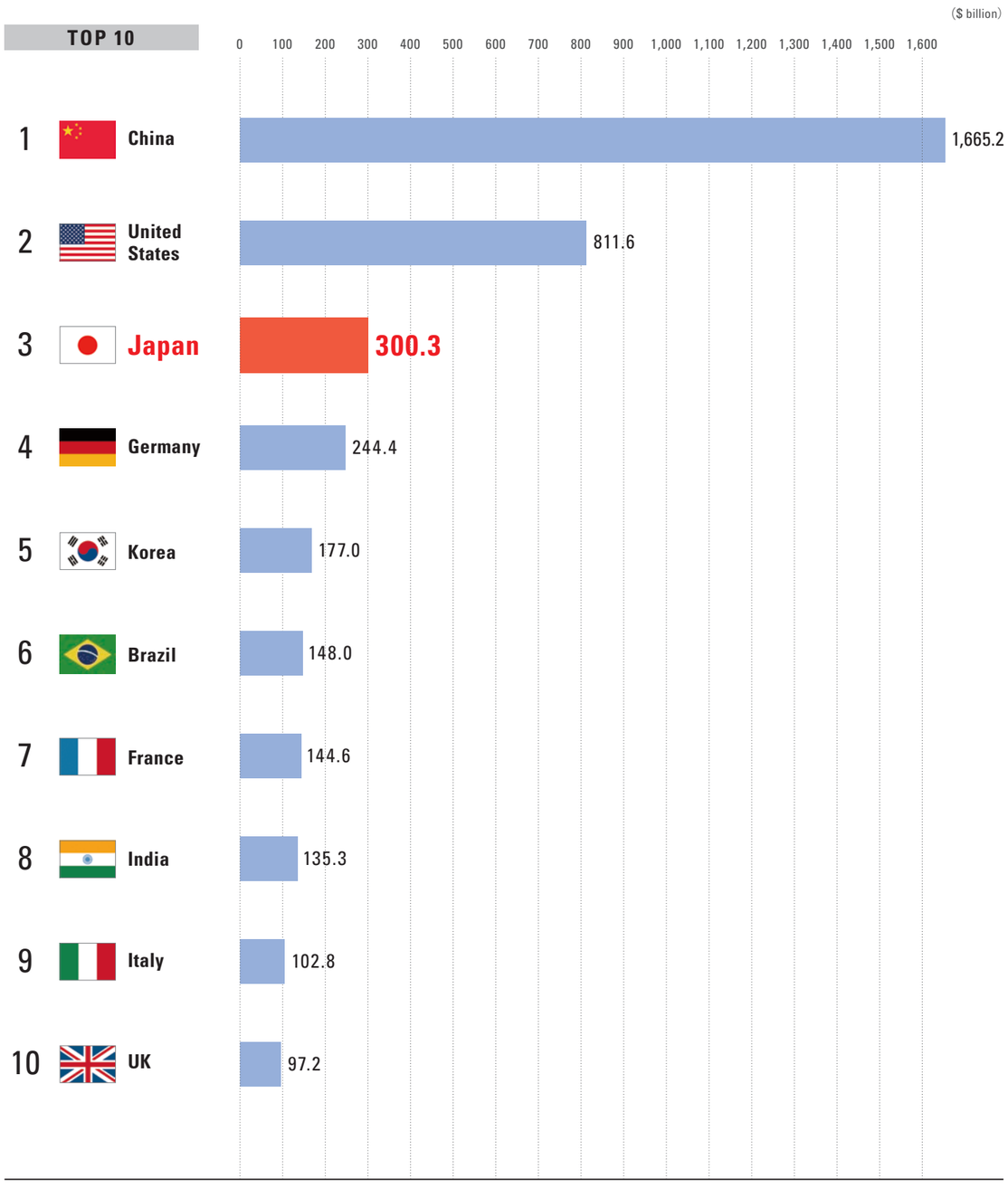
Industry \ Fiscal year	Every 5th year				Recent three years			
	1995	2000	2005	2010	2011	2012	2013	
Chemical industry	**1,260**	**1,368**	**1,314**	**1,312**	**1,455**	**1,236**	**1,450**	**13.0%**
Foods	1,285	1,376	1,246	947	1,175	1,131	1,516	13.6%
Printing & allied	537	507	563	414	188	143	241	2.2%
Ceramics, clay & stone products	548	480	404	333	235	253	234	2.1%
Iron & steel	770	463	627	802	879	917	596	5.3%
Non-ferrous metals & products	537	603	455	350	315	312	300	2.7%
Fabricated metal products	781	430	582	545	531	451	607	5.4%
General-purpose machinery	–	–	–	78	109	122	109	1.0%
Production machinery	–	–	–	461	633	609	562	5.0%
Business oriented machinery	–	–	–	364	381	418	377	3.4%
Electrical machinery	3,265	3,927	1,347	966	1,142	906	661	5.9%
Information and communication electronic equipment	–	–	1,407	1,447	1,180	924	1,169	10.5%
Transportation machinery	1,346	1,352	2,605	1,424	1,409	1,878	1,902	17.1%
Others	1,840	1,032	784	1,828	1,652	1,666	1,434	12.9%
Total manufacturing	13,849	13,238	14,343	11,272	11,285	10,967	11,157	100%

(Source) Ministry of Finance [Financial Statements Statistics of Corporations by Industry]
(Note) Rubber & plastic products are excluded from the chemical industry.

9 Shipments by country

Japan ranks 3rd in the world after China and the US.

Shipments of chemical products by country in 2013



(Source) American Chemistry Council(ACC) "Guide to the Business of Chemistry 2014"

10 The world's 30 leading chemical companies

Five Japanese companies are included among the world's leading chemical companies.

The world's 30 leading chemical companies in 2013

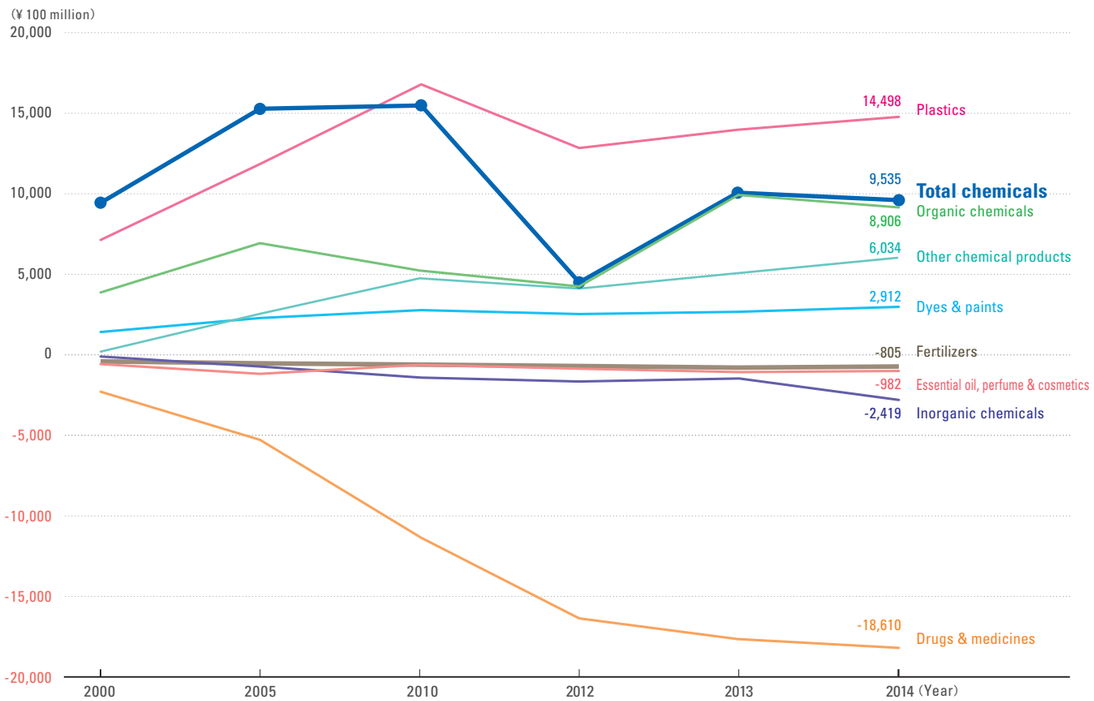
Ranking	Company	Country	Chemical sales			Chemical operating profits		
			2013 ($ million)	Change from 2012 (%)	Chemical sales as of total sales	2013 ($ million)	Change from 2012 (%)	Operating profit margin
1	**BASF**	Germany	78,615	-4.6%	80.0	6,317	-6.2%	8.0%
2	**Sinopec**	China	60,829	5.0%	13.0	103	71.9%	0.2%
3	**Dow Chemical**	U.S.	57,080	0.5%	100.0	4,715	6.6%	8.3%
4	**SABIC**	Saudi Arabia	43,589	3.1%	86.5	12,795	1.7%	29.4%
5	**Shell**	Netherlands	42,279	-7.6%	9.4	N.A.	N.A.	N.A.
6	**ExxonMobil**	U.S.	39,048	0.8%	9.3	5,180	6.0%	13.3%
7	**Formosa Plastics**	Taiwan	37,671	5.9%	60.2	2,352	67.2%	6.2%
8	**LyondellBasell Industries**	Netherlands	33,405	1.7%	75.8	5,087	17.5%	15.2%
9	**DuPont**	U.S.	31,044	2.7%	86.9	5,234	11.6%	16.9%
10	**Ineos**	Switzerland	26,861	-10.8%	100.0	2,137	-6.3%	8.0%
11	**Mitsubishi Chemical**	Japan	26,685	14.8%	74.4	507	121.1%	1.9%
12	**Bayer**	Germany	26,636	0.9%	49.9	4,409	1.0%	16.6%
13	**LG Chem**	South Korea	21,142	-0.5%	100.0	1,592	-8.8%	7.5%
14	**AkzoNobel**	Netherlands	19,376	-5.2%	100.0	1,193	-3.5%	6.2%
15	**Air Liquide**	France	19,153	-0.8%	94.7	3,569	1.1%	18.6%
16	**Braskem**	Brazil	18,994	15.4%	100.0	1,370	140.1%	7.2%
17	**Mitsui Chemicals**	Japan	18,916	11.5%	100.0	306	597.1%	1.6%
18	**Linde**	Germany	18,554	11.0%	83.9	5,108	13.0%	27.5%
19	**Sumitomo Chemical**	Japan	18,116	16.3%	78.8	688	136.9%	3.8%
20	**Reliance Industries**	India	17,778	10.4%	23.3	1,436	17.4%	8.1%
21	**Evonik Industries**	Germany	17,097	-3.7%	100.0	1,653	-22.5%	9.7%
22	**Toray Industries**	Japan	16,665	17.9%	88.5	1,152	22.5%	6.9%
23	**Lotte Chemical**	South Korea	15,017	3.4%	100.0	445	31.1%	3.0%
24	**Yara**	Norway	14,472	0.6%	100.0	1,963	-23.1%	13.6%
25	**PPG Industries**	U.S.	14,044	-0.9%	93.0	2,134	-3.0%	15.2%
26	**Solvay**	Belgium	13,768	-19.2%	100.0	1,179	-24.0%	8.6%
27	**Chevron Phillips**	U.S.	13,147	-1.2%	100.0	N.A.	N.A.	N.A.
28	**DSM**	Netherlands	12,773	5.3%	100.0	580	-11.9%	4.5%
29	**Shin-Etsu Chemical**	Japan	11,945	13.7%	100.0	1,781	10.7%	14.9%
30	**Praxair**	U.S.	11,925	6.2%	100.0	3,734	7.9%	31.3%

(Source) Chemical and Engineering News
(Note) Drugs & medicines are excluded.

11 Trade balance

Trade surplus in 2014 amounts to 1 trillion yen.

Trade balance of chemicals by product



Exports and imports of chemicals

(¥ 100 million)

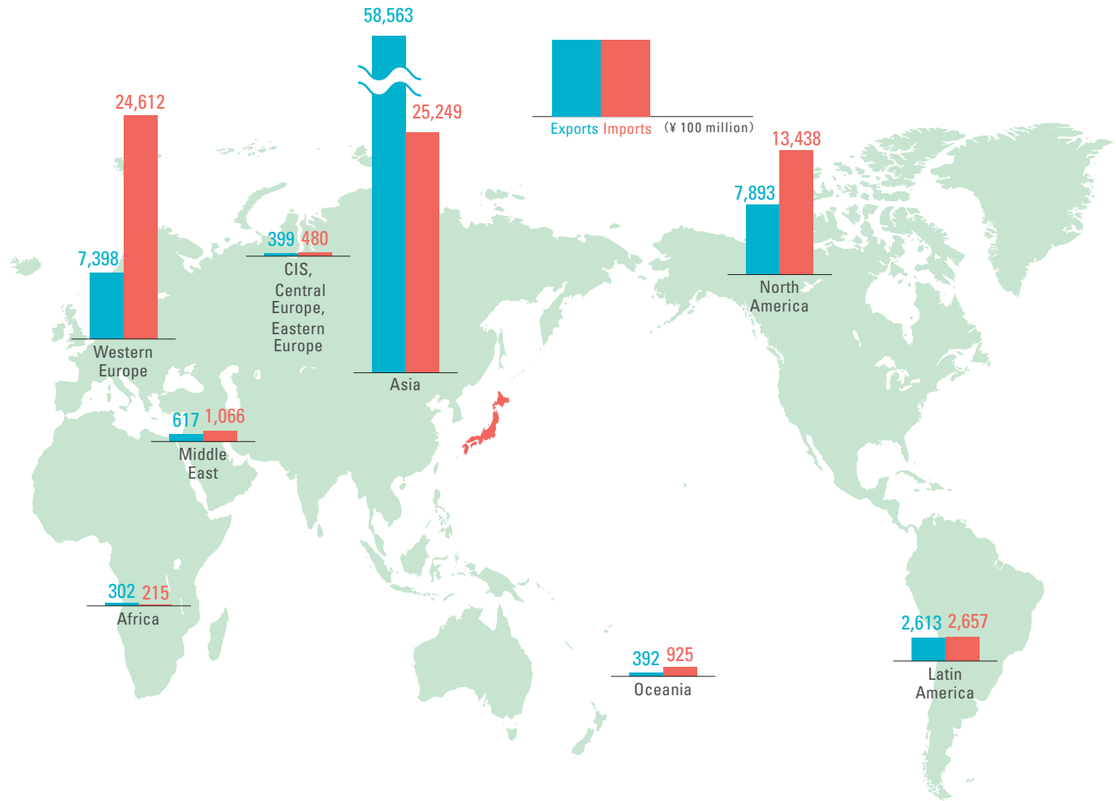
Exports						Articles	Imports					
Every 5th year			Recent three years				Every 5th year			Recent three years		
2000	2005	2010	2012	2013	2014		2000	2005	2010	2012	2013	2014
100	121	128	158	153	124	Fertilizers	570	783	745	861	955	929
2,221	3,109	3,772	3,297	3,646	3,839	Inorganic chemicals	2,287	3,935	5,237	4,936	5,142	6,258
11,927	18,832	18,728	18,183	25,204	24,396	Organic chemicals	7,993	11,843	13,496	13,977	15,205	15,490
10,575	17,157	23,360	20,429	22,593	24,129	Plastics	3,476	5,324	6,542	7,462	8,654	9,631
2,626	3,323	4,048	3,928	4,171	4,488	Dyes & paints	948	1,187	1,343	1,296	1,453	1,576
2,944	3,677	3,787	3,204	3,596	3,530	Drugs & medicines	5,149	9,060	15,226	19,407	21,382	22,140
1,292	1,820	2,479	2,447	2,682	3,005	Essential oil , perfume & cosmetics	1,944	2,909	3,087	3,423	3,853	3,987
6,361	10,442	12,950	12,000	13,027	14,665	Other chemical products	6,183	8,172	8,119	7,900	7,997	8,631
38,047	58,480	69,253	63,646	75,074	78,177	Total chemicals	28,550	43,212	53,794	59,263	64,642	68,642

(Source) Ministry of Finance [Trade Statistics]
(Note) Chemical fiber products are excluded from the chemical industry.

12 Exports and imports of chemicals by region

Exports to Asia have increased.

Exports and imports of chemicals by region in 2014



Exports and imports of chemicals by region

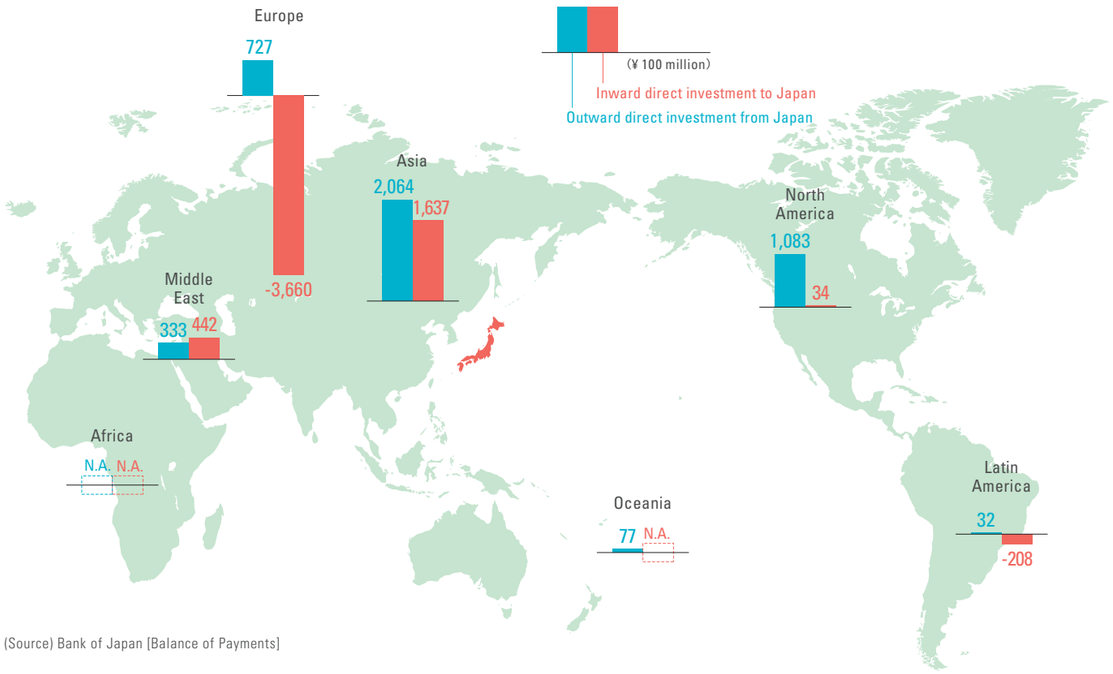
(¥ 100 million)

Exports						Region	Imports					
Every 5th year			Recent three years				Every 5th year			Recent three years		
2000	2005	2010	2012	2013	2014		2000	2005	2010	2012	2013	2014
22,742	40,150	51,799	47,830	56,702	58,563	Asia	6,414	12,974	17,474	20,356	22,714	25,249
224	364	580	585	578	617	Middle East	521	692	652	740	892	1,066
5,948	7,609	7,084	6,288	7,043	7,398	Western Europe	12,065	17,398	21,413	23,298	24,939	24,612
7,065	7,743	6,824	6,103	7,413	7,893	North America	8,198	9,364	11,190	11,293	12,026	13,438
1,402	1,629	1,819	1,849	2,275	2,613	Latin America	694	1,790	2,013	2,271	2,660	2,657
163	196	278	238	281	302	Africa	54	177	128	236	207	215
419	586	494	398	420	392	Oceania	457	520	595	682	815	925
84	204	374	354	363	399	CIS, Central Europe, Eastern Europe	147	298	330	387	388	480
38,047	58,480	69,253	63,646	75,074	78,177	Total	28,550	43,212	53,794	59,263	64,642	68,642

(Source) Ministry of Finance [Trade Statistics]
(Note) Chemical fiber products are excluded from the chemical industry.

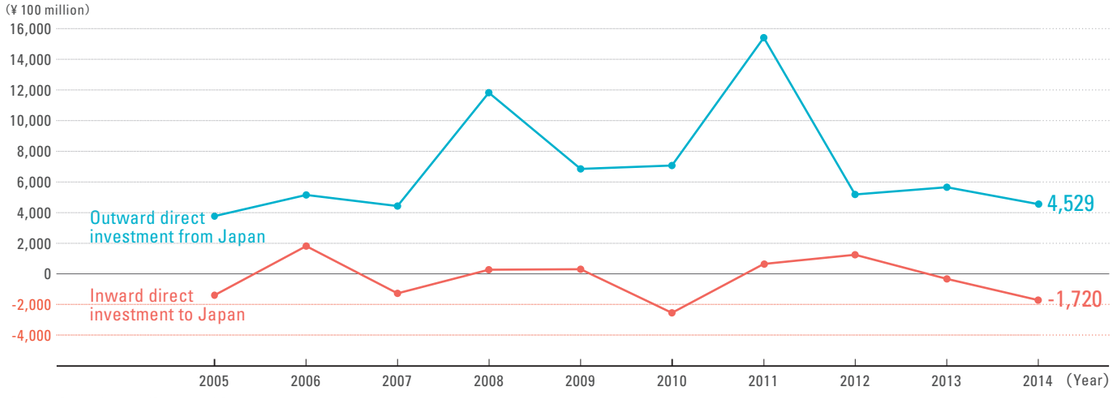
13 Outward/inward direct investments

Outward direct investment of Japanese chemical industry and inward direct investment to chemical industry in Japan in 2014



(Source) Bank of Japan [Balance of Payments]

Actual outward direct investment of Japanese chemical industry and inward direct investment to chemical industry in Japan

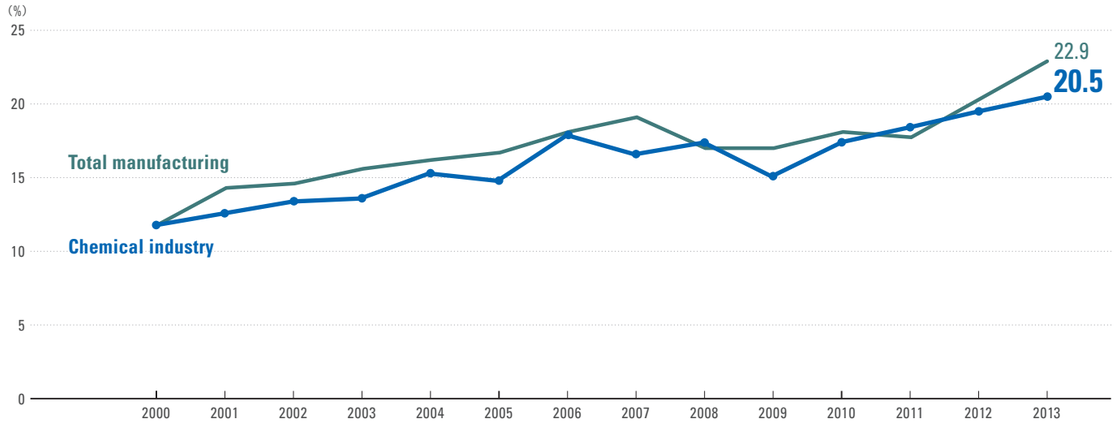


(Source) Bank of Japan [Balance of Payments statistics]

(Note) 1. As regards to direct investment, there are "outward direct investment", in which Japanese companies make direct investment abroad, and "inward direct investment", in which overseas companies make direct investment in Japan.
2. Because Balance of Payments statistics have been based on the BPM6 since January 2014, sign of "outward direct investment" was changed from minus figures to plus figures retroactively to the past.
3. Drugs & medicines are included in the chemical industry.

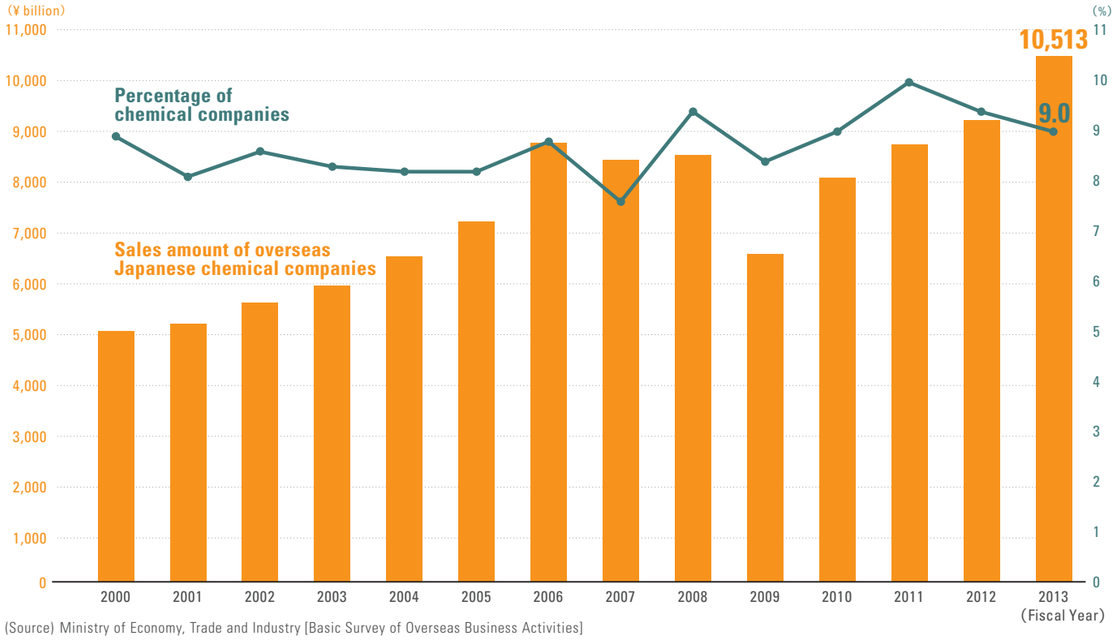
14 Ratio of overseas production/Sales of overseas subsidiary companies

Trend of overseas production of Japanese companies



(Source) Ministry of Economy, Trade and Industry [Basic Survey of Overseas Business Activities]
(Note) Chemical fiber products are excluded from the chemical industry.

Sales of Japanese chemical companies based overseas and its percentage of all overseas Japanese manufacturing companies' sales



(Source) Ministry of Economy, Trade and Industry [Basic Survey of Overseas Business Activities]
(Note) Chemical fiber products are excluded from the chemical industry.

Chemistry creates the future of the earth

Mission of the chemical industry for the future of the earth

Chemistry has made our lives affluent and pleasant by creating innovative substances and products/technologies which were not existing before such as plastic products and pharmaceuticals. Meanwhile, among the substances and products that chemistry creates, there are those which either consume much energy in the manufacturing process or affect human health and environment without proper risk management.

There is a limit in the natural resources of the earth. Therefore, the chemical industry which conducts its production activity by using the limited resources is responsible to realize "sustainable development" in which it makes the current and future living of the people in the world better through chemical products while it maintains and preserves the human health, environment and safety.

An initiative "Responsible Care®" which global chemical industry implements

To contribute to the "sustainable development", the chemical industry carries out "Responsible Care®" (RC) activities in which companies handling chemicals voluntarily secure "environment/safety/health" through the entire lifecycle of their products from development to production, distribution, use, final consumption and disposal/recycling, make the results of the activities to public, and conduct dialogue/communications with the society.

RC was launched in Canada in 1985. Later in 1989, the American Chemistry Council (ACC), the European Federation of Chemical Associations (Cefic), and the Japan Chemical Industry Association and others established the International Council of Chemical Associations (ICCA) to diffuse the RC in the world. Today, chemical associations of about 50 countries and regions around the world have become members of the ICCA including observers.

Responsible Care®
OUR COMMITMENT TO SUSTAINABILITY

With the design of both hands and molecular structure, it represents careful handling of chemicals. ICCA has established this RC logo as the international common brand for the companies and associations implementing RC activities. In Japan, only JCIA and the member companies of the JCIA RC Committee can use the logo.

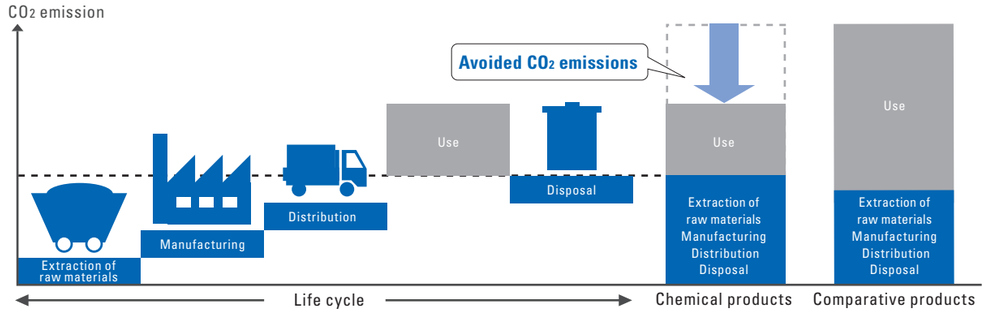
Japan's chemical industry addresses global climate change issue

Chemical industry consumes energy in the process of manufacturing the products. The chemical industry in Japan, which relies on imports for most of resources and energy, has achieved the world's highest level of energy saving after the "oil shock" through various activities such as transformation of process methods and process development, and improvement in energy efficiency of equipment and devices and operation methods. In addition, the industry has also contributed to the reduction of greenhouse gas (GHG) emissions through development, production and supply of highly energy-efficient chemical products in lifecycle such as thermal insulation materials and fuel efficient tires and LED bulbs.

As a core member of the ICCA, JCIA has been carrying out international promotion activity of the methodology for quantification by using carbon life cycle analysis (cLCA) to enhance the transparency and consistency in showing avoided GHG emissions enabled by chemical products.

The avoided CO_2 emissions calculated based on cLCA

Concept of Carbon Life Cycle Analysis (cLCA): Difference of CO_2 emission between chemical products and their comparable products based on the finished products



Chemical industry continues its efforts to minimize risk of chemicals

Among chemicals, there exist those which would cause adverse effects on human health and environment when improperly handled. Therefore, the chemical industry globally promotes an initiative to minimize the risk on "environment, health and safety" throughout an entire product's life cycle (supply chain) including development, production, distribution, use, final consumption and disposal/recycling. ICCA is promoting "GPS (Global Product Strategy)", under which each member company appropriately manages its chemicals based on risk by implementing risk assessment of their own chemicals (products) and widely discloses information such as risk management measures not only to supply chain but also to general society.

JIPS (Japan Initiative of Product Stewardship) activity is the domestic Japanese chemical industry's voluntary action based on risk assessment and management considering whole supply chain of chemical distribution. Japanese chemical industry has its own domestic situations such as the laws and regulations, needs of the society/customers and business customs. Therefore, the term "GPS/JIPS" is used as GPS activities in Japan to take into account the domestic situations described above.