

CHEMICAL PROFILE

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Pentaerythritol

USES

Pentaerythritol is used in alkyd resins, radiation cure monomers, polyvinyl chloride (PVC) stabilizers, polyurethanes, rosin esters, synthetic lubricants, pigment treatment, antioxidants, and explosives.

Worldwide, 37% is used in alkyd paints, 14.5% in alkyd inks, 11% in alkyd adhesives/sealants, 9% in plasticizers, 8% in alkyd varnishes for floors and woodwork, 7% in radiation cure coatings, 4% in lubricants, 1.3% in explosives and 8.2% in other applications.

Many grades are offered, but the largest is mono (pure) with a minimum purity of 98%.

SUPPLY/DEMAND

Global capacity was 465,400 tonnes/year in 2006, with 161,100 tonnes/year in Asia-Pacific (excluding Japan), 115,450 tonnes/year in Western Europe, 76,400 tonnes/year in the US (including Celanese, which shut its plant in 2006), and 31,500 tonnes/year in Japan. Asia-Pacific is the largest consumer, at about 118,900 tonnes/year, followed by Western Europe at 88,400 tonnes/year and the US at 70,700 tonnes/year. Asia/Middle East, Japan, and Eastern Europe consume 26,740 tonnes/year, 23,510 tonnes/year, and 21,120 tonnes/year, respectively.

Global demand in 2006 was 376,460 tonnes/year. Asia-Pacific was the largest exporter at 25,270 tonnes/year and the US was the largest importer with 21,860 tonnes/year.

PRICES

Prices depend on grade and purity. Third-quarter European prices for mono were at €1.42–1.62/kg (\$2.08–2.37/kg). Contract prices for the US and Asia-Pacific for September were at 90 cents–\$1.10/lb (61–75 euro cents/kg) and \$1.80–2.10/kg, respectively.

TECHNOLOGY

The synthesis of pentaerythritol involves reacting four moles of formaldehyde and one mole of acetaldehyde in two differentiated steps. The first is an aldol condensa-

tion to give pentaerythritose. Then, the aldehyde obtained is subjected to a crossed Cannizzaro reaction, whereby one molecule of the pentaerythritose is reduced to pentaerythritol, which is then separated.

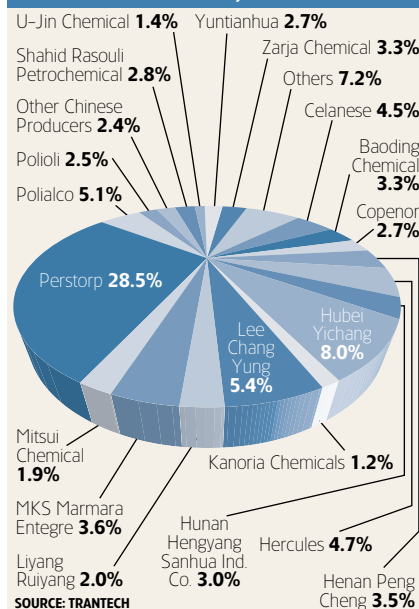
The raw pentaerythritol is dissolved again and subjected to high temperature acid hydrolysis, then purified in an activated carbon bed, concentrated and crystallized.

OUTLOOK

Global demand growth is forecast at 4%/year to 2011. Regionally, consumption will rise by 8.1%/year in Asia-Pacific, 5%/year in Asia/Middle East, 3%/year in Africa and Eastern Europe, 2.6%/year in Latin America, 1.5–2%/year in Australia/New Zealand and Mexico, 1.2%/year in the US, Western Europe and Canada, and 1%/year in Japan.

China's Hubei Yichang Chemical is building a 50,000 tonne/year plant for 2009.

GLOBAL MARKET SHARES FOR PENTAERYTHRITOL, 2006



GLOBAL PENTAERYTHRITOL CAPACITY* (2006), '000 TONNES/YEAR

Company	Location	Capacity
Baoding Chemical Raw Materials	Baoding, China	15
Celanese	Bishop, Texas, US**	34
Copenor	Camacari, Brazil	12
Henan Peng Cheng	Puyang, China	15
Hercules	Louisiana, Missouri, US	22
Hubei Yichang Chemical	Yichang, China	35
Hunan Hengyang Sanhua	Hengyang, China	13
Kanoria Chemicals & Industries	Ankleshwar, India	5
Lee Chang Kung	Kaohsiung, Taiwan	23
Liyang Ruiyang Chemical	Liyang, China	10
Mitsui Chemical	Takaishi, Japan	8
MKS Marmara Entegre Kimya	Gemlik-Bursa, Turkey	17
Perstorp	Bruchhausen, Germany	36
	Perstorp, Sweden	27
	Toledo, Ohio, US	21
	Vapi, India	15
Perstorp-Koei	Chiba, Japan	22
Perstorp-Oxiqum	Vina del Mar, Chile	10
Poliaco	Barcelona, Spain	23
Polioli	Vercelli, Italy	12
Shahid Rasouli Petrochemical	Bandar Imam, Iran	12
U-Jin Chemical	Yeosu, South Korea	6
Yuntianhua	Yunnan, China	12
Zarja Chemical	Rubezhnoye, Ukraine	14

NOTES: * Only includes plants producing more than 5,000 tonnes/year, also includes di- and tri-pentaerythritol capacity
** Closed Q3 2006
SOURCE: TRANTECH

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