

Polyacrylic acids

■ MAJOR GLOBAL PAA-LMW CAPACITY, '000 TONNE/YEAR		
Company	Country	Capacity
Western Europe		
BASF	Germany, Italy, Spain, Turkey	58.6
Ciba	UK, Netherlands	12
Coatex	France	24
Nalco	Germany, Netherlands	6.5
National Starch	UK, Italy	8.5
Protex	France	8.7
Rohm & Haas	France	18
US		
Ciba		5.5
Coatex		6.4
SC Johnson		12
Kemira		16.4
Lubrizol		9
Nalco		14.8
National Starch		9
Rohm & Haas		49.6
Stamford Chemical		9.6
Latin America		
BASF	Argentina, Brazil	6.9
Nalco	Brazil, Colombia	6
Rohm & Haas	Argentina, Brazil	5.3
Japan		
BASF		6
Nippon Shokubai		12.4
Sanyo		8
Asia-Pacific		
BASF	Indonesia, Malaysia, Philippines, China	8
Nalco	China, South Korea	4.7
Protex	Taiwan, Indonesia, Malaysia, China, South Korea	10.3
Rohm & Haas	Taiwan, Indonesia, China, Philippines, South Korea	10.7

SOURCE: TRANTECH

Asian markets are the main driver of future growth and companies continue to invest to keep up with demand

Uses

Polyacrylic acids-low molecular weight (PAA-lmw) are water-soluble homo-, co- and ter-polymers of acrylic acid mostly used as anti-scalants, anti-caking aids, dispersants and sequestrants in over 100 applications that are determined by molecular weight, dispersity (Mw/Mn), ionic binding and type of other monomers used in their structure. About 39% of global output goes into detergents, 20% in water treatment, and about 15% each in clay and calcium carbonate. PAA-lmw is also used in titanium dioxide, printing, personal care, polish and coatings. It is commercially available mostly in aqueous solution under different concentrations and pH, the most common being 25-50% active ingredient in water. About 6% of PAA-lmw is produced as powder, mainly for export.

Supply/demand

According to TranTech, global capacity for PAA-lmw stood at 460 000 tonne/year in 2004, 156 000 tonne/year of which was in western Europe, followed by the US at 149 000 tonne/year and Asia-Pacific (excluding Japan) with 70 000 tonne/year. Consumption was quite similar to capacity, because of the low export/import flow between various world regions with the exception of Nafta and western/eastern Europe. PAA-lmw is the second largest outlet for glacial acrylic acid after superabsorbents, consuming some 310 000 tonne/year.

Pricing

The price depends on molecular weight, dispersity, degree of neutralisation, residual monomer content, type of comonomer and its physical form. Based on 100% active ingredient, prices for liquid grade 90% neutralised homopolymer and customised ter-polymers were between €1.6-€3.6/kg. The powder grades, usually neutralised homopolymer or acrylic acid/maleic anhydride copolymer, range from €2.4/kg to €3.1/kg. Prices rose in 2004 by 12%, mainly due to rising glacial acrylic acid price.

Technology

PAA-lmw is obtained by aqueous solution polymerisation of glacial acrylic acid or neutralised acid with or without other ethylenically unsaturated monomers. The reaction requires an initiator, the most common being hydrogen peroxide and persulphate salts. For

low molecular weight and low dispersity polymers a chain transfer agent is also required, such as isopropanol, sulphite, bisulphite or hypophosphite salts, mercaptopropionic acid, and thioglycolic acid. The resulting PAA-lmw is usually used as solution or dried for export. Almost 94% of PAA-lmw is produced as liquid and used locally.

Health and safety

Aqueous PAA-lmw varies in colour from translucent to pale yellow and has a mild acrylic odour. Solid PAA-lmw is white and odourless. Although both forms irritate the eyes and skin, it is non-toxic. This makes it suitable for boiler water applications, if the concentration of the residual acrylic acid monomer is very low. In the US, up to 20ppm acrylic acid in polyacrylic acid based on the active ingredient content is acceptable for use in boiler water treatment. Europe follows similar rules.

Outlook

Demand has been rising steadily for two decades. Global demand growth is forecast at 5.1%/year to 2010, the highest growth rates being expected in Asia-Pacific (11%), Asia and the Middle East (6%), Australia/New Zealand (5%), US and western Europe (4%). The major players, BASF, Rohm & Haas and others, have been expanding capacity to meet demand. Any shortage within the next five years may be due to a lack of available glacial acrylic acid.

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Next profile: Adiponitrile will appear 4 April

