

# Superabsorbent Polymers

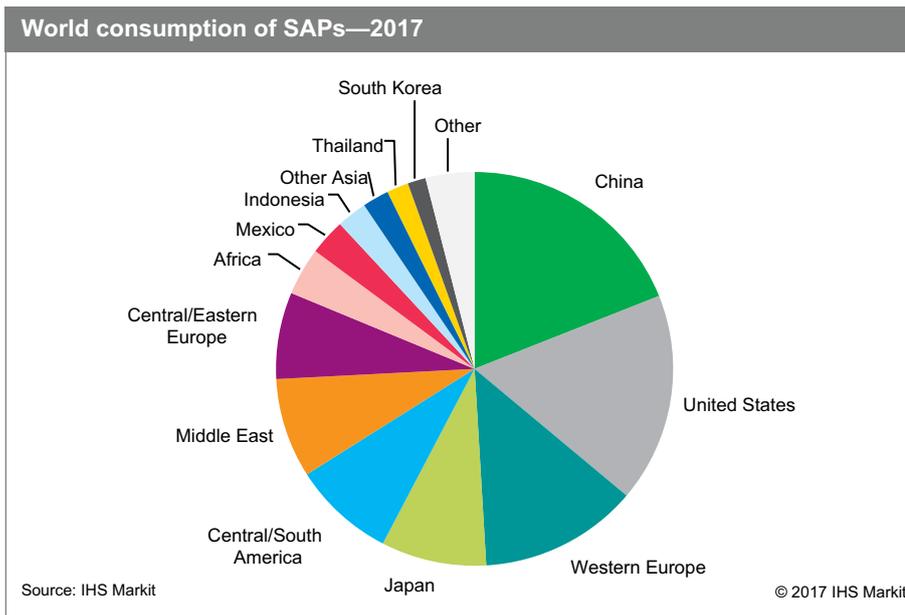
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## Abstract

Superabsorbent polymers (SAPs) are based on polyacrylic acid that can absorb hundreds of times its weight in liquids, making the polymers useful in disposable sanitary products like diapers, feminine hygiene products, adult incontinence products, and certain industrial materials. Use in diapers predominates by far, accounting for nearly 75% of global consumption. Use has been growing in this application in China and other developing countries where disposable incomes are rising, more women are working outside of the home, the population is growing, and commercial availability is increasing. In other regions like the United States, Western Europe, and Japan, penetration of disposable diapers is already well over 90%, so the markets are mature. However, the industry is counting on growth in the incontinence market because of aging populations, longer lifespans, and greater acceptance by consumers.

The largest producers of SAPs are Nippon Shokubai, BASF, and Evonik, which together have about 50% of global capacity. All three have been building capacity in recent years. However, producers in China and South Korea have also been rapidly increasing production, which has led to depressed pricing. Costs have decreased since 2014 because of lower-priced acrylic acid feedstock, which is derived from propylene.

The following pie chart shows world consumption of superabsorbent polymers:



In the largest application, disposable diapers, demand continues to be strong in developing regions, but remains flat in developed countries because of market saturation and low birthrates. Good growth is expected in the developing world for several reasons:

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- Increasing disposable income. Disposable diapers are a luxury to families with low disposable income. A baby's diaper is changed five or six times a day in prosperous countries like the United States, which can cost \$1,000–2,000 annually. By contrast, in less developed countries, an infant's diaper might be changed only once a day, and cloth diapers are often used.
- More women working outside of the home and creating more demand for the convenience of disposables. Improvements in childcare facilities have made it easier for couples to balance work and childcare.
- Demand from educated women who insist on more effective sanitary products.
- Higher population growth. As an example, in China, the one-child-per-family policy was recently relaxed to allow two children per family.
- Greater availability in the developing world. For example, in India, higher-quality hospitals have begun to promote the use of disposable sanitary products, which should increase the penetration rate of diapers.

It is expected that adult incontinence products, the second-largest use, will experience much higher growth in developed regions for several reasons:

- The population is aging quickly in the United States, Europe, Japan, and other countries.
- Longevity is increasing.
- There is greater acceptance of incontinence products.

The third major use of SAPs is in feminine hygiene products. This generally has become a low growth area in the developed world, but is expected to be higher growing in the developing world as their availability increases and women become more educated about the products. The industry is developing newer products that appeal to sports-minded women.

SAPs are also used in industrial applications such as agriculture, where they are used to regulate water release in soils in arid climates and adsorb excess water in damp climates. Other uses include protective coatings for electrical cable, food packaging, and medical/medical waste adsorbents.

SAP feedstock costs have been dropping because of lower acrylic acid pricing, which, in turn, has dropped as propylene costs have eased considerably from mid-2014 highs. From a competitive side, the prices of SAPs have dropped as the industry faces overcapacity despite relatively strong global demand. In particular, South Korea and China have added considerable amounts of new capacity since 2012. It will take several years for demand to balance with supply.

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