



SOY-BASED SURFACTANTS

Emerging technologies provide opportunities for more renewable, environmentally friendly products.

THE PRODUCT

Surfactants, or surface-active agents, are broadly defined as organic compounds that can enhance cleaning efficiency, emulsification, wetting, dispersal, solvency, foaming/defoaming and lubricity of water-based compositions.

MARKET POTENTIAL FOR SOY PRODUCTS

Current annual surfactant demand in the United States is estimated to be just over 8.1 billion pounds. The largest end-use market for surfactants is household cleaning detergents. Large-volume, lower-priced laundry and dishwashing detergent commodity products account for roughly one-half of the U.S. surfactant market. “Specialty surfactants” are low-volume, higher-priced products used in a broad range of industrial and personal care market applications with annual demand estimated at slightly over 2 billion pounds or 26 percent of the total U.S. surfactant market.

Key Markets	Million Pounds
Household Detergents	3,500
Personal Care	800
Industrial & Institutional Cleaners	490
Food Processing	405
Oilfield Chemicals	385
Agricultural Chemicals	270
Textiles	200
Emulsion Polymerization	200
Paints & Coatings	200
Construction	100

Other Markets	Million Pounds
Lubricant and Fuel Additives	615
Metalworking	150
Mining Chemicals	100
Pulp & Paper	75
Leather Processing	30
Other	195
Total	7,715

SURFACTANT FEEDSTOCKS AND PRICING

Oleochemical/biobased surfactants are commonly derived from plant oils such as coconut and palm oils; from plant carbohydrates like sorbitol, sucrose and glucose; or from animal fats such as tallow. Oleochemical feedstock sourcing for surfactants has been changing in recent years. Animal fats have lost favor to vegetable oils, including the growing utilization of soybean oils.

Petrochemical/synthetic surfactants are derived from petroleum-based feedstocks — mainly crude oil. The primary synthetic feedstocks are ethylene, benzene, kerosene and n-paraffins. The surfactant industry currently uses roughly equal amounts of “biobased” oleochemicals and “synthetic” petrochemicals.





SOY-BASED SURFACTANTS

Despite wide fluctuations in both petrochemical and oleochemical feedstock pricing in recent years, the escalation of crude oil prices was most dramatic and had the biggest impact on surfactant pricing. Supply/demand changes, along with other factors such as currency exchange rates and commodity speculation, will continue to influence pricing of surfactants but not to the extent of the stronger influence exerted by 1) the growing U.S. dependence on crude oil imports (now 70 percent of supply) and 2) growing environmental and regulatory pressure on surfactant manufacturers to use natural, renewable raw materials. As a result, demand for oleochemical-based feedstocks will grow at the expense of petrochemical-based surfactants.

Historically, the oleochemical feedstocks of choice have been palm, palm kernel and coconut oils as well as tallow. Soybean oil use has been restricted in the higher-use markets most likely because of the higher level of polyunsaturates and longer carbon chains that lower the ability for “foam” and the reduction of biodegradability.

SOY-BASED SURFACTANTS AND EMERGING OPPORTUNITIES

The structure of the surfactant supply industry is stratified and complex. Because of this complexity, it is difficult to estimate the amount of soy-based surfactants being used. The largest current volume of soy-based surfactants is represented by lecithin. Examples of soy-based surfactants can be found in most of the key markets. Soybean oil and soy protein are used as the starting materials for surfactants; however, soybean oil is currently the predominate feedstock used in the manufacture of surfactants where soybeans are used.

Increasing environmental awareness and the use of renewable resources provide opportunities for the use of soybeans in surfactants through new technologies that are emerging, especially in the field of protein-based surfactants.

Emerging technologies that may affect the increased usage of soy-based surfactants in the future are:

1. Increased knowledge in enzymatic processes that are related to fermentation to produce surfactants.

2. Increased knowledge in the area of protein-based surfactants to provide functionality.
3. Increased knowledge of the oil content to produce fatty acid components with less unsaturation.
4. Process technology improvements for producing surfactants by using microfluidizer technology to prepare more stable emulsions.
5. Separation technologies to produce products with fewer impurities, which will increase potential market applications, especially in food and personal care.

CURRENT RESEARCH STATUS

The concern for the environment includes the impact of crude oil supply and demand, environmental impact of chemicals, energy usage, conservation of resources, etc. There is considerable consumer awareness in these issues. These trends have driven changes in the household detergent market from soaps to synthetic detergents with biodegradability, from powder to liquid products that are more concentrated to reduce packaging and shipping costs, to front-loading washing machines that use less water and operate at lower temperatures to save energy.

United Soybean Board (USB)—sponsored research is aimed at increasing the use of soybeans in the surfactant market.

ABOUT USB

The 69 farmer-directors of USB oversee the investments of the soy checkoff to maximize profit opportunities for all U.S. soybean farmers. These volunteers invest and leverage checkoff funds to increase the value of U.S. soy meal and oil, to ensure U.S. soybean farmers and their customers have the freedom and infrastructure to operate, and to meet the needs of U.S. soy's customers. As stipulated in the federal Soybean Promotion, Research and Consumer Information Act, the USDA Agricultural Marketing Service has oversight responsibilities for USB and the soy checkoff.

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