



SOY-BASED PRINTING INKS

Soy oil offers improved pigment dispersal, lower odors and renewability for printing industry.

SOYBEAN USAGE POTENTIAL

Market expansion opportunities can be seen for soybean oils in the various printing methods, particularly lithography, flexography and most recently in gravure. Soybean oil has gained wide acceptance in both colored and black inks. However, poor economic conditions have significantly reduced the volume of soybean oil in news inks. In addition, most major newspapers are available for free in many electronic applications. As a result, the volume of soybean oil may have dropped from 100 million pounds to as low as 50 million pounds. In spite of these, poor economic conditions, rising petroleum prices and environmental concerns are drawing attention to soybean oil and its derivatives. Major ink companies are closely following any technical breakthroughs that pertain to altering soybean oils, especially any research that increases the drying abilities or ultraviolet (UV) reactivity of soybean oil or its derivatives. Small amounts of soy acrylate chemistry are used in radiation-cured inks to improve pigment dispersion and wettability properties. In addition, soy isolate proteins are used in corrugating inks for adhesion and improved heat resistance.

PROJECTED TIME OF ENTRY

Chemically modified soy oils are major factors in market penetration. Additional penetration in lithography applications is foreseen as faster curing resins, now in the research stage, enter the market in ink formulations and also in wood coatings. High-energy, soy-containing ink using UV and electron beam could enter the market soon, while water-soluble materials could replace certain acrylics in the more distant future.

CURRENT RESEARCH STATUS

USB has supported Lehigh University in developing soy-based resins for UV/EB curing that are more cost effective than acrylic resins and can be used as part of the new hybrid ink systems or a stand-alone product. In the area of lithographic inks, Cytec has committed to a pilot trial of chemically modified soybean oil in its red pigmented inks. North Dakota State University is evaluating the technical feasibility of adding sucrose to soy/acrylic monomers for improved toughness and higher bio-content in UV-cured inks.

A new project by Niemann and Associates has been recently funded in gravure inks to determine the technical feasibility of using alkali soybean oil and soy oil derivatives so that they can receive the soy seal of approval. Resinall, a major supplier of resins for the gravure ink industry, is running trials in its laboratories.





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OUTLOOK FOR FUTURE USB SUPPORT TO ACHIEVE BROAD MARKET ASSISTANCE

At the 2009 Coatings, Inks, and Solvents Technical Advisory Panel (TAP), a new initiative in biorenewable content for inks was identified. A voluntary labeling program started in 2008 was established by the National Association of Printing Ink Manufacturers for printers to satisfy their customers' need for more biorenewable and sustainable inks. An effort will be made to locate a project with an ink formulator or resin supplier to increase the soy content in printing inks.

PROJECT COVERAGE VERSUS MARKET OPPORTUNITY

Market research has indicated much interest in hybrid inks. These are inks that can be both conventionally and radiation cured, giving great flexibility to the end user. USB is currently supporting a project from Lehigh University and Northampton Community College to explore soy-based resins in this market area. Trade associations, market studies and current TAP members will be studied to insure we optimize any possible opportunities for soybean oil in the printing ink market. The ink industry is still looking for improved economics, faster drying inks and environmental compliance through reduced VOC emissions. In 2007, a UV/EB ink team was formed to commercialize the new chemically modified soy oils in radiant cured ink systems. The team is composed of professionals from Lehigh University, Northampton Community College, retired Sun Chemical research directors and Omni Tech.

ISSUES AFFECTING COMMERCIAL SUCCESS

Key issues remain in the development of rapid-cure resins based on soy offering low VOC emissions (possible water-based) and competitive cost versus petroleum-based products. Benefits are the environmental implications of easier paper recyclability, use of a

renewable resource and the possible advantages of modified soy oil as a unique printing ink raw material.

ABOUT USB

USB is made up of 68 U.S. farmer-directors who oversee the investments of the soybean checkoff, a U.S. soybean research and promotion program, on behalf of all U.S. soybean farmers. Checkoff funds are invested in the areas of animal utilization, human utilization, industrial utilization, industry relations, market access and supply. As stipulated in the Soybean Promotion, Research and Consumer Information Act, USDA's Agricultural Marketing Service has oversight responsibilities for USB and the soybean checkoff.



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