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THE DISCONNECT

Downstream Shortages Trump Petrochemicals Drop

Despite recent improvements, the price of oil to natural gas ratio remains very high, relative to historical values and is a large determinant in whether petrochemical plants produce ethylene from oil or natural gas. Currently, the price of natural gas is at a historic low relative to oil so producers are cracking natural gas. Natural gas cracking (known as light cracking) generates a much lower level of the feedstreams needed to produce adhesive raw materials. This is driving shortages of adhesive raw materials and higher prices. The oil/natural gas price ratio needs to be toward the 8.5 equilibrium for adequate by-product streams. However, it is currently about a 15, which continues to put the by-product supply under pressure and lower raw material prices still elude adhesive manufacturers.

Ethylene Pricing Does Not Ease Supply

Through May, prices were on the rise for petrochemicals ethylene, propylene and benzene. The Flash Crash of May 6 changed all this. Oil prices dropped from mid \$80s to \$70s, natural gas eased and feedstock pricing came down. Through June, ethylene, propylene and benzene pricing has fallen and some petrochemicals are expected to continue falling for the next six months. Unfortunately this has not translated to lower costs for adhesive manufacturers. "Most of the raw material pricing issue is between the petrochemicals and the manufacturers' front door," observed Stephen Willging, H.B. Fuller's Technical Program Manager – Sourcing. "At this point, constrained supply is the key driver in raw materials pricing." (For more information, visit HBFullerStrength.com to view Feedstock Selection – A key to by-product supply)

Adhesive Tape Returns to Traditional Raw Materials

Recent short supplies of water-based acrylic raw materials has prompted the return of the adhesive tape industry to the hot melt adhesive raw material supply pool, which is causing havoc for adhesives manufacturers. Similar to standard hot melts, pressure sensitive tape traditionally relied on block copolymer technology along with oil and tackifying resin. In 2004, major isoprene supply issues forced the rebound of an alternative technology based on acrylate polymers. Water-based acrylate polymers allowed tape manufacturers to avoid the isoprene and butadiene market (both heavy by-products derived from the ethylene cracker) during the past couple of years. It also reduced their dependence on hydrocarbon tackifying resins which are also derived from ethylene by-products streams. This alternative worked well until December 2009 when production interruptions at various acrylate producers suddenly tightened supplies.

According to the recent issue of *Chemical Engineering News*, several other issues such as a reviving economy have converged with production issues in the US and Europe to further reduce the supplies of acrylic acid and its derivatives. This situation has necessitated a return to block copolymer technology and put tape manufacturers back into the market with adhesive manufacturers for raw materials including C-5 tackifying resin. With heavy by-product based C-5 tackifying resins already tight as a result of predominately light cracking in North America and a gradual shift away from heavy feedslates in Europe, the tape manufacturers are filling the gaps by pulling in nontraditional tape tackifying resins such as hydrogenated hydrocarbon resins and rosin-based resins. Shortages are driving upward pricing pressure. Since late 2009, the rosin price in China is up 100% although the current harvest is alleviating shortages and prices are falling in response. However, this drop has been tempered by China's recent announcements on tax credits and weather related delays in the gum rosin harvest. ■

Tape is a new source of demand, further straining by-product supply

- Adhesives raw material prices continue to rise on tight supply
- Tape manufacturers return to blocked copolymers
- Available alternatives ease supply issues

Product Spotlight



LiquiLoc® Adhesives Offer Alternative for Labeling

With casein prices volatile due to supply

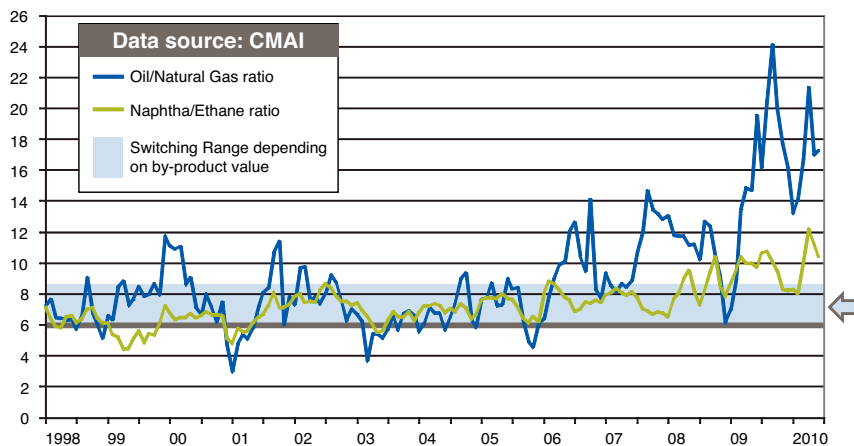
fluctuations, many customers are searching for alternative cold glue labeling adhesives options. H.B. Fuller's synthetic cold glue **LiquiLoc**® Container Labeling Adhesives offer breakthrough performance and greater assurance of supply compared to traditional casein-based labeling adhesives.

With proprietary H.B. Fuller polymer technology, LiquiLoc adhesives feature a unique combination of robust adhesion and high wet tack in addition to excellent machining and application characteristics. Additionally, LiquiLoc adhesives offer high mileage due to aggressive bonding and mileage improvements — 30% improvement for LiquiLoc versus casein adhesives have been demonstrated. ■

Contact your **H.B. Fuller** representative for more information.

Light Cracking Trend Supports a Supplier Market

Cracking crude oil heavy feedstocks produces nearly 3-4 times the relative amount of by-products used by suppliers of raw materials to the adhesive manufacturers compared with cracking natural gas light feeds. During the past twelve years, there have been short periods of light feedstock cracking alternating with heavy feeds cracking. With Europe and Asia using 100% heavy feeds, the supply of raw materials for North American manufacturers was stable as European and Asian exports provided relief supplies during light cracking periods. This changed two years ago when historically high oil prices kept light feedstock cracking more attractive for North American ethylene producers. As Europe continues to shift from 100% heavy feedstock cracking, by-products traditionally used by adhesives manufacturers are increasingly in short supply.



Production interruptions around the world have tightened adhesive raw material supply during the past six months. Additionally, both refineries and petrochemical producers have taken capacity offline during this economic cycle further contributing to tight supplies. "Capacity will come back online but in a controlled manner," said Willging. "In the foreseeable future, it will be a supplier market. H.B. Fuller's dedicated sourcing and technical groups continue to focus on alternative supplies and exploring innovative new products utilizing materials, we believe to have a more secure supply future." ■

Adipic Acid Constrains Reactives

Similar to water-based and hot melt adhesives, reactive adhesives are experiencing pricing and supply issues. Adipic Acid is a feedstock for polyester polyols used in the polyurethane area, which is very tight particularly in Europe due to production closures in 2009. This tight supply is in turn affecting the supply for North America. This situation will be explored further in future Raw Material Reports. ■

Weather Watch

While the Gulf oil spill is causing many serious issues, immediate supply issues are not among them. The strong demand for surfactants to break up the oil on the Gulf's surface water however, is tightening the ethylene oxide market. Derived from ethylene oxide, the same feedstock used for antifreeze and polyester resin, ethoxylated surfactants are used to stabilize some water-based products. Demand is increasing at a time when alternative raw materials such as Malaysian palm oil are in reduced supply due to the drought caused by last year's El Niño.



According to the National Weather Service's Climate Prediction Center, El Niño dissipated during May and conditions are favorable for a transition to La Niña conditions during June – August 2010. This prediction is supported by recent observations that show cooling trends in the Pacific Ocean. The emergence of La Niña is expected to bring an active 2010 Atlantic hurricane season, increasing supply concerns, and a cooler winter in North America, potentially spurring greater natural gas demand. ■

This report is published by H.B. Fuller based on industry knowledge and opinions, in-house research and publicly available news sources. While we believe it to be accurate when published, no guarantee of accuracy is made.

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