

# Surfactant Developments

*A quarterly newsletter covering primary surfactants*

*Sample*



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Note: This sample issue is a compilation of materials from several issues.

## End Use and Customer News

### Procter & Gamble Cleaning House

"We are going to sort through our smaller brands. We are going to divest the ones that don't have a strategic role or cannot deliver strategic growth or financial performance," announced P&G CEO A.G. Lafley during and investors' call last week. Which brands will face the block? Following the expulsion of Jif<sup>®</sup>, Prell<sup>®</sup> and Comet<sup>®</sup>, brands such as Gleem<sup>®</sup>, Ivory<sup>®</sup> and Luvs<sup>®</sup> may follow. Although the list is not yet written in stone, the targeted brands are among those who do not top \$1 billion sales, and show little potential to do so.

While some of our readers may have a sentimental attachment to some of the departing brands, P&G does not. Not even to Ivory<sup>®</sup> which started the company in 1879. Ivory<sup>®</sup>, which has bar soaps, detergents and dishwashing liquids, is being outperformed in all categories. Dial<sup>®</sup> is the top-selling bar soap, Tide<sup>®</sup> is a billion-dollar seller in the detergent department and Dawn<sup>®</sup> is the frontrunner in dishwashing liquids.

Some of the products might be acquired by companies that specialize in reviving heritage brands. An example is Lornamead Brands, based in the UK, which purchased Finesse<sup>®</sup> and Aqua Net<sup>®</sup> from Unilever this month. Prestige Brands in Irvington, NY has some former P&G products such as Comet<sup>®</sup>, Chloraseptic<sup>®</sup> and Prell<sup>®</sup>.

### P&G and Southeast Asia and Hong Kong to Benefit from Colgate-Palmolive

P&G has completed an agreement to transfer several Colgate-Palmolive laundry detergent brands in Southeast Asia and Hong Kong. Fab<sup>®</sup>, Trojan<sup>®</sup> and Dynamo<sup>®</sup> will be added to the existing brand portfolio maintained by Ben Foods, P&G's exclusive distributor in Brunei. "This deal is fully in line with our strategy to focus on and build on our fabric care business. It will strengthen P&G's portfolio and presence in the Southeast Asia region and provide better value and more choices for our customers," claims Deb Henretta, President of Asean/India/Australasia region.

### P&G Innovation Updates

Tide with Downy<sup>®</sup>, Tide with Febreze<sup>®</sup> and Tide Coldwater<sup>®</sup> were launched a year ago and are still building market share; Olay Regenerist<sup>®</sup> was launched in 2003, grew four percent over a two-year period and continues to grow; Olay Definitely<sup>®</sup>, an anti-aging product will be ready to ship in July; in hair care there is a new Head and Shoulders<sup>®</sup> formula in the works and a re-launch for Herbel Essence<sup>®</sup>.

### Kao Makes Laundry in Japan More Convenient

In June, 2006, Kao will satisfy the wishes of 60 percent of homemakers surveyed who wanted detergents to have other functions such as bleaching, deodorizing, softening and disinfecting instead of just basic cleaning. Attack ALL<sup>®</sup> is the innovative product that meets the needs of consumer trends in easy-to-use products.

### Cryotec Anlagebau AG Welcomes Back Two Engineers

Rene Braeunlich and Thomas Nitschke were happy to be back on German soil after their 99-day hostage ordeal in Iraq. They had been on their way to work at the Iraqi-government owned LAB plant in Beiji, 155 miles north of Bagdad. CAHA joins the many well-wishers who expressed joy and relief at the news of the men's release.

### Wal-Mart Defines Retail in America

So states Frederick A. Crawford, managing director at the corporate advisory firm, AlixPartners. AlixPartners' 2006 Consumer Sentiment Index shows Wal-Mart as the country's most popular discount store, favorite grocery store, No. 2 convenience chain and No. 3 among do-it-yourself stores and electronics retailers. Furthermore, Wal-Mart ranks among the top five drug stores, office suppliers, sports retailers, book stores, clothing and department stores. Having penetrated the American consumer psychology in a big way, Wal-Mart will continue to wield tremendous leverage with its vendors.

### Chinese Households Save Less but Don't Relieve the Trade Imbalance

The new urban middle class in China enjoys spending money. Much of their family incomes are spent on basic, domestic necessities such as education, housing and health care. While sales of U.S. brands are strong in China, most of the products are actually made there, too, such as P&G's Safeguard<sup>®</sup> soap and Head & Shoulders<sup>®</sup> shampoo. China is one of P&G's top five global markets, but is fairly self-contained. Irwin Lee, P&G's VP for Greater China says "We do not export a lot and don't import a lot." The result is that the 49,000 American companies operating in China will see the benefit of the spending trend on their bottom line, trade flows will remain largely unaffected.

## Surfactant Producer News

### Air Products has Purchased Tomah Products

Air Products announced that it purchased Tomah Products in Milton, WI for approximately \$115 million in cash on March 31. Tomah had sales of \$73 million in 2005. The company produces specialty surfactants and processing aids for the institutional and industrial cleaning, mining and oilfield industries, among others. This privately held company has production facilities in Milton and Reserve, LA. The Milton plant produces amine-based surfactants, while the Reserve facility produces alcohol ethoxylate surfactants.

Air Products is restructuring its chemicals operations to become more focused, less cyclical, and to achieve higher growth. It is restructuring or divesting business units that amounted to \$1.25 billion of 2005 sales. These include the DNT plant sold to BASF, the sale of its polyurethane intermediates business and the polymer emulsions business which had 2005 sales of \$500 million and is in the process of being sold. The company also has plans to enter the personal care segment and specialty ingredients market through a licensing and development contract with Landec Corporation. Air Products intends to focus on ingredients for skin care, hair care, and color cosmetics.

### Oil Prices Worsen Global Imbalances

Growing global imbalances are being exacerbated by continued high oil prices says the IMF. The IMF forecasts strong global growth at 4.9 percent for this year in the latest *World Economic Outlook* (WEO), which is 0.6 percent higher than the WEO's projection in September 2005. The IMF forecasts that 2007 prices will rise to \$63/bbl, although it has revised its 2006 projection down slightly to \$61.25/bbl from September's projection \$61.75/bbl.

Downside risks are increasing. The IMF is calling for measures to prevent an abrupt economic adjustment and recession. Countries with large current account deficits must curb demand and increase savings. Countries with current account surpluses, primarily oil exporters and Asian nations, need to step up investments. Oil exporters are under continuing pressure to spend windfall oil profits to keep the global economy balanced. The IMF recommends spending to spur household demand, diversified economies and job opportunities. Money should also be spent on energy production adds IMF, pointing to IEA estimates that oil sector investments are probably 20 percent below what is needed to meet projected demand over the medium to long term. The low level of excess capacity and the low

level of investment reflect tight fundamentals in the oil market. This leads to continued high oil prices but there is a lot of uncertainty. Geopolitical concerns are pushing oil prices to new highs surpassing the prices recorded after the Gulf Coast hurricanes. Tensions over Iran's nuclear ambitions, Iraqi insurgency and production cuts in Nigeria are not showing any signs of lessening. The WEO warned that with prices increasingly being driven by supply side concerns, the adverse impact is likely to be greater than in the recent past, especially if feed-through to core inflation increases.

The IMF GDP Growth forecasts are presented in the following table.

IMF GDP GROWTH FORECASTS					
Region	April 2006 WEO %			±September 2005 WEO % points	
	2005	2006	2007	2006	2007
World	4.8	4.9	4.7	0.6	0.3
U.S.	3.5	3.4	3.3	0.2	-0.3
Euro area	1.3	2.0	1.9	0.2	-0.3
UK	1.8	2.5	2.7	0.3	-0.1
China	9.9	9.5	9.0	1.3	1.0
India	8.3	7.3	7.0	1.0	0.5
Japan	2.7	2.8	2.1	0.8	0.5
Middle East	5.9	5.7	5.4	0.6	0.6
Oil \$/bbl	53.35	61.25	63.00	-0.50	n.a.

### Dow Chemical to Scale Back West Virginia Operations

Dow Chemical said that it will discontinue a services agreement at its South Charleston, VA plant with Bayer effective April 1, 2009. This could result in the elimination of 230 to 330 Dow employees at the site. Dow says that its biocides business will relocate a vinyl methyl ether facility from South Charleston to its St. Charles plant in Hahnville, LA. A change in the manufacturing activity in South Charleston that has reduced employment from 2,200 at the end of 2002 to currently about 913 is the reason for discontinuing the services contract.

Dow Chemical will continue to produce its Triton surfactants and Ucon fluids and lubricants at South Charleston as the specialty business supports the smaller manufacturing center to improve its competitiveness and enhance value to its customer base.

### **Shell to Raise Its Output of Higher Olefins**

Shell Chemicals will increase the production of higher olefins at its Stanlow, UK plant by eight to ten percent next year, in response to tight market conditions. The 330,000 tons per year plant will be debottle-necked during a planned 35-day turnaround in the middle of next year. The closure of BP's plant in Pasadena last year has created a shortage in the market that is likely to continue for several years. The market shortage was also impacted by an unexpected rise in the demand for hexene. Demand has been strong from the paper sizing and additive sectors but increased competition in the detergents sector has negatively impacted demand. The oleochemicals industry has yet to see the impact of competition from biodiesel but the demand for alpha-olefins is still growing.

### **Bidders Line Up for Cognis**

Reports say the BASF, Croda and private equity firms Apollo Management, Bain Capital, BC Partners, Blackstone and CVC Capital Partners are interested in Cognis. Cognis's private equity owners, Goldman Sachs Capital Partners and Permira, recently put it up for sale. Analysts expect the sales to raise about €2.6 billion (US\$3.1 billion).

### **Cognis to Form Another JV in Thailand**

Cognis Thai (a wholly owned subsidiary of Cognis) and Thai Oleochemicals (TOL) (a subsidiary of PTT Chemical) will form a 50-50 joint venture to produce fatty alcohols. The JV, Thai Fatty Alcohols, will build a 100,000 million tons/year plant at Rayong, Thailand, with completion scheduled for early 2008. Thai Fatty Alcohols will be the first producer of refined fatty alcohols in Thailand, and will make Cognis the only company in Thailand with access to its own ethoxylation, hydrogenation, and sulfation capacities.

Cognis Thai and TOL already operate an ethoxylates JV in Rayong.

### **Huntsman's Port Arthur Light Olefins Unit Damaged by Fire**

Huntsman's Port Arthur, TX plant which makes up about 30 percent of the company's global ethylene capacity was heavily damaged by fire on April 29. The fire, which started in the propylene refrigeration unit, was difficult to contain and was still burning in the middle of the next week. None of the 50 employees at this facility were hurt and all of the Huntsman plants nearby remain operational. This plant which has capacity for 635,000 tons per year of ethylene, 363,000 tons per year of propylene, 308,000 tons per year of cyclohexane and 209,000 tons of benzene per year will be closed for several months. Huntsman has already announced plans to rebuild the Port Arthur plant. It has also declared a "force majeure" on ethylene and propylene production and for all grades of ethylene glycol, diethylene glycol and triethylene glycol. Huntsman does not expect that this fire will significantly impact previously announced plans to spin off its commodity chemicals business.

According to analysts, an extended outage of this duration could be the catalyst for an ethylene demand rebound, adding momentum to the emerging recovery of the ethylene derivatives demand. Ethylene demand and prices have firmed in recent weeks due to the surge in feedstock prices, production problems at Chevron Phillips' Sweeny, TX plant and increased downstream demand. Prior to the fire, ethylene prices were down to 45.5¢/lb but ethylene producers have announced a price increase of 2¢ to 4¢/lb for May contracts.

Nova was forced to temporarily idle its 1.7 billion pounds per year styrene plant in Bayport because of the Huntsman outage. The Huntsman plant accounts for the majority of the ethylene supply for the styrene unit. Nova's Bayport plant accounts for 11 percent of the North American styrene capacity. Nova has been able to increase the styrene production at its plant in Sarnia, ON and expects to be able to supply its styrene and styrenic polymers customers from this plant as well as through other supply arrangements.

## Financial Results

Note: Unless otherwise noted, results are for the fiscal year 2013 and percent changes are from the 2012 and 2013 fiscal years.

**BASF** - FY2013 Sales +2.6% to €73,973 million, EBITDA €10,427 million. Sales for the Performance Products division decreased 1.1 percent to €15,534 million. This was a result of negative currency effects and cheaper prices due to lower raw materials costs. EBITDA for the division fell 4.9 percent to €1,987 million. Care Chemicals sales made up 31 percent of the division and decreased 0.6 percent to €4,871 million. Care Chemicals had a 5 percent increase in volume, 3 percent decrease in prices, and a 3 percent loss due to negative currency exchange.

**Church & Dwight** - FY2013 Sales +9.3% to \$3,194 million. Organic sales grew 1.9 percent, with a 3.8 percent increase in volume despite a 1.9 percent decrease in prices. Household Products sales increased 1.8 percent to \$1,436 million. Personal Care sales increased 31.1 percent to \$977.4 million.

**Clariant** - FY2013 Sales +1% to CHF 6.08 billion, EBITDA +5% to CHF 858 million. In January 2014, Clariant completed the sale of its Detergents & Intermediates Unit. Sales for discontinued operations were CHF 142 million. The Care Chemicals division accounted for 41 percent of total sales and increased 5 percent to CHF 1,561 million.

**Henkel** - FY2013 Sales -1% to €16,355 million, EBIT +4% to €2,285 million. 44 percent of sales were in emerging markets (East Europe, Africa/Middle East, Latin America, and Asia excluding Japan), while 34 percent of sales were from Western Europe, and 18 percent from North America. Laundry & Home Care made up 28 percent of sales, a 0.5 percent increase to €4,580 million, representing an organic sales growth of 5.7 percent. Negative currency effects included in the sector's total sales are not included in the reported organic sales growth figure. EBIT for the division increased 9.7 percent to €682 million. Care made up 21 percent of total sales, of which there was a 0.9 percent decrease to €3,510 million. Organic sales for the division increased 3 percent.

**Huntsman** - FY2013 Revenue -1% to \$11,079 million, EBITDA -25% to \$889 million. In the Performance Products segment, revenues fell 2 percent to \$3,019 million, while adjusted EBITDA increased 9 percent to \$403 million. The decrease in revenue was partly due to reduced prices because of lower raw material costs.

**Procter & Gamble** - 2Q 2014 Net Sales +0.5% to \$22.3 billion. Organic sales increased 3 percent. Fabric Care and Home Care net sales increased 1 percent to \$6,851 million. The division's organic sales increased 4 percent due to market expansion in developing regions.

**Unilever** - FY2013 Turnover -3% to €49.8 billion, Operating Profit +8% to €7.5 billion. Underlying sales grew 4.3 percent, with a 2.5 percent increase in volume and a 1.8 percent increase in prices. In Personal Care, turnover remained unchanged at €18.1 billion, with an underlying sale growth of 7.3 percent and an underlying volume growth of 5.5 percent. Home Care turnover fell 2 percent to €13.4 billion due largely to exchange rate effects. Underlying sales grew 8 percent, while volumes increased 5.7 percent. Prices were up 2.1 percent.

**Stepan** - FY2013 Net Sales +4% to \$1.9 billion, Net Income -8% to \$72.8 million. Sales in the Surfactant division increased 1 percent to \$1.32 billion. Surfactant sales in North America were the largest contributor to the company's decline in net income, claiming it was the effects from higher raw material and maintenance costs and a one-time \$9 million expenditure for specialty surfactant growth.

## Prices

Note: The following table presents current intermediate and surfactant prices. These prices are considered to be representative but some transactions might take place outside the ranges reported in this table. All prices, unless otherwise noted, are in U.S. dollars or euros, metric tons and have been converted 100 percent active.

WORLD INTERMEDIATES AND SURFACTANTS PRICING, MAY 2006					
	Grade	North America <sup>a</sup> US\$	West Europe		Asia <sup>b</sup> US\$
			Euro	US\$	
<b>INTERMEDIATES</b>					
LAB		\$ /ton	€ /ton	\$ /ton	\$ /ton
<b>SURFACTANTS</b>					
LABS Acid		\$ /lb	€ /ton	\$ /ton	\$ /ton
AE	2 mole	\$ /lb	€ /ton	\$ /ton	\$ /ton
AE	7 mole	\$ /lb	€ /ton	\$ /ton	\$ /ton
AES	70%	\$ /lb	€ /ton	\$ /ton	\$ /ton
AS	30%	\$ /lb	€ /ton	\$ /ton	---
NPE	9 mole	\$ /lb	€ /ton	\$ /ton	\$ /ton
Currency rates as of May 15, 2006: \$1 = €0.7739; €1 = \$1.2922					

Continued high and fluctuating oil prices are still hot topics for discussion. Crude oil prices hit new highs in the low to mid\$70/bbl range in late April only to back off into the high\$60/bbl range and then advance into the \$70+/bbl range. It has been mentioned repeatedly that continued high and fluctuating oil prices would, at some point, impact the World GNP growth. It has been believed that prices continuing over \$70/bbl would slow global economic growth and lead to inflation; some minor signs of lower GDP growth are now being seen.

The main culprit in keeping oil prices high is the geopolitical risk of supply interruption from Iran, Nigeria and South America. Iran is proceeding with plans to continue its nuclear enrichment program. If this issue is referred to the U.N. Security council and sanctions are applied, then Iran could use its oil production as a political weapon. The prospect of the world's fifth largest oil producer in a major confrontation is helping to keep prices high. Rebels continue their attack on oil facilities in Nigeria. These actions have already reduced oil production by over 500,000 bb/day. It is reported

that more attacks are planned. Now additional factions have also begun to attack oil facilities and kidnap foreign workers. In South America, government unrest continues as Venezuela and Bolivia move to take more control/ownership of oil leases. The increased insurgent attacks in Iraq are also hot spots where oil production and distribution is in danger of being interrupted. These forces, coupled with the prospect of damage to the Gulf Coast oil production, product distribution and refineries, are keeping many traders worried about future supplies of crude oil. It has been speculated that the big investment funds, chasing high returns in a relatively low global interest rate environment, have invested heavily in commodities and have helped fuel their rise. Also looming on the horizon is the upcoming Atlantic hurricane season which starts on June 1.

Huntman's fire at its Port Arthur, TX cracker is having an immediate impact on surfactant prices. Its light olefin unit in Port Arthur has a production capacity of 635,000 tons of ethylene (30 percent of its global capacity), 363,000 tons of propylene, 308,000 tons of cyclohexane

and 209,000 tons of benzene. The damage to the plant is extensive and is expected to be down for three to six months. Ethylene prices that had been weakening due to falling costs and increased downstream demand saw an increase in U.S. spot market price offerings by about 5¢/lb. The impact of this fire caused the European benzene market to increase by about \$45 /ton over the close on May 12. Significant increases are also being seen in the spot market prices for toluene, propylene, acronitrile, and other ethylene derivative products. It is expected that once the extent of the damage is determined and an estimate established of the time to repair the plant, price increases will be seen in the ethylene and derivative contract prices. However, producers do not want to underestimate the long term impact on ethylene prices. An additional factor is the BASF/Total ethylene refinery is undergoing a maintenance shut down but it is expected to be on stream shortly. This will relieve some pressure on ethylene availability in the Gulf Coast.

## INTERMEDIATES

### Linear Alkylbenzene (LAB)

In North America increased on April 1, taking back the January 1 decline of 2¢/lb and are now █¢ to █¢/lb or \$█ to \$█/ton. Huntsman has announced a 4¢/lb price increase for all grades of alkylates – linear alkylbenzene and co-products – effective July 1, 2006 or as contracts allow.

In Europe, prices for LAB were increased €20-€30/ton and are now in the €█ to €█/ton range.

Asian LAB prices are reported to be in the range of \$█ to \$█/ton having been increased \$30/ton on April 1.

## SURFACTANTS

### Linear Alkylbenzene Sulfonate (LABS)

Prices in North America have remained in the █¢ to █¢/lb range. The market is very competitive and producers are maintaining current price levels to keep market shares.

European LABS prices have increased €15 to €20/ton in response to the recent increase in LAB costs. Current prices are in the range of €█ to €█/ton.

LABS prices in Asian are reported to be in the range of \$█/ton, marginally down from May.

### Alcohol Ethoxylate

Prices in North America have seen some minor changes. AE-2 prices have declined slightly and are now expected to be in the range of █¢ to █¢/lb. AE-7 prices remained at current levels of █¢ to █¢/lb. This slight decline was in response to the early April dip in ethylene raw material costs. This price does not reflect on increase in spot ethylene prices as a result of the fire at Huntsman.

European AE-2 prices are reported to be in the range of €█ to €█/ton and reflect the increased cost of EO. AE-7 prices are reported to be in the range of €1200/ton.

Asian AE-2 prices are believed to be \$█ to \$█/ton. AE-7 prices are reported to be about \$█0 to \$█/ton.

### Alcohol Ethoxysulfate (AES)

Prices in North America are continuing to hold at previous levels of █¢ to █¢/lb for 70 percent active materials or \$█ to \$█/lb on a 100 percent active basis.

AES prices in Europe remain unchanged at €█0 to €840/ton for 70 percent product or €█ to €█ for the 100 percent active material.

AES prices in Asia for 70 percent active material is reported to be (as-is) in the \$█ to \$█/ton range or \$█ to \$█/ton on a 100 percent basis.

### Alcohol Sulfates (AS)

Prices in North America are holding at previous levels, █¢ to █¢/lb for 30 percent product or \$█ to \$█/lb for 100 percent active material.

European AS prices are believed to have remained at €█ to €█/ton for 30 percent active product or \$█ to \$█/ton for 100 percent active material.

### Nonylphenol Ethoxylate (NPE)

Off list (contract) prices in North America declined 5¢/lb and are now █¢ to █¢/lb. This decline was caused by some of the producers, impacted by the Gulf Coast hurricanes, trying to regain market share. Another impact was Russian imports into North America.

NPE prices in Europe are believed to be in the range of €█ to €█/ton.

Asian NPE prices are reported to be about \$█ to \$█/ton, up slightly in a strong market.

## Technology Review

**Synthesis and Solution Properties of Nonionic Hybrid Surfactants with a Benzene Ring.** Miyazawa, Haruhiko; Wakatsuki, Yutaka; Kondo, Yukishige; Yoshino, Norio (Department of Industrial Chemistry, Faculty of Engineering, Tokyo University of Science, Tokyo, Japan 162-8601). *Journal of Oleo Science* 2005, 54(6), 361-368 (Eng), Japan Oil Chemists' Society. Four nonionic hybrid surfactants, C<sub>6</sub>F<sub>13</sub>C<sub>6</sub>H<sub>4</sub>CH[O(C<sub>2</sub>H<sub>4</sub>O)<sub>m</sub>H]C<sub>5</sub>H<sub>11</sub> [where m=4,6,8,10,14 and {C<sub>6</sub>H<sub>4</sub> phenylene}], with a benzene ring as a spacer were synthesized. The new materials are stable and only slightly hydrolyzable with low surface tension. The surfactant reduced the cloud point of salt solutions.

**Phosphated Alkanol, its Use as a Hydrotrope and Cleaning Composition Containing the Compound.** Company, Mahnaz; Franck, Magnus; Thyberg, Anette (Akzo Nobel N.V., Neth.) PCT Int. Appl. WO 2006 5,721 (Cl. C11D3/36), 19 Jan 2006, US Appl. 2004/PV608,167, 8 Sep 2004; 27 pp. (Eng). This patent teaches the use of phosphated 2-propylheptanol or the alkoxylate as a hydrotrope in aqueous alkaline solutions of C<sub>8</sub>-C<sub>18</sub> alcohol alkoxylate containing 1-20 EO units. The products may be used for industrial cleaning of hard surfaces, for example for vehicle cleaning or machine dishwashing.

**Alkaline Earth-based Alkoxylation Catalysts.** Smith, George A.; O'Neill, James; Sneed, George; Whewell, Christopher J. (Huntsman Petrochemical Corporation, USA) PCT Int. Appl. WO 2006 25,898 (Cl. B01J31/00), 9 Mar 2006, US Appl. 2004/PV604,656, 26 Aug 2004; 22 pp. (Eng). The patent provided herein reviews catalysts useful in enabling and promoting the insertion of alkylene oxides into ester linkages. The esters employed as a substrate to be alkoxyated include esters of fatty acids, such as Me esters of C<sub>14</sub>-C<sub>22</sub> fatty acids, and mono-, di-, and triesters of glycerin, including vegetable oils, animal fats, and plant oils. A catalyst includes at least two alkaline earth compounds, which may include any known stable compounds of the alkaline earths, and optionally contains one or more additional materials such as a carboxylic acid or a polyalkylene glycol having a molecular wt. between about 100 and 1500 or a C<sub>1</sub> - C<sub>10</sub> alkyl-capped polyalkylene glycol having molecular wt. between about 100 and 1500, which has been acidified with a strong mineral acid. The preferred alkaline earths employed are salts and compounds of magnesium and calcium.

**Sorbitan Ester-containing Aqueous Cleaning Compositions for Complex Profile Tiles and Plates.** Mueller, Felix; Peggau, Joerg (Goldschmidt G.m.b.H., Germany) Eur. Pat. Appl. EP 1,619,237 (Cl. C11D1/94), 25 Jan 2006, DE Appl. 1,004,036,067, 24 Jul 2004; 15 pp. (Ger). The title compound is especially useful as a floor

cleaner formulated with nonionic, anionic and amphoteric surfactants also a sorbitan ester with optionally substituted and optionally containing heteroatom C<sub>6</sub>-C<sub>22</sub> acyl, R<sub>1</sub> and R<sub>2</sub> = H or R, alkylene = ethylene, l-propylene or butylene groups, a, b and c = 0 - 25 and a + b + c = 0 - 25).

**Synthesis of New Extended Surfactants Containing a Xylitol Polar Group.** Fernandez, Alvaro; Scorzza, Cesar; Usubillaga, Alfredo; Salager, Jean-Louis (Research Institute, Pharmacy College, University of The Andes, Merida, Venez. 5101). *Journal of Surfactants and Detergents* 2005, 8(2), 193-198 (Eng), AOCs Press. A new class of extended surfactants was prepared in which the spacer arm between the polar portion and the hydrophobic alkyl chain was a polymer of propylene glycol with an av. length of six propylene oxide units. The polar head was a single or double xylitol moiety or a xylitol mol. with carboxylic acid functionality. Surfactants containing double xylitol polar head groups showed a much higher critical micelle concentration value than surfactants with a single polar head.

**Alkyl Toluene Sulfonate Detergent, Catalysts, Cleaning Compositions Taking Different Forms, and Cleaning Various Surfaces.** Smith, George A.; Anantaneni, Prakasa R.; Ashrawi, Samir S.; Smadi, Raeda M. (Huntsman Petrochemical Corporation, USA) U.S. US6,995,127 (Cl. 510-352; C11D17/00), 7 Feb 2006, US Appl. 2000/PV227,795, 25 Aug 2000; 40 pp., Cont.-in-part of U.S. Ser. No. 616,568. (Eng). the sulfonated alkyltoluenes have a higher content of the sulfonated 2-Phenyl alkyltoluene isomers than was previously available in sulfonated alkyltoluene surfactants of the prior art. Cleaning compounds are more effective as cleaning agents over their counterparts which contain sulfonated alkyltoluenes having lower contents of the 2-phenyl alkyltoluene isomers, owing to an unexpected increase in tolerance of H<sub>2</sub>O hardness minerals normally associated with precipitation of the active detergent agent. Solid sulfonate salts of alkyltoluenes are also provided, including dry cleaning formulations containing same. The alkyltoluenes may be combined with alkylbenzene surfactants to provide detergent blends having increased H<sub>2</sub>O hardness tolerance, lower Krafft temp., and increased cleaning performance.

**Synthesis and Properties of Gemini Cationic Surfactants with Amide Spacers.** Deng, Qi-gang; Yu, Hong-wei; Lin, Hong; Jia, Li-hua; Guo, Xiang-feng; Zhou, De-rui (Department of Applied Chemistry, Harbin Institute of Technology, Harbin, Peop. Rep. China 150001). *Chemical Research in Chinese Universities* 2005, 21(3), 337-339 (Eng), Higher Education Press. Four gemini cationic surfactants {N,N'-di[2-(lauryldimethylamino) acetyl]polymethylenediamine dichloride, LAA-s-LAA,



s = 2, 3, 4, 6} were synthesized by using four bis(alpha-chloroacetamide)s and N,N-dimethylaurylamine, respectively. Changing the length of the spacer chain changes the CMC value.

**Method for Preparing Light Color Transparent Alkyl Glycoside from Glucose and Fatty Alcohol.** Yang, Xiuquan; Zhang, Jian; Yang, Qingli; Wang, Jun; Hao, Xu; Li, Qiuxiao; Dong, Wantian; Cheng, Yumei (China Research Institute of Daily Chemical Industry, Peop. Rep. China) Faming Zhuanli Shenqing Gongkai Shuomingshu CN 1,634,949 (Cl. C07H15/02), 6 Jul 2005, Appl. 10,064,505, 18 Oct 2004; 8 pp. (Ch). Alkyl glycoside surfactant is prepared in steps: 1. glycosylating glucose with C8-18 fatty alcohol at a molar ratio of 1:(3-6) in inert gas in the presence of an acid catalyst at 100-130° and 10-30 mmHg for 3-4 hours, neutralizing at 80-90° to pH 8-9; 2. Vacuum distilling at 130-180° to recover free fatty alcohol; 3. Removing color with 30-50% H<sub>2</sub>O<sub>2</sub> in 50-70% alkaline solution, and 4. Fine filtering at 60-90° and 0.2-0.6 MPa. The acid catalyst may be p-toluenesulfonic acid, dodecylbenzenesulfonic acid, EDTA, H<sub>2</sub>SO<sub>4</sub>, HCl, etc.

**Synthesis and Surface Activities of Sodium Oleoyl Amido Diphenyl Ether Disulfonate.** Hu, Jianli; Li, Gang (Department of Chemistry, Zhengzhou University, Zhengzhou, Henan, Peop. Rep. China 450052). *Jingxi Huagong* 2005, 22(5), 345-347 (Ch), Jingxi Huagong Bianjibu. A new gemini surfactant, sodium oleoylamidodiphenyl ether disulfonate was synthesized from p-nitrodiphenylether oleoyl choride and chlorosulfonic acid through nitro-group reduction, acylation and sulfonation. The gemini surfactant has excellent surface activities and lower CMC (2.14 mmol/L) than that of sodium dodecylbenzenesulfonate, and can efficiently lower the surface tension of a water solution to 34 mN/m.

**New Oligomeric Surfactants with Multiple-ring Spacers: Synthesis and Tensioactive Properties.** Murguia, Marcelo C.; Cabrera, Maria I.; Guastavino, Javier F.; Grau, Ricardo J. (Laboratorio de Quimica Fina., Instituto de Desarrollo Tecnologico para la Industria Quimica-INTEC, Universidad Nacional del Litoral (UNL) and Consejo Nacional de Investigaciones Cientificas y Tecnicas (CONICET), 3000 Santa Fe, Argent.). *Colloids and Surfaces, A: Physicochemical and Engineering Aspects* 2005, 262(1-3), 1-7 (Eng), Elsevier B.V. New anionic tetrameric surfactants with different spacing architecture based on dioxane rings were synthesized, and their surface-active properties were studied. The synthesis of these compds. involves a 3-step procedure comprising tetraglycidyl ethers as key intermediates for connecting 4 amphiphilic moieties.

The ability of these compds. to lower surface tension is good, but the high relative propensity to form aggregates is their distinctive feature. This ability of aggregation is favored as the no. of dioxane rings in the spacer group increases and the spacer group is less flexible.

**Amphoteric Polysaccharide Compounds Containing Aldehyde Function(s), Comprising Them and Cosmetic Use Thereof.** Philippe, Michel (L'Oreal, Fr.) PCT Int. Appl. WO 2006 18,324 (Cl. C08B15/06), 23 Feb 2006, US Appl. 2004/PV612,177, 23 Sep 2004; 25 pp. (Eng). The present invention relates to novel amphoteric polysaccharide compounds containing aldehyde function(s) corresponding to the formula P-(O-(Y))<sub>p</sub>-CAT<sub>m</sub> in which: P represents a polysaccharide chain. The polysaccharides are useful for cosmetic compounds such as hair conditioning agents and shampoo with good lathering and softness. Thus, reacting oxidized starch with 2,3-epoxypropyltrimethylammonium chloride gave a cationized compound.

**Production of Quarternary Ammonium Compounds at Atmospheric Pressure.** Szarvas, Laszlo; Massonne, Klemens; Reidl, Silke; Saas, Walter; Rueb, Lothar; Kober, Reiner; Erhart, Bertold; Kudis, Steffen (BASF Aktiengesellschaft, Germany) PCT Int. Appl. WO 2006 18,249 (Cl. C07D295/02), 23 Feb 2006, DE Appl. 1,004,039,418, 13 Aug 2004; 34 pp. (Ger). A new patented process claimed to be simple and economical and yields products free from undesirable anions and amines.

**Synthesis and Characterization of Gemini Phosphate Surfactant.** Qiu, Feng; Chen, Ye-pu (Department of Chemistry, Shanghai University, Shanghai, Peop. Rep. China 200436). *Hecheng Huaxue* 2005, 13(3), 280-281 (Ch), Hecheng Huaxue Bianjibu. Two novel gemini phosphate surfactants were synthesized by esterification and hydrolysis of phosphorus oxychloride and alcohol.

**Polyoxyalkylene Amine Surfactants and Detergent Compositions Containing Them.** Asano, Hotaka; Tamura, Masaru (Lion Corp., Japan) Jpn. Kokai Tokkyo Koho JP 2006 63,273 (Cl. C11D1/44), 9 Mar 2006, Appl. 2004/250,296, 30 Aug 2004; 11 pp. (Japan). The surfactants contain R<sub>1</sub>N[(AO)<sub>p</sub>H][(AO)<sub>q</sub>H] (R<sub>1</sub> = C<sub>10</sub>-22 linear or branched alkyl, alkenyl; A = C<sub>2</sub>-3 alkylene; p, q = molar no. of av. addition, p + q = 35-70) and R<sub>2</sub>N[(AO)<sub>r</sub>H][(AO)<sub>s</sub>H] (R<sub>2</sub> = same as R<sub>1</sub>; A = same as above; r, s = molar no. of av. addn., r + s = 2-35). Thus, a liquid laundry detergent containing 19% ethoxylated octadecylamine (Ethomeen SA 2Y103) and 1% ethoxylated tallow alkyl amine (Ethomeen T 20) showed good detergency against oils on a T-shirts.

## FEATURE: BASF PROFILE

### INTRODUCTION

BASF SE, the world's largest chemical company since 2004, was founded in 1865 in Mannheim, Germany, and built its first manufacturing facilities across the Rhine River in Ludwigshafen, where it is headquartered today. It operates six business segments: Chemicals, Plastics, Performance Products, Functional Solutions, Agricultural Solutions, and Oil & Gas. The Performance Products segment is comprised of five divisions, and surfactants reside primarily within two of them: Care Chemicals and Performance Chemicals. Care Chemicals includes products and technologies for household and personal care products, as well as superabsorbents. Performance Chemicals offers additives and solutions for a range of industries, including fuels and lubricants, oilfield, leather, mining, plastics, textiles and water treatment.

In 2010, BASF SE achieved sales of €63,873 million. On a regional basis, Europe accounted for 55 percent of this total, followed by North America with 21 percent and Asia Pacific with 18 percent. Sales of the Performance Products segment totaled €12,288 million in 2010. Within this segment, the Care Chemicals division had sales of €2,755 million and the Performance Chemicals division had sales of €3,141 million.

Throughout its history, BASF has carried out a number of strategic acquisitions and divestitures, but relatively few of these transactions have involved surfactant businesses. BASF established its surfactant and urethane position in North America with the acquisition of Wyandotte Chemical Co. in 1969. The Pluronic<sup>®</sup> and Tetronic<sup>®</sup> EO-PO surfactant product lines were part of this acquisition. In late 1997, BASF increased its presence in North America by acquiring the surfactant businesses of Olin Chemical and PPG Industries. In 2003, BASF sold its North American-based silicones business to Lubrizol Corp., and its ester and alkoxylates surfactant production site in Gurnee, IL, acquired from PPG, to Petroferm's subsidiary Lambent Technologies, later acquired by Vantage Oleo.

BASF's most significant recent surfactant-related transaction was the 2010 acquisition of Cognis Holding GmbH from Cognis Holding Luxembourg S.a.r.l. controlled by the private equity firms Permira Funds, GS Capital Partners and SV Life Sciences. Cognis, a world leader in specialty chemicals based on renewable resources, was a major global supplier of surfactants, especially anionic alkyl and alkyl ethoxy sulfates, with a strong position in market segments of particular interest to BASF, including personal care, home care, health and nutrition, and functional products. The transaction, valued at €3.1 billion, closed in December 2010.

Over the last year BASF has successfully integrated almost all of the Cognis businesses into its Performance Products segment. The Care Chemicals division was enlarged, combining BASF's personal care, hygiene, home care and formulation technologies businesses with Cognis' personal care and home care businesses. The synthetic lubricants and mining chemicals of Cognis were added to BASF's Performance Chemicals business. In addition, a new division, Nutrition and Health, was created to combine the two companies' various human and animal nutrition, pharma ingredients and services, and aroma chemicals businesses. And formulation additives and resins from Cognis were incorporated into BASF's Dispersions and Pigments division.

The addition of the Cognis businesses is reflected in the 31 percent increase in total sales of the Performance Products segment from 2009 to 2010. EBIT for this segment increased from a loss of €150 million in 2009 to €1,345 in 2010. BASF is targeting an additional EBIT of €275 million from the integration of Cognis, through realizing €140 million in cost synergies by the end of 2013, and growth synergies of €135 million by the end of 2015. By the end of 2012, BASF expects to have created 230 new jobs worldwide, mainly in Care Chemicals, to achieve the growth targets, and to have eliminated 680 positions due to overlaps in administrative areas, resulting in a net reduction of 450 employees. This is a relatively small number, compared to BASF's overall global workforce, which totaled 109,140 at the end of 2010.

BASF places great importance on an integrated site structure, which it terms "Verbund." The Verbund is one of BASF's greatest strengths. The company establishes profitable value-adding chains by linking production plants. By-products from one plant can be used as raw materials in another plant. Linking production plants also saves energy and resources (Energy Verbund). BASF's huge complex in Ludwigshafen, Germany is the largest integrated chemical site in the world owned by one company. In Europe, BASF also has another "Verbund" site in Antwerp; in the United States, Freeport and Geismar are integrated sites. BASF has constructed similar high-efficiency Verbund sites at Kuantan, Malaysia and Nanjing, China. The site in Nanjing, China is a 50:50 joint venture with Sinopec. In addition to the six Verbund sites, BASF operates 380 other production sites worldwide.

## **CORPORATE OVERVIEW**

### **Europe**

Europe remains BASF's stronghold, where the company continues its legacy as the leading chemical company in the region, with sales of €35,156 million. However, the percent of its total sales represented by Europe declined from 60 percent in 2009 to 55 percent in 2010. European sales increased in 2010, but not by as much as in North America and Asia Pacific. With two "Verbund" sites, at Antwerp, Belgium, and Ludwigshafen, Germany, and major production sites in Spain, Italy, the United Kingdom, France, Denmark, Finland and Turkey, BASF has a strong position and looks to maintain its leading edge. BASF employs nearly 70,000 people in Europe, which represents about 64 percent of its global workforce.

### **North America**

BASF Corporation, based in Florham Park, NJ, is a wholly-owned subsidiary of BASF SE. It is the headquarters for the NAFTA region, overseeing all operations, including manufacturing sites, in the U.S., Canada and Mexico. BASF employees in the NAFTA region total around 16,500. The company has two "Verbund" sites, at Geismar, LA and Freeport, TX.

BASF is among the largest producers and marketers of chemicals and related products in North America. Sales in this region increased by 41 percent in 2010 over 2009, to €13,246 million, representing approximately 21 percent of BASF's global sales.

In November 2011, BASF announced that it would close its Washington, NJ site and transfer production and finishing equipment for ethoxylated surfactants and other products to Geismar, LA, one of its two North American Verbund sites, by the end of 2014. Production will continue at Washington until a state-of-the-art facility at Geismar is in full production. BASF currently produces EO and EO derivatives, including ethoxylates, polyols and specialty amines at Geismar.

### **Asia Pacific**

In 2010, BASF's Asia Pacific sales totaled €11,642 million, representing 18 percent of global sales, and its employees in the region totaled nearly 16,000, or 14.6 percent of its global workforce.

BASF's impressive presence in this region began over three decades ago; in addition to marketing its products there, BASF began to establish chemical production joint ventures in the early 1980s. In 1990, it listed its shares on the Tokyo stock exchange. In 1992, BASF inaugurated its first plant in China, and then continued to invest in other ventures in the country. In 1996, BASF established a Chinese holding company, BASF (China) Company Ltd., to manage its joint ventures in China, with emphasis on logistics, EDP, purchasing, finance, personnel and marketing. In 1997, BASF established a Board position in Hong Kong.

Over the next few years, BASF continued to build production sites in Asia Pacific, including its first Verbund site in the region, a joint venture in Kuantan, Malaysia inaugurated in 2000. Its second Verbund site, BASF-YPC, a major petrochemicals joint venture with Sinopec in Nanjing, China, started up in 2005. None of this build-up of production sites in the Asia Pacific region has involved surfactants until recently. In the third quarter of 2011, BASF-YPC started up the second phase of its integrated petrochemical site (IPS) at Nanjing, a U.S. \$1.4 billion investment that expanded the ethylene cracker and four derivative plants, and added ten more downstream plants, including a new butyl glycol ether plant, an EO purification unit and a 60,000 ton/year ethoxylation unit, and a new amines complex for the production of ethanolamines, ethyleneamines and dimethylethanolamine.

### **Other Regions - South America, Africa, Middle East**

BASF reported sales for Other Regions of €3,829 million, up 31 percent from 2009, and accounting for six percent of the global total. The almost 6,900 employees in these areas represent 6.3 percent of the global workforce. In South America, BASF's largest markets and most extensive production sites are in Argentina, Chile and Brazil. The company produces a wide range of products and is a major supplier of paints, pigments and dyes, as well as being a leader in crop protection chemicals in the region. In Africa and the Middle East, BASF's operations are relatively small but growing, and the company continues to seek new business opportunities. Surfactants were not produced by BASF in Other Regions until its acquisition of Cognis in 2010 added sulfation/sulfonation plants in Argentina and Brazil.

**INTERMEDIATE AND SURFACTANT PRODUCTS**

BASF was historically strongly oriented towards nonionic surfactants, but has broadened its portfolio with anionics produced by Cognis. Nonionics production is primarily located in West Europe and North America, while anionics are produced in every region. BASF produces ethylene oxide in Germany, Belgium, the U.S. and China, and its nonionic surfactant business position is based largely on this captive production of EO. Propylene oxide is also a key raw material for BASF, and is produced captively in Europe and purchased in North America. The main nonionic products include alcohol ethoxylates, block polymers and alkylpolyglucosides. Alcohol alkoxylates, ethoxylated amines and a variety of specialty ethoxylates are produced as well. BASF's main anionic surfactant products are alcohol sulfates and alcohol ethoxysulfates, for which Cognis (and previously Henkel) was regarded as the quality product supplier in North America and Europe for many decades.

The following table lists main products by region.

<b>BASF - ACTIVE PRODUCT AREAS FROM BASE MATERIAL TO FINISHED PRODUCT BY REGION - 2010</b>				
	North America	West Europe	Asia	Other Regions
<b>INTERMEDIATES</b>				
Higher Alcohols	P	P	P	
EO	P	P	P	
<b>SURFACTANTS</b>				
AE	P	P	P	
APG	P	P	P	
AES/AS	P	P	P	P
Quats	P	P	P	
Other	P	P	P	P
Key: P = producer				

**Ethylene Oxide**

BASF has captive pipeline ethylene available for the production of EO at Verbund sites in the U.S., Europe and Asia. The company has 220,000 tons of purified EO capacity in Geismar, LA. The primary use for EO is for captive production of surfactants, polyethylene glycols, urethane polyols, and specialty amines. BASF ships PEO via railcars to the merchant market and to its surfactant plants in New Jersey and South Carolina.

In Europe, BASF has 345,000 tons/year of EO capacity at Ludwigshafen, where its largest olefins cracker and a 500,000 ton/year EO/EG plant at Antwerp, Belgium.

In 2005, BASF-YPC, the joint venture with Sinopec in Nanjing, China, started up a large petrochemical complex including 250,000 tons/year of EO capacity, used primarily for glycol production. EO production was expanded in the third quarter of 2011 by an undisclosed amount to provide purified EO for a new 60,000 ton/year ethoxylation unit.

**Higher Alcohols**

BASF is a major producer of oxo alcohols, but prior to the Cognis acquisition, the company produced detergent alcohols at only one location – Ludwigshafen, Germany, where it has 135,000 tons/year of capacity for higher branched and linear oxo alcohols. The major use of this capacity is the production of isononyl, isodecyl, and isotridecyl alcohols for plasticizer outlets. About 45,000 tons of the oxo alcohol capacity is available for making C<sub>9-11</sub> and/or C<sub>13-15</sub> alcohols from purchased alpha-olefins. BASF also produces about 15,000 tons/year of tridecanol based on butene trimer. This particular tridecanol is more linear than propylene tetramer-based material.

Cognis brought to BASF detergent-range oleoalcohol production in the U.S., France and Germany. Cognis produces a range of alcohols from fats and oils at its multiple plant sites. Besides the various grades derived from lauric oils, Cognis also operates units that make unsaturated as well as Guerbet alcohols at Dusseldorf. Germany is the largest site with capacity for 220,000 tons/year of detergent range alcohols. The second oleo site in Europe is at Boussens, France where an additional 55,000 tons/year of detergent range is located. The French site was set up to operate a production route through a fatty acid intermediate. The German and U.S. plants practice the hydrogenation of methyl esters. France had a large surplus of esters which were dedicated to biodiesel production several years ago. Total capacity in Cincinnati, OH is 45,000 tons/year of higher alcohols.

In addition to higher alcohols, BASF also produces the branched alcohol 2-propylheptanol (2-PH), a product it developed and introduced primarily for plasticizer applications, but which is also used to produce ethoxylates/propoxylates for surfactant applications (see below). BASF has produced 2-PH at a 100,000 ton/year plant in Europe since 2002. In 2006, the company converted a 2-ethylhexanol plant in Pasadena, TX to the production of 120,000 tons/year of 2-PH. BASF continued to expand its global capacity for 2-PH, bringing on stream an 80,000 ton/year plant in China in 2011.

### Alcohol Ethoxylates

BASF offers a wide range of alcohol ethoxylates based on captive as well as purchased alcohols. The products are sold primarily under the Lutensol<sup>®</sup> trade name for use in detergents, cleaners and industrial applications, and include grades based on both petro alcohols and oleoalcohols.

In addition to products based on linear alcohols, several types based on branched C<sub>10</sub> alcohols (2-PH) are offered. These products are marketed for their unique properties and as replacements for alkylphenol ethoxylates. The Lutensol<sup>®</sup> XL grades are manufactured by alkoxyating a single-branch C<sub>10</sub> alcohol, and offer excellent wetting action and good degreasing. The Lutensol<sup>®</sup> XA grades are similar, but are narrow-range ethoxylates with a low residual alcohol content (< 1 %), resulting in a very low intrinsic odor. The Lutensol<sup>®</sup> XP grades offer good wetting on hard surfaces, with performance similar to that of C<sub>9-11</sub> alcohol ethoxylates. The Lutensol<sup>®</sup> M grades are alkyl polyethylene glycol ethers made from a C<sub>10-18</sub> alcohol, and are targeted for liquid and powder detergents.

BASF also offers ethoxylated decyl (DA) and ethoxylated tridecyl (TDA) alcohols. Their rapid wetting and low foaming properties are used in formulations as emulsifiers, dispersants, and solubilizers. Applications include textile scouring and dyeing, I&I and household cleaning, and specialty products. The lower ethoxylate members of this series are also used as chemical intermediates for conversion to anionic phosphate, sulfate and carboxylate surfactants.

### EO/PO Block Copolymers

BASF is the leading producer of EO/PO block copolymers. This position is the result of years of research and development leading to innovative products and advantageous patents. The BASF products are the industry standard.

BASF's Pluronic<sup>®</sup> series utilizes proprietary technology to selectively vary the length of both the hydrophobic (polyoxypropylene) and the hydrophilic (polyoxyethylene) portions of the molecule to obtain the desired properties. They find use in a wide variety of industrial applications, some household detergents and cleaners, and personal care products.

BASF also offers the Tetronic<sup>®</sup> series, which are tetrafunctional block copolymers derived from the addition of EO and PO to ethylene diamine. Again, the hydrophobic and hydrophilic portions of the molecule can be varied to achieve the desired functional characteristics. They are used as a foam suppressant and demulsifier.

### Alkylpolyglucosides

APG was developed by Cognis (then Henkel) and first offered for commercial use in 1989. Today, BASF produces APG in the U.S., Germany and China. A range of APG products are offered for personal care applications under the Plantaren<sup>®</sup> and Plantacare<sup>®</sup> trade names, and for household and I&I cleaners under the original Glucocon<sup>®</sup> trade name. A line of APGs specially designed for use in agricultural adjuvants is sold under the Agnique<sup>®</sup> trade name.

### Alcohol Sulfates and Alcohol Ethoxysulfates

BASF was not historically a producer of either AS or AES, but the Cognis acquisition brought with it a significant global position in these products. BASF now produces AS and AES in North America, Europe, Asia and Latin America.

In accordance with its overall corporate sustainability strategy, in 2009 a Cognis innovation team developed process improvements for AES production to make it more efficient and improve product quality, reducing the formation of dioxane. The new procedures also reduce waste water emissions. In 2010, Cognis began a program of implementing the improved technologies and procedures at all of its sulfation plants worldwide.

## OTHER SURFACTANTS AND RELATED PRODUCTS

### Linear Alcohol Alkoxylates

The Plurafac<sup>®</sup> series are nonionic straight chain primary alkoxyated alcohols. They use detergent range alcohols as a hydrophobe, and modifications to the alkoxyated hydrophile result in foam control and oily soil removal characteristics. When combined with anionic, nonionic, or cationic ingredients, these LAAs reduce foaming in high mechanical energy cleaning situations. Applications include detergents, rinse aids, metal spray cleaners, textile processes, I&I cleaners, and household cleaners and personal care products. The equivalent Cognis products are the Dehypon<sup>®</sup> line.

BASF's Plurafac<sup>®</sup> LF grades were developed in order to provide more biodegradable equivalents of the Pluronic<sup>®</sup>. They offer excellent wetting and foam-inhibiting properties, as well as excellent dispersing, emulsifying and lubricating action. The alkyl-terminated Plurafac<sup>®</sup> LF grades are designed for use in highly alkaline cleaners, where they remain stable and retain their defoaming action. They are used in industrial cleaners such as bottle-washing detergents and cleaners for the food industry.

### **Linear Alkylbenzene Sulfonates**

LABS was added to BASF's offerings through the Cognis acquisition. It is a minor product that the company no longer produces in Europe. BASF closed its sulfonation plant in Germany when it divested its LAB business, Wibarco, to Hansa in 2007.

### **Phosphate Esters**

BASF offers Lutensit A-EP<sup>R</sup> a fatty alcohol alkoxyate phosphate acid ester, used as emulsifier, wetting agent, dispersant, hydrotrope, solubilizer and detergent for industrial and household cleaners. Degressal SD 40<sup>R</sup> is a phosphoric acid ester suitable as defoamer for cleaning formulations and as defoamer/plasticizer in dry-bright emulsions. Degressal SNC<sup>R</sup> is a modified phosphoric acid monoester recommended as a defoamers for detergents and cleaners.

### **Alkylphenol Ethoxylates**

BASF exited the APE market in North America two years ago, but continues to offer a few APE products in Europe. The Lutensol<sup>R</sup> AP grades are very effective emulsifiers, dispersing agents, and wetting agents.

### **Ethoxylated Fatty Amines**

The Lutensol<sup>R</sup> FA range includes ethoxylated coco amines (5 and 10 EO), oleyl amines (12 EO) and tallow amine (15 EO). These are emulsifiers, wetting and degreasing agents used in heavy-duty detergents and crop protection adjuvants.

### **Other Alkoxyates**

BASF also sells a wide range of other commodity and effect alkoxyates, including:

- ethoxylated natural (C<sub>12</sub>-C<sub>18</sub>) and synthetic (C<sub>13</sub>-C<sub>15</sub> and C<sub>13</sub> iso) fatty alcohols
- methoxy PEGs
- PEGs and PPGs
- fatty acid alkoxyates
- castor oil and hydrogenated castor oil ethoxylates
- allyl alcohol alkoxyates

### **Other Performance Surfactants**

Cognis brought to BASF a range of other products including amphoteric, betaines and imidazolines, ethoxylated amines, quats, sorbitan esters, and sulfosuccinates.

### **Specialty Amines**

BASF is a fully integrated supplier of short-chained amines in Europe, and the main supplier/producer of methyl diethanolamine which is used to make DEEDMAC, a fabric softener quat used by P&G. BASF's specialty amine, DMAPA, is used in the production of mild surfactants, such as betaines, for personal care products and dishwashing detergents.

### **Polyacrylic Dispersants**

The Sokalan<sup>R</sup> PA line are polyacrylic dispersants used in water treatment, laundry detergents, agricultural chemicals, paints and coatings, and I&I formulations. The Sokalan<sup>R</sup> CP group are copolymeric carboxylate dispersants with a higher anionic charge density on the polymer for more specialty applications. Both series prevent the redeposition of soil and the deposition of inorganic salts by sequestering calcium and magnesium ions, as well as by dispersing soil and modifying crystal growth. The Sokalan<sup>R</sup> HP grades are polymers with a distinct set of properties that can be used to obtain special effects such as dye transfer inhibition.

As of the end of 2010, including the Cognis facilities, BASF reported global anionic surfactants capacity of 550,000 tons/year and nonionic surfactants capacity of 570,000 tons/year.

The following table summarizes BASF's surfactant-related capacities by region.

<b>BASF - PRODUCTION LOCATIONS, PRODUCTS AND CAPACITIES, 2011</b> (thousand tons)			
Location	Process/Feedstock	Products	Capacity
NORTH AMERICA			
United States			
Geismar, LA	Ethylene	EO	
	Alkoxylation	Ethoxylates, polyols	
Cincinnati, OH	Methyl ester hydrogenation	Detergent Alcohols	
		APG	
Washington, NJ <sup>a</sup>	Ethoxylation	BP, AE	
Whitestone, SC	Ethoxylation		
Mauldin, SC	Ethoxylation	AE, EO/PO, APE	
Kankakee, IL	chlorosulfonic	AES, AS	
Mexico			
Lerma (Polioles JV)	Ethoxylation		
Ecatepec	Chlorosulfonic-CSA	AES, AS	
	Ethoxylation	AE	
LATIN AMERICA			
Argentina			
Avellaneda	Sulfation/sulfonation - air SO <sub>3</sub>	AES, AS	
Brazil			
Jacarei	Sulfation/sulfonation - air SO <sub>3</sub>	AES, AS, LABS	
WEST EUROPE			
Belgium			
Antwerp	Ethylene	Ethylene oxide	
	Ethoxylation	AE	
	Ethoxylation	Alkoxylates	
France			
Boussens	Hydrogenation of fatty acids	Detergent alcohol	
Meaux	Sulfation/sulfonation - air SO <sub>3</sub>	AES, AS	
	Ethoxylation	AE, EO/PO	
Germany			
Düsseldorf, Germany	Sulfation/sulfonation - air SO <sub>3</sub>	AES, AS, LABS	
	Ethoxylation	AE, EO/PO	
	Methyl ester hydrogenation	Detergent alcohol	
		APG	

**BASF - PRODUCTION LOCATIONS, PRODUCTS AND CAPACITIES, 2011 (CONTINUED)**  
 (thousand tons)

Location	Process/Feedstock	Products	Capacity
Ludwigshafen	Oxo/alpha-olefins	Detergent alcohols	
	Oxo/butene trimer	C <sub>13</sub> alcohol	
	Ethylene	Ethylene oxide	
	Ethoxylation	AE	
Worringen, Germany	Ethoxylation	AE, EO/PO	
Italy			
Fino-Mornasco	Sulfation/sulfonation - air SO <sub>3</sub>	AES, AS, LABS	
	Ethoxylation	AE, APE	
Spain			
Barcelona (Castellbisbal)	Sulfation/Sulfonation - air SO <sub>3</sub>	AES, AS, LABS	
Barcelona (Zona Franca)	Sulfation/sulfonation - air SO <sub>3</sub>	AES, AS, LABS	
	Ethoxylation		
	Ethoxylation		
ASIA			
China			
Jinshan, Shanghai	Sulfation/sulfonation - air SO <sub>3</sub>	AES, AS, LABS	
	Ethoxylation		
		APG	
Nanjing	Ethoxylation	EO/PO	
Indonesia			
Cimanggis	Sulfation/sulfonation - air SO <sub>3</sub>	AES, AS	
Thailand			
Bangkok	Sulfation/sulfonation - air SO <sub>3</sub>	AES, AS	
Rayong	Ethoxylation	AE	
EAST EUROPE			
Russia			
Tosno (St. Petersburg)	Sulfation	AES	
Turkey			
Gebze	Sulfation/sulfonation - air SO <sub>3</sub>	AES, AS	
<sup>a</sup> Production to be transferred to Geismar by the end of 2014 <sup>b</sup> Mainly urethane polyols <sup>c</sup> Not all surfactants <sup>d</sup> C <sub>13-15</sub> alcohols <sup>e</sup> BASF-YPC Chemicals, JV with Sinopec, on stream Q3-2011 <sup>f</sup> JV with PTT Chemicals			



## **END USE MARKETS FOR SURFACTANTS**

BASF's surfactants are sold for use in personal care products, household detergents, I&I cleaners and many industrial applications.

The Cognis acquisition catapulted BASF's position in the global personal care ingredients market from number three to number one. BASF supplies many types of ingredients including commodity and performance surfactants, and claims to participate in all personal care applications, including skin care, oral hygiene, hair care, sun protection and cosmetics.

Important household end uses include applications such as autodish products and toilet bowl cleaners, where BASF's EO/PO copolymers and linear alcohol alkoxylates are particularly effective.

BASF sells surfactants to several sectors of the I&I cleaning market, including laundry, dishwashing, dairy and food plant cleaning, and metal cleaning. The company sells directly to formulators.

Sales to the laundry and dishwashing segments benefit from BASF's technical expertise in the household as well as the I&I detergent arenas. BASF in Germany is one of the leading suppliers to the European dairy and food plant cleaning and metal cleaning industries, and this experience has translated into a strong position in the U.S.

Industrial applications to which BASF is a major surfactant supplier include coatings, crop protection, emulsion polymerization, leather processing, oilfield chemicals and textile processing.

## **RESEARCH AND DEVELOPMENT**

Both BASF and Cognis traditionally have invested strongly in basic research and new product development. BASF has 70 major R&D sites worldwide and over 1,900 research cooperations with customers, partners, and others. In 2010, BASF had 9600 employees working on 3,000 projects, at a cost of €1,492 million, or 2.3 percent of sales. Research in the Performance Products segment accounted for 19 percent, or about €283 million. Cognis, a much smaller enterprise, spent €55 million on R&D in 2009, but this, representing two percent of sales, is proportional to BASF's investment.

BASF sees R&D as an essential element of its economic success. The company surpassed its 2010 goal of generating sales of €6 billion with product innovations, which it defines as new and improved products or applications that have been on the market for a maximum of five years. The R&D organization expects to raise this figure to €8 billion by 2015.

BASF and Cognis have demonstrated a keen awareness of social and environmental trends, as well as political and economic evolution. Therefore in addition to responding to immediate market and customer opportunities, they conduct research within the context of their carefully developed long-range strategic vision and goals.

In terms of surfactants and related products, BASF and Cognis have an enviable history of technical and application expertise. Both are very focused on understanding customers' markets, and the value of product innovations to the ultimate end user as well as the customer. In addition to independent, basic R&D, both work closely with customers to develop solutions and new approaches that enhance product performance cost effectively.

One example of successful R&D is seen in BASF's early action to develop APE replacements, which resulted in a range of new products that meet customers' needs, including most prominently the Lutensol<sup>®</sup> alkoxylates based on 2-propyl heptanol.

An example of successful R&D by Cognis is its continual effort to develop new grades of APG to broaden its usefulness in a variety of applications.

## **STRATEGIC CONSIDERATIONS AND OUTLOOK**

BASF has always been a relatively conservative company, emphasizing the development of a range of internal competencies that undergird carefully planned outward moves. It has grown steadily, and according to plan, embracing new approaches that demonstrate value, and eschewing the latest fads that have derailed the success of some other chemical companies. It has achieved excellent sales and earnings growth, and as the world's largest chemical company, it has considerable financial resources to invest in future growth. Over the last ten years, BASF has strengthened its core businesses through selective and well-reasoned acquisitions, divestments and partnerships. As noted earlier, few of these transactions have involved surfactants, – not because of a lack of desire to expand this business, but because most potential surfactant acquisitions did not match BASF's stringent criteria.

Cognis, headquartered in Germany, represented a uniquely attractive opportunity for BASF due to many factors, including the markets it serves and its product lines, the global reach of its business, its technical competence, commitment to green principles and a compatible corporate culture. The synergies with BASF's businesses are obvious and extensive, and it was clear

that Cognis will enable BASF to enhance and strengthen its relationships with many existing customers, as well as giving access to new customers and markets.

BASF is committed to shifting its portfolio toward businesses with higher returns and less cyclical, and Cognis has achieved some success on its own in this regard. It moved its commodity oleochemicals operations to a joint venture and in 2007 divested its interest entirely. Also in 2007, Cognis moved its process chemicals business into an independent company which it divested in 2008. Process chemicals included fiber, textile and leather processing chemicals that were essentially lower-margin products due to a highly competitive market environment.

BASF's newest motto is "Chemistry as Enabler," and the company sees innovation as increasingly important to success. Sustainability is viewed as a strategic driver that presents opportunities for innovative products and solutions. Cognis has identified sustainability and wellness as leading global megatrends that are powering markets, and it sees innovation as the key to successfully serving and realizing the potential value of these markets.

Both BASF and Cognis supplement in-house technical expertise and teamwork with collaboration with others, including customers, partners, scientific institutions and universities. In 1999, Cognis acquired Laboratoires Serobiologiques (LS), a French company that is a leading supplier of cosmetic ingredients that has extensive technical expertise, engages in scientific collaborations and has a strong customer orientation. LS, dedicated to skin and hair care applications, has been a valuable resource for Cognis' personal care business. LS has now been combined with BASF's Beauty Care Solutions, which uses biotechnology to provide active ingredients and delivery systems primarily for the skin care market.

Another key trend that BASF has identified for the future is the continued high growth of emerging markets and the rapid growth of local competitors in these markets. With its surfactant production facilities, marketing operations and customer base in Latin America, Asia and East Europe, Cognis strengthens BASF's ability to compete in these fast-growing markets and take advantage of opportunities.

BASF also sees an increasing need for vertical integration to attain and retain resource efficiency and cost competitiveness. Although BASF has been well integrated in nonionics, with captive EO and

good ethoxylation capacity, it has lacked a substantial hydrophobe position. The Cognis oleoalcohols fill this need with the ideal hydrophobe to support growth in the personal care market, an important focus of BASF's surfactants business.

A major strategic guideline adopted by BASF is that "the prerequisite for long-term success is earning a premium on the cost of capital." This involves growth above the industry average, constant portfolio optimization, setting the benchmark in operational excellence, and innovating. Regarding operational excellence, BASF has been engaged in what it refers to as NEXT - New EXcellence Targets, an initiative that includes 500 individual projects to simplify processes, structures and production sites in all regions between 2008 and 2011. This initiative achieved an annual earnings contribution of €600 million in 2010, and an annual earnings contribution of more than €1 billion is expected to be achieved in 2012. From 2012 to 2015, BASF plans to continue this initiative, renaming it STEP - Strategic Excellence Program, targeting an additional earnings contribution of about €1 billion by the end of 2015.

During the ten years from 2000 to 2010, BASF achieved good sales growth despite two major recessions. The company has set an ambitious sales growth target of two percent above chemical production, or six percent per year to 2020, to achieve sales of €85 billion by 2015 and €115 billion by 2020. BASF's goals for this period also include earning a premium on the cost of capital of at least €2.5 billion per year on average, and doubling EBITDA to €23 billion by 2020 (over 2010).

On a regional basis, BASF is targeting average annual sales growth of 5.5 percent for North America, 4.5 percent for Europe, eight percent for Asia and eight percent for Other Regions.

Although these sales and earnings targets are for the entire company, BASF's surfactants business must support them. It is clear that Cognis will play a major role in the contribution that the surfactant business makes toward achievement of these targets. BASF has completed the assimilation of Cognis to a large degree, and the transition has been quite smooth. The integration of the Cognis and BASF surfactant businesses into one organizational entity paves the way for this business to demonstrate the first statement of BASF's Roadmap to 2020: 'We add value as 'One company.'

## FEATURE: CENTRAL & WEST EUROPE PROFILE

### INTRODUCTION

The countries in Europe have a population of 541 million or about eight percent of the global population. Consumption of primary surfactants in the region is 19 percent of global consumption. Additional information about global primary surfactant consumption by region is presented in the following table.

WORLD PRIMARY SURFACTANT CONSUMPTION IN ALL APPLICATIONS, 2009		
Region	Consumption (million tons)	Percent (%)
North America		
Latin America		
Central and West Europe		
Asia/Pacific		
Other Regions <sup>a</sup>		
TOTAL		

<sup>a</sup> East Europe, Africa, Turkey and the Middle East.

Europe for this profile consists of Central and West Europe. The countries of Central Europe were added to West Europe because as members of the EC, the ability to distinguish surfactant demand between the west and central areas has disappeared. The countries that are now included in Europe are:

MAJOR COUNTRIES IN CENTRAL AND WEST EUROPE	
Albania	Lithuania
Austria	Luxembourg
Belgium	Macedonia
Bosnia	Malta
Bulgaria	Montenegro
Croatia	Netherlands
Cyprus	Norway
Czech Republic	Poland
Denmark	Portugal
Estonia	Romania
Finland	Serbia
France	Slovakia
Germany	Slovenia
Greece	Spain
Hungary	Sweden
Ireland	Switzerland
Italy	United Kingdom
Latvia	

The economic environment of Europe has been slower to recover than other regions of the world. With both advanced and emerging countries in Europe, individual recovery by countries has varied considerably.

The European surfactant markets continue to be served by a few large integrated intermediate and surfactant producers and a number of smaller, regional surfactant suppliers. The large multinational detergent producers, like Unilever, Henkel, and Procter & Gamble, are major customers for intermediates and surfactants and, in some cases, utilize toll production for some surfactants. Most of the large detergent manufacturers have sulfation/sulfonation plants but none have ethoxylation facilities and must purchase ethoxylates, often for additional processing. Smaller, regional detergent producers tend to purchase more surfactants than intermediates. Only a few personal care producers manufacture the surfactants utilized in their products and most are surfactant customers. Formulators and blenders are important surfactant customers as they offer both formulation and services to end users in specific application areas. Industrial users of surfactants purchase surfactants in many forms: as complete formulations (mainly in textiles, pulp and paper and agricultural uses), as partial blends that are finished by the end user, or the purchase of individual surfactants that are blended by the end user to provide the desired performance.

Large merchant surfactant producers like AkzoNobel, BASF, Clariant, Cognis, Huntsman and Sasol typically provide a wide range of commodity and performance surfactants not only to the European operations of the major customers but to their international operations as well. Other companies like Rhodia, Evonik (Degussa/Goldschmidt), Shell and Croda have concentrated on niche areas and are a different breed of surfactant supplier.

REACH (Registration, Evaluation and Authorisation of Chemicals), a European Union regulation that replaces a number of European Directives and Regulations with a single system, has its registration deadlines approaching in November 2010. REACH required all the manufacturers and importers of chemicals to pre-register them with the new European Chemical Agency (ECHA) at the end of 2008. Full registration starts on November 30, 2010 with those products manufactured or imported at 1,000 tons/year or more. Smaller volumes of chemicals need to be registered in stages up to 2018. REACH has the potential to exclude manufacturers and importers from the intermediate and surfactant markets. If companies do not register, or if they cannot demonstrate that their substance can be used in a way that controls risk to workers, consumers and the environment, then the

manufacturer cannot supply the chemicals intended for that use. The ECHA is currently offering assistance to companies which have found themselves in difficulty submitting a full registration dossier for the legislation.

### **SURFACTANT SUPPLIERS**

The European surfactant market is supplied by multinational and a number of many medium sized and smaller privately held companies supplying a regional or speciality niche market. The production of primary surfactants – sulfates, sulfonates, ethoxylates and ethoxysulfates – account for over 50 percent of the total surfactants consumed. The larger surfactant producers have ethoxylation and/or sulfation/sulfonation capacity.

After months of rumors and a contest to win Cognis, the owners announced in June 2010 their intentions to sell its shares to BASF. BASF has reached the agreement with Cognis Holding Luxembourg S.à r.l. – which is controlled by Permira Funds, GS Capital Partners and SV Life Sciences – to acquire the specialty chemicals company for an equity purchase price of €700 million. Including net financial debt and pension obligations, the enterprise value of the transaction is €3.1 billion. The acquisition is subject to clearance by the competent merger control authorities. Closing of the transaction is expected for November 2010 at the latest. Cognis was an integrated part of Henkel, the German consumer products company until 1999, when it became an operationally independent business unit. In November 2001, Cognis was bought by private equity funds Permira, GS Capital Partners and SV Life Sciences. In 2008, Cognis recorded sales of about €3 billion and an Adjusted EBITDA (operating result) of €351 million.

The Cognis/BASF event is the “mega-event” of three key events taking place in Europe in 2010. The other two are the closure of ethoxylation at Wilton, UK and the planned start of Hansa’s new sulfonation/sulfation unit at Genthin, Germany in November. The effect of the closure of Wilton’s reactors early in the year has been mitigated by the shift of production to the other locations on the continent. The start-up of the Hansa unit later this year will likely have a negative effect on smaller anionic producers that will have difficult competing with the new, large scale unit.

### **Sulfators/Sulfonators**

The large number of sulfators/sulfonators in Europe is a vestige of pre-EC Europe and the result of the practice of maintaining local operations on account of restrictive tariffs which prevented the free movement of goods. As the EU evolved, these tariffs were eliminated resulting in the consolidation of sulfation/sulfonation plants by a few multi-national surfactant producers and the rationalization of smaller plants. However, this process is largely complete and leaves a tiered structure of large, pan-European suppliers, regional players and a few local operators.

Central and West Europe experienced an increase in sulfation/sulfonation capacity from [redacted] tons in 2008 to [redacted] tons in 2009, an increase of [redacted] tons. New plants include Kapachim Greece’s [redacted] tons per year plant in Inofita, Greece and Zschimmer & Schwartz Italiana [redacted] tons per year plant in Tricerro, Italy. Balkin Progetti Management’s plant in Sofia, Bulgaria was identified to have an annual capacity of [redacted] tons.

German-based Hansa Group AG, and its affiliate Chemische Fabrik WIBARCO GmbH, have started work on a new sulfonation plant in Genthin, Germany. The new [redacted] ton unit will make LABS, AES, and AE, with production capacity slated 50 percent towards LABS, and 25 percent towards each of the alcohol-based surfactants. The plant uses Chemithon technology with two falling-film reactors. Earlier, Hansa acquired the site which contains detergent production from Henkel.

When Pulcra was sold by Cognis, a [redacted] ton, two-unit sulfonation/sulfation plant became part of Fashion Chemicals. The operation is located in Barcelona, Spain. The products made at this location include LABS, AES, AS as well as a range of other chemicals.

Sasol Olefins & Surfactants has reportedly stopped the production of secondary alkane sulfonates (SAS), also referred to as paraffin sulfonates, in June 2010. The company operated a [redacted] ton/year operation in Marl, Germany, using the sulfoxidation process. West Europe is currently the only region that SAS is produced, and the remaining companies that have capacity include Clariant, Lanxess and Leuna Tenside. The end-uses for SAS include: detergents and cleaning compositions, hand cleaners, textile and leather auxiliaries, crop-protection compositions, metal processing, and emulsion polymerization.

The leading merchant sulfators/sulfonators in Europe are shown in the following table along with their main products.

**EUROPE - LEADING MERCHANT SULFATORS/  
SULFONATORS, PRODUCTS AND CAPACITIES, 2010<sup>a</sup>  
(thousand tons)**

Company	Product	Capacity
Sasol Olefins & Surfactants		
Cognis		
Huntsman		
Stepan		
CEPSA - San Roque		
IFraChimie		
Clariant		
Unger Fabrikker A.S.		
Kao		
PCC Rokita SA		
ISU		
Kapachim Greece		
Zschimmer & Schwarz GmbH		
Hansa Group		
Ital Silva		
Fashion Chemicals		
Tensichem		
Verila		
Balkan Progetti Management		
Leuna-Tenside GmbH		
Lanxess AG		
Chimcoplect		
Benckiser (Mira Lanza SpA)		
Alapis Group		
Other Merchant		
TOTAL		

<sup>a</sup> Excludes producers of petroleum sulfonates, naphthalene sulfonates and hydrotropes and captive detergent producers.

<sup>b</sup> New [redacted] ton plant expected in Q4-2010

**Ethoxylators**

European ethoxylators are 32 in number versus 42 to merchant sulfators/sulfonators. The large number of producers is also a vestige of multi-European countries that have now merged to form the EC. With the establishment of the EU and the elimination of tariff barriers, other factors have risen in importance like the availability of EO and the logistics of safely transporting EO to plant sites. Consolidation and rationalization continue as witnessed by the closure of UK ethoxylation earlier this year and now by the acquisition of Cognis.

The top five ethoxylators accounted for over 49 percent of the European ethoxylation capacity. Sasol has been the largest ethoxylator and has two ethoxylation sites along with an amount of captive EO and higher alcohols. Cognis, the second largest ethoxylator with seven manufacturing plants, is not integrated into captive EO production but does have a large captive supply of detergent alcohols. The combination with BASF later this year will push Cognis ahead of Sasol in this category and in EO and alcohols as well. Ineos Oxide has reportedly expanded its ethoxylation capacity in Antwerp, Belgium by [redacted] tons, bringing its total capacity to [redacted] tons. Clariant and Huntsman are the next two largest ethoxylators. Clariant maintains two sites with captive EO at one plant while Huntsman has two sites and is not integrated.

As a result of the closing of Dow's ethylene oxide plant in the UK in January 2010, Croda International and Shell have shuttered their downstream ethoxylation plants in Wilton with allocated capacities of 40,000 tons per year and 130,000 tons, respectively. This move was the only realistic response to the loss of the only domestic producer of EO in the UK. Although significant efforts had been undertaken to keep the plant operating by placing it under new ownership or other arrangements, no adequate agreements could revive the EO-related components of the site. Since the closures of the plants in the UK, Croda has expanded its capacity in France by an estimated [redacted] tons and Shell has created a tolling agreement with Dr. Kolb.

Dr. Kolb (Kuala Lumpur Kepong, KLK) brought on new capacity in 2008 of [redacted] tons at its plant in Moerdijk, Netherlands increasing the total company capacity to [redacted] tons per year. Wall Chemie on the German/Belgium border has been identified. The plant operates an estimated [redacted] tons of ethoxylation capacity.

It will be interesting to see what integration measures are taken with the acquisition of Cognis by BASF. Cognis is one of the leading ethoxylators in Europe and currently sources much of its EO from Ineos. BASF, which has its own captive EO, could potentially supply the EO for the Cognis ethoxylation operations although it prefers not to make shipments of the material. Thus, on the one hand, the Dormagen Site in Köln (Worringen) looks to make long term sense with proximity to Cognis alcohols and Ineos EO. It would appear that the other locations also make sense from the standpoint of serving more distant customers. Although no announcement of an integration plan has been made, an opportunity exists for some adjustment to this supply chain in the future.

The following is a list of the leading Europe ethoxylators and capacities for 2010.

<b>EUROPE - LEADING ETHOXYLATORS AND CAPACITIES, 2010 (thousand tons)</b>	
Producer	Capacity
Sasol Olefins and Surfactants	
Cognis	
BASF	
Ineos Oxide	
Clariant	
Dr. Kolb (KLK)	
Huntsman	
Seppic	
Akzo-Nobel	
Croda International	
Evonik	
IQA	
Lamberti Group	
Dow	
Baker Hughes	
Rhodia Geronazzo	
Teol	
Wall Chemie	
Kao Corp.	
Elementis	
IFraChimie	
PCC Rokita SA	
Bozzette Industrie Chimiche SpA	
CECA S.A.	
PetroBrazi/Teleajen Combine	
Sabo	
Zschimmer & Schwarz GmbH	
Others	
TOTAL	

## **RAW MATERIALS**

Production of the key surfactant intermediates - detergent alcohol, linear alkylbenzene, ethylene oxide and is distributed widely across the region. Intermediate feedstock prices peaked in 2008 in response to petroleum and followed it down through early 2009. Since this fallout of prices seen during Q4-2008 through Q1-2009, each of the raw materials has progressed on an individual track, allowing intermediate producers to implement steady increases. For both alcohols and LAB, profitability has been recovered.

## **LAB**

The linear alkylbenzene market in Europe has not shown any significant changes over the past two years. Production levels by some producers have been scaled back over the past year due a reduction in demand caused by the global economic crisis.

In Germany, HANSA had a temporary shut down due to an explosion at AkzoNobel's chlorine plant, the supplier for the LAB plant's catalyst. The four-week shutdown hindered the overall production output, but has since returned to optimal production levels. The plant has a nameplate capacity of [REDACTED] tons/year.

## **Detergent Alcohols**

European production has been hampered by the intense competition from Asian imports during the last three years. Smaller units have been compromised, stopped production or at least cut back. In August, Sasol and Cognis managed to get the EC to open an anti-dumping case against the exporting Asian countries.

## **Ethylene Oxide (EO)**

EO in Europe has been hampered by planned and unplanned outages through 2009 and 2010. The latest unplanned events affected Ineos and Shell in 2010. Competition from new Mid-Eastern capacity start-ups has been less severe than anticipated, thus there has yet to be any fallout amongst the European plants.

## **INTEGRATION**

The integration of primary surfactant producers is strong in Europe. The share of ethoxylators held by integrated producers stands at 69 percent today compared to 33 percent for sulfonation/sulfation. In nonionics, producers can be integrated on both sides of the molecule and with EO under pressure from rising world capacity, one sees EO producers looking for ways to reduce their exposure to ethylene glycol. Surfactants remain an important outlet for EO and further adventures into the field of ethoxylation could be expected over the next few years.

Different levels of integration with detergent alcohols and/or EO exist for nonionic producers today while the European LAB producers are nearly fully integrated. Sasol has the most sulfonation of the LAB producers with plants in Italy and Germany. Sasol also is the largest ethoxylator ahead of Cognis by about 35,000 tons. With the closure of alcohol capacity at Augusta in 2008, Sasol fell slightly behind Cognis in European capacity. While Sasol has some ethylene oxide, Cognis currently has none and has relied greatly on Ineos. The other differences between the market leaders include the significant synthetic alcohol position of Sasol, the LAB/LABS and the focus by Cognis on the personal care sector. As mentioned earlier, the BASF acquisition will benefit both companies. Adding BASF with Cognis, the combined entity jumps ahead with the additional EO, alcohol and ethoxylation of BASF.

In the anionics, after the two leaders, there are two large non-integrated producers: Huntsman and Stepan. Huntsman has some ethoxylation and focuses largely on the sulfates. Stepan produces a wider range of sulfates and sulfonates. After these non-integrated producers, the next largest sulfonator is CEPESA, with capacity in Spain. CEPESA is also working with Petrochemia in the eastern zone which is a less captive market for sulfonates than the west. ISU, the Korean LAB maker [REDACTED] tons of capacity) took over the Unilever reactor in Mannheim, Germany. The company also operates a small unit at Marseilles. Hansa, a small sulfonator/sulfator in Germany has bought the WIBARCO LAB business and is in the process of erecting a large new sulfonation capacity in Genthin.

In nonionics, on the second tier of capacity size has been BASF, Shell, Ineos and Clariant. Shell was closely matched in ethoxylation capacity to BASF, but has moved into a tolling agreement with Dr. Kolb (KLK). Shell needs to take some action to hold onto its position long term. Otherwise it will be out of surfactants and have to play the field in intermediates. Shell has EO in Holland and alcohols are located in the UK. BASF has EO integrated at ethoxylation sites in Belgium and Germany. BASF has several types of synthetic alcohol production at Ludwigshafen and has been aggressively pursuing the industrial market where the use of alkylphenols is being eliminated. With BASF moving up, Clariant and Ineos remain at this level. Clariant and Ineos both have EO and were close followers to the leaders and will now lead the second tier in terms of ethoxylation capacity. Their approaches are really completely different. Clariant eschews commodities to focus on application technology as much as possible. Clariant, like BASF is an important supplier of block copolymers in Europe. Clariant is also

an important supplier to oilfield chemicals. A difference in the approaches of Clariant and Ineos to the market is that Ineos relies entirely on the toll production of ethoxylates for customers. Ineos is also the key merchant supplier of EO for surfactant makers in Europe.

While European producers have a considerable edge in surfactant feedstocks, no one expects large capacity increases to support exports. Rather, as Sasol has shown in 2007, the trend is to close European capacity in favor of offshore production. Cognis has exported to Asia for years and has recently completed a new APG plant in China.

**EUROPE - INTEGRATION OF LEADING MERCHANT SURFACTANT PRODUCERS, 2010**  
(thousand tons)

Company	C <sub>12+</sub> Alcohol	LAB	AP	EO	Sulfation/Sulfonation	Ethoxylation
Akzo-Nobel						
BASF						
Cognis						
CEPSA Quimica						
Clariant						
Dr. W. Kolb (KLK)						
Evonik						
Hansa Chemie						
Huntsman						
Kao						
IFraChimie						
Ineos Oxide						
ISU						
Sasol Olefins & Surfactants						
Seppic						
Shell Chemicals UK Ltd.						
Stepan						
Unger Fabrikker A.S.						
TOTAL LEADERS						
TOTAL EUROPE						
Leaders as a percentage of Total Europe						
NR = Non-regional <sup>a</sup> - Closed, January 2010						



## **STRATEGIC APPROACH**

### **BASF**

BASF places great importance on an integrated site structure, which it calls "Verbund." Its European Verbund sites are in Antwerp, Belgium and Ludwigshafen, Germany. These are the core of its European operations. Ludwigshafen has over 300 production units while the Antwerp site has about 54 units. The Verbund concept is based on the creating value by linking the production, production of co-products and waste products from one plant to other plants or directly to the merchant market. Ludwigshafen is integrated with production of ethylene, ethylene oxide, ethoxylation capacity (over [REDACTED] tons/year) and the production of higher alcohols (capacity near [REDACTED] tons/year, including plasticizer alcohols). Since 2001, the company's surfactant development activities have centered on the commercialization of 2-propyl heptanol-based ethoxylates as replacements for alkylphenol ethoxylates. It is the leading producer of plasticizer alcohols and offers a wide range of ethoxylated derivatives based on captive EO and alcohols made in its oxo alcohol plant in Ludwigshafen. The Antwerp site is also heavily integrated into the production of EO and ethoxylates and its derivatives. In June 2010, BASF announced plans to purchase Cognis.

### **CEPSA**

Grupo CEPSA (Compañía Española de Petróleos SA) is the 100 percent owner of CEPSA Química, S.A., formally Petresa. CEPSA manufactures n-paraffins, linear alkyl benzene and its derivatives. The European plant in San Roque, Spain is a leading LAB producer with [REDACTED] tons of capacity based on n-paraffin feedstock. It also has sulfonation capacity for [REDACTED] tons of LABS at the San Roque site. Its LAB is mainly sold to the merchant market for use in household detergents and to other sulfonators but it also sells some LABS and linear alkylbenzene sulfonic acid. It is a large efficient LAB producer and exports about half of its production from Europe. It has a partnership with Petrochema (LABS capacity [REDACTED] tons/year) in Dubová, Slovenia. It also has cooperative efforts with ISU Chemical in Germany to produce sulfonic acid earmarked for Central European markets.

### **Clariant**

Clariant's surfactants are part of the Detergents & Intermediates Business Unit that supplies products to the household, personal care. A reorganization in January 2010 to ten business units from four has separated several elements of the operation.

Clariant's ethylene oxide plant in Gendorf, Germany is integrated with an ethoxylation plant (capacity [REDACTED] tons/year). It produces a range of EO derivatives that includes tallow amines for agricultural applications, PEG's and EO/PO block polymers for personal care and other surfactants. A [REDACTED] ton/year ethoxylation plant in Tarragona, Spain is mainly focused on producing surfactants for the local household/industrial market. Clariant has sulfonation capacity in Cruise-Lamotte, France ([REDACTED] tons/year) and in Wiesbaden, Germany ([REDACTED] tons/year). These plants produce paraffin sulfonates (SAS). Another major producer of SAS, Sasol, has recently exited the business leaving Clariant as the sole supplier of this material for use in detergents. Clariant produces a wide range of anionic, nonionic, cationic, and amphoteric surfactants as well as bleach activators.

### **Cognis**

Cognis was spun off as an independent company from Henkel in 2001 and was taken private by the equity funds Permira, Goldman Sachs Capital Partners and SV Life Sciences. The original plan was to double the business and then take the company public in four or five years. In 2007, this divestiture plan for Cognis was abandoned after failing to uncover adequate offers for the business. It was felt that it was in the best interest of the stockholders to keep the company as the growth potential was greater than originally projected. Meanwhile Cognis worked on problem segments. During this period, the oleochemicals business was put into a joint venture with Sime Darby (formerly Golden Hope Plantations). Then Cognis sold off their remaining share and the venture was re-christened Emery Oleochemicals.

Cognis is back integrated into fatty alcohols with European plants located in Düsseldorf, Germany and Bousens, France. Its anionic focus is on AES and AS while the nonionics are mainly AE and block polymers. Cognis is the second largest ethoxylator in Europe with two plants in France (total capacity [REDACTED] tons/year), Germany (in Düsseldorf and Worringen - a total capacity

of [REDACTED] tons/year), Italy ([REDACTED] tons/year) and Spain (total capacity [REDACTED] tons/year). Cognis is also the second largest merchant sulfator/sulfonator in Europe with a total capacity of [REDACTED] tons/year with plants in Meaux, France (capacity [REDACTED] tons/year), Düsseldorf, Germany ([REDACTED] tons/year), Italy ([REDACTED] tons/year) and in Spain (capacity [REDACTED] tons/year). In November 2008, Pulcra, a former subsidiary, was sold and a two-unit, [REDACTED] ton sulfonation unit in Barcelona, Spain became a part of Fashion Chemicals. Cognis is known to be exporting products from these plants to support activities in other parts of the world.

Cognis is focused on supplying surfactants to the personal care, household and specific industrial applications like textiles, oilfield, leather, ag chemicals, coatings and plastics. Cognis is the largest APG producer in Europe and recently opened a new APG plant in China. Cognis is also an important supplier to the European betaine market.

### **Croda**

Croda purchased Uniqema's oleochemical and surfactant business from ICI in 2006. Prior to the acquisition, Croda had been shifting away from industrial chemicals to focus on the higher margin consumer markets. Its oleochemicals were used in lubricants and specialty coatings as well as in personal care products. Croda had ICI's Uniqema as a prime acquisition target for several years as this acquisition strengthens Croda's position in consumer care. Croda has since sold the ICI Uniqema oleochemicals site in Klang, Malaysia to KLK in 2007 and its U.S. oleochemical business to HIG Capital Miami in May 2008.

Croda's acquisition of Uniqema added a total of [REDACTED] tons/year of ethoxylation capacity ([REDACTED] tons/year in Wilton, UK, 40,000 tons/year in Choques, France and [REDACTED] tons/year in Mevisa, Barcelona, Spain) to Croda's [REDACTED] tons/year in the Rawcliffe Bridge, UK to reach a total capacity of [REDACTED] tons/year. Due to the closure of Dow's EO plant in the UK, Croda has been forced to close its 55,000 ton UK capacity. Croda has shifted the production to its other locations, primarily in France and expanded the Choques capacity by an estimated [REDACTED] tons. Croda's surfactants are mostly based on Uniqema's product line and include EO/PO block polymers, alkoxyated ethylene diamines, alkoxyated bisphenol A, EO/PO alcohols, fatty amines ethoxylates, castor oil ethoxylates, Spans<sup>®</sup>, Tweens<sup>®</sup>, natural and synthetic alcohol ethoxylates and a range of performance ethoxylates. Although Croda's surfactants are used in a number of industrial applications, its focus in the last few years has concentrated on the personal care and lubricant markets.

### **Dr. Kolb**

Dr. Kolb was an independent producer of paper chemicals and nonionic surfactants that was bought in 2006 by Kuala Lumpur Kepong Berhad (KLK) Malaysia. Dr. Kolb operates two European manufacturing plants, one in Hedingen, Switzerland with capacity for about [REDACTED] tons/year of specialty oleochemicals and a [REDACTED] ton/year alkoxyates plant in Moerdijk, The Netherlands. A third ethoxylation reactor installed at Moerdijk was installed in 2008. This increased the company's capacity to over [REDACTED] tons/year. Dr. Kolb is also engaged in the distribution and trading of specialty oleochemicals. The Netherlands site is connected by an EO pipeline to the nearby Shell ethylene plant. The plant concentrates on volume products which includes toll manufacturing of EO derivatives. The Hedingen site receives EO by truck and rail and has smaller reactors and concentrates on the production of specialty products, esters and other nonionic products. The acquisition of Dr. Kolb provided KLK an outlet for its fatty alcohols and fatty acids, two main raw materials purchased by Dr. Kolb. It also provided alkoxylation technology to KLK that could be use to expand downstream in the production of nonionic surfactants and esters at other locations. Since the closure of Shell's ethoxylation unit in the UK, the company has worked out a tolling agreement for ethoxylated products.

### **Huntsman**

Huntsman is a multinational producer and marketer of commodity and specialty products. Huntsman's European surfactants business was created in 2001 when it acquired the former Albright & Wilson European surfactant business from Rhodia. This business has been a difficult business for Huntsman to manage and with continuing losses, it had undergone reorganizations and plant closures and consolidations. Huntsman closed the alcohol, ethoxylation and sulfation plants in Whitehaven, UK, consolidated ethoxylation production in Italy by closing the Castiglione plant and moved the equipment to Patrica, Italy. Huntsman currently operates ethoxylation plants in France at Lavera and St. Mihiel (total capacity of [REDACTED] tons/year) and in Italy ([REDACTED] tons/year). It has sulfation/sulfonation plants in St. Mihiel, France ([REDACTED] tons/year), Italy at Castiglione and Patrica (total capacity [REDACTED] tons/year) and Barcelona, Spain ([REDACTED] tons/year). Huntsman's plants in Europe are mainly producing AS, AES and some LABS. It has strong position in AES and competes with Cognis and Stepan. It also produces some AE and APE. It also has sales in specialty products that include betaines, quats, amine oxides, sulfosuccinates, phosphate esters, imidazolines and ethoxylated amines.

Huntsman is competing in the household and personal care markets with a full range of anionic, nonionic and specialty surfactants.

### **IFraChimie**

IFraChem (as it was called) was formed when InChem holdings purchased the Witco sulfonate and ethoxylate business located in Elbeuf, France in 1998. The original owners incurred financial difficulties and in 2004 it passed through bankruptcy and emerged in 2006 under new owners as IFraChimie. It has a current ethoxylation capacity of [REDACTED] tons/year and sulfonation capacity of [REDACTED] tons/year. IFraChimie is known to do extensive tolling, producing AES, AOS, and LABS for several major European surfactant producers. It has recently been reported that the company has encountered financial troubles and entered in receivership, part of the bankruptcy process, on July 1, 2010. A decision on the next step is in the legal process is due by November 1, 2010.

### **PCC Rokita SA**

As of April 2010, Rokita is 100 percent owned by the German company PCC, SE which started acquiring the company in 2003. PCC SE based in Duisburg, Germany is global organization that engages in trade in chemical products, coal and electricity, chemical products, and logistics and transport. PCC Rokita SA is a group of companies based in Brzeg Dolny, Poland with manufacturing plants in Poland. It is based on four business units: Chlorine Business Unit, Polyols Business Unit, Surfactant Business Unit and Phosphorous Business Unit. PCC Rokita is not integrated into the production of EO but is on a pipeline and had a long term EO supply contract with PKN Orlen, which is reportedly now closed. It has recently been reported that the EO supply has been disrupted and the ethoxylation capacity is not operational. Current ethoxylation capacity is [REDACTED] tons/year in Brzeg Dolny, Poland but it had announced a new [REDACTED] tons/year plant to be under construction in Plock, Poland in late 2006. This plant has been delayed and is now reported to be in engineering and a completion date is not available at this time. Rokita's sulfonation plant in Brzeg Dolny was expanded in 2007 and is currently rated at [REDACTED] tons/year. The major markets for its surfactants are in detergents and personal care.

### **Sasol Olefins & Surfactants**

Sasol is the leading and best integrated intermediate and surfactant producer in Europe. Sasol's acquisition of RWE's chemical subsidiary CONDEA in 2001 provided the basis for the European surfactants business with plants in Germany and Italy. Its plants in Germany include Brunsbüttel for synthetic and oleo detergent alcohols with a total capacity of [REDACTED] tons of C<sub>12</sub>+ alcohol. It has a special grade of synthetic alcohol tolled for them by Oxeno which took over many of the plant operations at the Marl site in the 1990s. In Marl, Sasol also produces alkylphenols, ethylene oxide, ethoxylates (capacity [REDACTED] tons/year), sulfonates and sulfates (combined capacity [REDACTED] tons/year). Sasol replaced its old Cascade sulfonation unit in Marl with a Ballestra plant with [REDACTED] tons/year capacity in 2007. Its plants in Italy produce LAB, normal paraffins, ethoxylated products (capacity [REDACTED] tons/year) and has sulfated/sulfonated surfactants (total capacity of [REDACTED] tons/year) as well. Operations in Central Europe include a [REDACTED] ton/year ethoxylation plant in Nováky, Slovakia. Although it has tried to branch out into other surfactants, its main markets in Europe are in LABS, AE, AES and APE. It has added other products like amines, amides, betaines and other materials to complement its primary surfactant position. In 2010, Sasol exited and closed a [REDACTED] ton reactor for the paraffin sulfonate (SAS) business. This leaves the [REDACTED] Ballestra unit and a [REDACTED] ton sulfate plant operating in Marl. Sasol is well integrated in surfactant production and has this region's second largest merchant ethoxylation capacity totaling [REDACTED] tons/year and the largest sulfation/sulfonation capacity totaling [REDACTED] tons/year.

In 2007, Sasol idled its European LAB plant in Porto Torres, Sardinia, reduced the normal paraffin operating capacity by closing 2 [REDACTED] tons of capacity in Italy, and with the start-up of its [REDACTED] tons/year of oleoalcohol capacity in China with its joint venture partner, Wilmar China Investments, idled [REDACTED] tons/year of oxo alcohol capacity in Augusta (about half of the plants total capacity).

## Shell

Shell is back integrated for the production of ethoxylates with the captive production of ethylene oxide capacity of [REDACTED] tons/year at Moerdijk, the Netherlands; capacity of [REDACTED] tons/year of synthetic detergent alcohol at Stanlow, UK. In January 2010, Shell was forced to close its [REDACTED] ton European ethoxylation operation at Wilton, UK, due to Dow closing their EO plant and cutting off a key raw material supply. Despite the closure, Shell has worked out a tolling agreement with Dr. Kolb (KLK) for ethoxylated products. Shell Chemical has indicated that it wants to be in the top tier of bulk chemical suppliers and has made investments in Moerdijk and Stanlow to improve manufacturing performance and to reduce expenses. Shell has closed an olefin-based LAB plant in South Africa in 2007 and the plant officially was dismantled in 2009.

## Stepan

Stepan is a producer of anionic and cationic surfactants. In 2000 to 2002, the company expanded its European base with acquisitions. In 2000, it acquired Manro Performance Products in Staleybridge, UK, which added [REDACTED] tons/year of sulfation/sulfonation capacity that produced LABS, AES, AS and other products. Fabric softener quat production was added in 2004 at this plant. Stepan acquired Pentagon's UK surfactants business in 2002 and added biocidal quats to its portfolio. Stepan had a small sulfation/sulfonation plant ([REDACTED] tons/year capacity) producing LABS and AES in Cologne, Germany and a multipurpose quats plant in Voreppe, France (about [REDACTED] tons/year capacity). Other surfactants manufactured in Europe are amine oxides, alkanolamides, betaines and sulfosuccinates. These and the above cited performance surfactants are seen as a growing segment in Stepan's business. It has, however, worked to expand its anionic business and has also diversified into special industrial accounts with performance surfactants.

## **SURFACTANT CUSTOMERS**

### Household

Heavy duty laundry detergents constitute the majority of the market for surfactants in household products. The largest detergent producer is Procter & Gamble with over a 30 percent value share. Other producers with closer to 20 percent share include Henkel and Unilever. In several areas, Reckitt-Benckiser holds an important share as Unilever does not participate evenly across the region. Private labels are important in Europe, representing an

average of 12 percent of the market value and a higher share of volume. Robert McBride from the UK is one of the leading private label suppliers. Hansa has bought the Genthin site of Henkel and will now produce detergents as well as LAB and anionic surfactants. Western Europe saw a slight expansion in the market for detergents and household cleaners during 2009. The economic slump caused uncertainty among consumers. This led to increased price sensitivity and, as a result, a rise in the market share of private labels and also an increase in the share of the market attributable to discounters. Not all producers responded quickly and at first Henkel gained share against rivals. Henkel achieved about three percent growth in household revenue in 2009. More recently, Procter & Gamble has been responding with lower prices to gain back share it lost.

The European detergent scene has been changing with a shift to liquids and declining wash temperatures. The tablet form has lost significance and only holds a credible share in the UK where it is down to about 20 percent share. This leaves the UK liquid share at over 40 percent and growing, but behind the continent where liquids passed the 50 percent mark in 2009. Liquids are typically promoted for low wash temperatures and helped the region move down from the 60°C wash temperature range. Liquids were positioned for 40°C washes and have increasingly been pushing for 30°C. The amount of water used is also on the decline in laundry with better machines now having less than a ten litre wash bath. And in selling, promotion remains key. In Germany, 50 to 60 percent of detergents are bought with coupons while in the UK, the 2-for-1 offer remains highly popular. Moves to more concentrated liquids have been developing, as in other regions.

Detergent formulators utilize large quantities of anionic surfactants, some of which are produced captively from purchased intermediates. The three majors and a few smaller producers have captive sulfation/sulfonation facilities in the region. The captive production is not geographically consistent. In the North, outside the UK, there is little captive, while the highest presence is in Italy. Ethoxylates are purchased since detergent producers have no ethoxylation capacity in-house. After the sale of Cognis in 2001, Henkel maintained a supply relationship with Cognis, but as contracts ran out, Cognis became more independent, working to pick up business at other accounts where the integration factor with Henkel had interfered. Other major players in household products include SC Johnson and Jeyes. Two of the most important private label makers are McBride and Dalli Werke.

**Personal Care**

Many of the leading West European household product producers are also leading personal care companies: Henkel, Unilever and Procter & Gamble. In key markets, L’Oreal and Beiersdorf can be more important. In a few locations, surfactant integration by the household producers Unilever and P&G to make alcohol ethoxysulfates, the largest-volume surfactant used in personal care products is used to advantage. But these producers toll and buy more than they make for personal care products.

A recent shift in consumer behavior has been witnessed. The personal care market has traditionally been dominated by premium label products. Being conscious of the economic recession, consumers have started to use more private label products. The inroads of private label first seen in Spain have progressed on into top markets like Germany.

The demand for green products continues to show excellent growth over the past several years. The public and certifiers are faced with inconsistent standards for the criteria of qualifying green ingredients. Several certification labels exist, Germany’s Blue Angel, the Nordic Swan, and the EU Eco-label (EU Flower), do not apply consistent guidelines. The European Commission recently revised the rules governing the EU Ecolabel scheme by adopting the changes at the end of 2009. The revision streamlines procedures while maintaining the EU Ecolabel’s high environmental standards. For more than a year, European certification agencies have been trying to harmonize to an industry standard. In June 2010, a set of standards for natural and organic products was released.

**I&I**

Thousands of companies participate in the I&I market; a few operate on a regional or even global level, but the majority serve local country or sub-regional markets. The I&I cleaning market can be subdivided into a variety of categories including: hard surface cleaning (HSC), dairy and food plant cleaning, commercial dishwashing, laundry, dry cleaning, carpet cleaning, hand cleaners, metal cleaning, car wash, and transport vehicle cleaners.

**Industrial**

The following table lists some of the largest surfactant customers in the major industrial end uses in West Europe. The industrial segment has been hit much harder by the global economic recession than other segments.

<b>CENTRAL &amp; WEST EUROPE – MAJOR INDUSTRIAL SURFACTANT CUSTOMERS</b>	
Agricultural chemicals	
Oilfield	
Paint	
Paper	
Plastics and elastomers	
Synthetic Rubber	
Textiles	

**SURFACTANT CONSUMPTION**

The consumption of primary surfactants in Europe totaled [redacted] million tons. The following table summarizes consumption by end use for 2009. Overall, consumption levels are down by [redacted] percent from 2008 levels.

<b>CENTRAL &amp; WEST EUROPE - CONSUMPTION OF PRIMARY SURFACTANTS BY END USE, 2009 (thousand tons)</b>				
Surfactant	Household	Personal Care	Industrial (Includes I&I)	Total
Linear alkylbenzene sulfonates		--		
Alcohol ethoxysulfates				
Alcohol sulfates				
Alcohol ethoxylates				
Alkylphenol ethoxylates	--	--		
TOTAL				

**Household**

The economic condition in Europe has been slow in recovery. And the once booming eastern part of Central Europe seen earlier in the decade may suffer the hardest recovery. In the first quarter of 2009, the unemployment rate in the EU27 for those aged 15–24 was 18.3 percent. The official unemployment rate in the 16 countries that use the euro was 9.5 percent in May 2009. Subsequently, this rate has risen and stands at ten percent today. Europe’s young workers have been especially hard hit. As with most of the western hemisphere, consumer spending has not recovered and is still considered to be down. Across Europe, many countries are struggling with the fallout from the economic crisis, in which their governments intervened to support banks that teetered toward collapse following risky investments. The spread of economic woes forced the European Union as a whole to arrange an emergency bailout for the Greek economy. Ireland, already reeling from a banking crisis that is threatening its financial credibility, suffered another recent setback when unveiled that its ailing economy shrank 1.2 percent in the second quarter of 2010.

Household surfactant consumption declined by [redacted] percent during 2009 with [redacted] tons of surfactant consumed. Household markets were affected by destocking and the changes in consumer buying patterns. Deformulations have been more pronounced in the Central European area as a result of the crisis. And the move to HDL, which in many cases plays out more among the liquid fine fabric brands, is a positive step for surfactant consumption.

LABS declined by [redacted] percent during 2009, when compared to 2008 levels in the household segment. AS remained relatively flat, declining only marginally in tonnage, but overall showed a [redacted]. AES also declined from 2008 levels, but only marginally at [redacted]. AE suffered along with LABS in the household area, as consumption dropped by [redacted] for the year.

### Personal Care

Despite a transition from brand products to private label, the personal care industry has been reported to be a resilient sector during the global economic recession. Surfactant use in the personal care sector was the only category that showed an increase in 2009, over 2008 levels. The primary surfactants used in personal care, AES, AS and some AE, all showed slight increases during 2009, bringing overall consumption levels up by one percent.

### I&I and Industrial

Industrial surfactant consumption declined by over [REDACTED] during 2009, showing the largest percent in decline of the three sectors.

LABS is utilized in a large number of industrial processes that include I&I cleaning, agricultural chemicals, plastics and elastomers, textiles and several miscellaneous uses. A significant decline seen during 2009 has been attributed to the global economic recession.

AES has relative limited use in industrial applications but it is mainly used in I&I cleaners, including commercial hand dishwashing and car wash applications. AES is also used in emulsion polymerization of plastics and elastomers. Other minor use areas include textiles and in the production of wallboard. A slight decline in consumption has been seen during 2009, falling about 2,000 tons from 2008 levels.

AE is used in all types of cleaners, agricultural chemicals, pulp and paper chemicals and in textile processing. A shift from APE to AE and other nonionic surfactants has been going on for years. This conversion will no longer drive increased AE consumption, as it appears done. AE saw a [REDACTED] decline in the industrial sector, declining more than its use in the household sector.

APE use was down the by the largest percent but only modestly in nominal terms. APE is still allowed in derogated applications where and when it is part of a registered formulation. However, many manufacturers have advanced with APE-free formulations. Although still produced in Western Europe, local consumption has been dropping and the produced material is largely being exported. At the same time, some material is still seen being imported into the region from Russia. APE use is off significantly in the western area but in some of the Central European areas, the substitution process still has opportunities.

# Surfactant Developments

A quarterly newsletter covering primary surfactants

Sample

## SURFACTANT DEVELOPMENTS NEWSLETTER QUARTERLY REPORT CALENDAR, 2013-2017

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2016	APE Replacements	Dow Profile	
	Sustainable Surfactant Programs		Southeast Asia
	Feedstock Review		Central & West Europe
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2013	Alcohol Ethoxysulfates Profile	Oxiteno Profile	
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