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SNIPPETS
FOR THE PAPER INDUSTRY

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EVOLVING CHEMISTRIES - WORKING FOR PAPER

While there are about 3000 different types of chemicals which '*can be used*' in papermaking, in practice, there are only about 200 individual chemicals commonly used, each satisfying a specific need.

Specialty paper chemicals have helped to reduce the consumption of water and energy and increased the use of wastepaper. They have also contributed to the tremendous speed increase possible now in modern paper machines.

According to a new report published by Transparency Market Research on ***Specialty Pulp and Paper Chemicals Market*** *(Basic, Functional, Bleaching and Process Chemicals)* the specialty pulp and paper chemicals market was valued at US$ 18 billion in 2012 and is expected to cross US$ 24 billion by 2019.

WHICH ARE THE EVOLVING CHEMISTRIES ?

STARTING FROM THE END : PRINTING

"All's well that ends well". Hence the printer is the ultimate consumer of all graphic papers and the packaging converter for the packaging grades. How best have the novel chemistries served them ?

Considerable research has gone into paper optimized specifically for color inkjet printers. The technology developed to improve inkjet-printing quality on plain uncoated porous paper is based on priming the substrate (paper) with a cationic agent that binds the anionic pigment or dye, present in the ink, to the paper, thereby reducing feathering and smearing.

ColorLok Technology developed by HP represents a new more advanced standard developed with a similar chemistry. ColorLok papers are engineered with special additives that chemically react with inkjet inks, causing the ink vehicle to absorb more deeply into the paper while holding the pigment close to the surface, resulting in faster drying time, more vivid colors and bolder blacks.

'Blanket contamination' is another a 'devil' that printers have to face, while printing offset on coated paper or packaging boards. The water fountain in the offset machine tends to hydrolyze the hydroxyl and carboxyl groups in the coated layer of the paper leading to release of pigment which appear as 'debris' on the printing blanket leading to machine downtime for cleaning. This has been solved to a large extent by use of insolubilisers based on Glyoxal, or AZC in the coating slurry. Research is directed towards further development of Polyamide polyurea grades which besides being insolubiliers are also 'printing promoters' leading to higher print gloss.

TACKLING THE 'STICKY' RUNWAY

The path to smooth machine runnability is strewn with obstacles termed as 'stickies'. Different 'chemical solutions' have been recommended :

- Bio-dispersants to break-up the agglomerates.
- Enveloping the sticky particles to prevent agglomeration
- Passivating wire part /other contact points to repel deposits
- Using esterase enzyme to hydrolyse polymeric adhesives
- Using nanoparticles like bentonite as scavengers
- Passivating stickies with polymer emulsions of high Tg values

Many approaches are evolving with mills ready to 'pay' for 'solutions' rather than just the 'chemicals'.

SIZING

The purpose of sizing is to resist the penetration or spreading of liquids through or on paper.

However, today, there are widely different kinds of liquids with which the paper may have to interact, and to which resistance is required.

Internal Sizes : There has not been a major change in the offered internal sizing products. The most important are still rosin sizes, AKD & ASA.

Although there have been no ground breaking developments within these typical internal size products, recent developments which have taken place are related, mainly, to change within the hydrophobic backbone of ASA and introduction of an unsaturated hydrocarbon chain (alkenyl ketene dimer) for AKD.

This last modification resulted in the change of the physical form of the delivered AKD product, which allowed reduction in the slipperiness problem encountered in earlier AKD processes.

The biggest improvement in the ASA application, which allowed for increasing importance of this product, was improved quality and improved application knowledge - allowing deposit free runs. Sizing reversion and fugitive sizing, issues that were so dominant in mid 1990's, are of much less concern now.

Ongoing Research in various organizations still concerns itself with : the *mechanism of AKD operation* ; *dynamics of AKD*

INDUSTRY NEWS	**Edelmann Group**, a leading German manufacturer of packaging materials (*for pharmaceutical, healthcare, tobacco and confectionery markets*) already operating 13 production sites around the world, have acquired major shares of Indian company **Janus Packaging Pvt Ltd,** signifying their interest in the growing Indian 'food and healthcare' packaging industry.

retention ; *improved stability of AKD emulsions* ; and *optimizing selection of suitable starch for emulsification to improve the ASA performance.*

Surface Sizing : Since sizing is affected by many different variables at the wet end of the paper machine, so there is a definitive trend in the industry toward surface sizing applications. Significant improvements in size press technology such as speed sizers, which offer good runnability and also allow for good economics have made it possible.

Major products in this group include Styrene Maleic Anhydride (SMA), Styrene Acrylic Emulsion (SAE), Styrene Acrylic Acid (SAA) and Polyurethane (PUR). In the last few years, Ethylene Acrylic Acid (EAA) surface size was introduced. Today some of these polymeric sizes are available in the cationic emulsion form which are described in literature as wet-end soft sizes suitable for application in mechanical grades.

STRENGTH IMPROVEMENT

Starch and modified starch continue to be the major dry strength improvers. Evolving chemistries are directed towards improved functionality and better efficacy of starch derivatives.

VTT, the Finnish Research Institute has collaborated with a starch producer to bring forth a new process which provides cost effective production of new types of chemically modified starch materials used as paper strength enhancers **.**

TALKING OF THE START : THE FIBER

The properties of fiber products are normally determined by its physical and chemical properties and the additives used in the processing. Surface chemistry has a profound influence on the binding properties of fibers required for papermaking. Attempts to modify fiber properties by chemical or physical grafting of cellulose and lignin by radical reactions evolved in the 1940's.

VTT, the Finish research organisation has now developed an innovative process that enables manufacturers and end users to customize fibers according to their specific needs and requirements. Properties of fibers can now be engineered based on targeted industrial needs.

The new method enhances the native surface properties of lignin rich fibers to bring completely unique properties to fiber materials. The process enables, bonding of chemical components to lingo-cellulosic fiber materials by chemical, enzymatic, and chemo-enzymatic methods.

CONCLUSION

Today, environmental concerns are paramount in any chemical process and chemicals have to conform to certain legislative norms. One such globally recognized norm is **REACH.**

REACH is the Regulation on "***Registration***, ***Evaluation***, ***Authorisation*** *and* ***Restriction of Chemicals".*** The main aims of REACH are to ensure a high level of protection of human health and the environment from the risks that can be posed by chemicals, the promotion of alternative test methods, the free circulation of substances on the internal market and enhancing competitiveness and innovation.

REACH makes industry responsible for assessing and managing the risks posed by chemicals.

However, this itself affords tremendous opportunities to Chemical companies and Research organizations to develop more ecologically safe products and processes to replace existing ones. Although initially perceived as 'costly', in the long run they can only benefit and contribute to the 'sustainability' of the Paper industry and the chemical industry itself !

QUOTABLE QUOTE	***"All life is an experiment. The more experiments you make the better." -*** *Ralph Waldo Emerson*
SCRABBLE	What does **p p i** stand for? (Hint : Relates to book production) First correct answer will win a Parker Vector Roller Pen (Maximum two prizes for one person in a year). Email your answers to snippets@wirefabrik.com by 20th October, 2013.
WINNER SEPT'13	**Mr. A. K. Sahu, Manager (QC/R&D), Emami Paper Mills Ltd.,** Village Balgopalpur, Dist.Balasore, Orissa-756020 **Answer :** **T R S** : TOTAL REDUCED SULFER
?QUIZ	**Place in order of bond strength (*strong to weak*)** **a) Van der Waals force b) Hydrogen bond c) Ionic bond** Email your answers to snippets@wirefabrik.com by 20th October, 2013.
WINNER SEPT'13	**Mr. Biman K Ghosh, Manager-Product Development, ITC Ltd.**, PSPD, Unit-Tribeni, PO Chandrahati, Dist. Hooghly,WB **Quiz :** Why is it necessary for décor papers to have sufficiently high wet-strength ? **Answer :** Décor papers are normally gravure printed with water based inks and subsequently impregnated with resins to create laminates. In both processes the paper is 'wet' under tension, hence high wet strength is desired.
Prizes	**1. Best / first correct answer** received will win one-year subscription to **IPPTA Journal** *(Maximum one prize for one person in a year).* **2. Best of the 12 monthly winners** in a year, will win one-year subscription to **Paper 360° Magazine, USA.**
☺ ***Fuelling Stations***	Some elderly persons on their morning walk were discussing the recent rise in fuel prices and its impact on their domestic budget. One senior citizen was particularly vehement, decrying the state of the economy. *"But Sir"*, said one*, "What's your worry. After retirement, you have sold off your vehicle, nor do we see you commuting anywhere".* The gentleman looked at him sternly and said *"Well. I still use my cigarette lighter"*

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