Deposit control

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OTHERS :

Felt and Wire Conditioning

Biocide

Deinking Chemical

Defoamer

Formation Aids

WWT Polymers

In the paper making process, other than slimy deposition caused by accumulation of biological phenomenon, non-biological deposition is another major production problem affecting yield and quality of paper. As cellulose papers are made from wood, they have a myriad of organic and inorganic substances either intra-cellular or extra-cellular which are intrinct to all plant products. These materials include both water-solubles and non-water solubles. Water soluble plant substances are lignin, tanins, flavoroids and phenolics; while the water insolubles are fatty acids, terpenes, rosin, glycerides and esters. Typical inorganic materials are calcium, silica, barium, sulphates, oxalates and carbonates. Much of these unwanted contaminants are removed during pulping, washing and refining processes by either physical or chemical means, however there are still culpable residue accumulated to cause significant damage to machine run-ability and paper quality.

There are 3 types of deposit in pulp and paper making namely, i)Pitch, ii)Inorganic and iii)Stickie. Type (i) or Pitch problem derives from natural substances which are caused by accumulation of extractives from chemical and mechanical pulp. During pulping, organic and inorganic substances are rendered soluble by high Temperature and high pH, when ambient conditions are returned to normal during paper making , depositions will occur. If these agglomerated substances are small, it does affect physical properties of the paper. When they are large enough, they become problematic. Generally water soluble inorganic salt will not poise deposition problem unless there is availability of high concentration of precipitating contra charge ions. E.g. oxalate from tree bark will remain soluble; however when high concentration of Ca ions from underground is added with conducive pH>6, hard inorganic precipitate will occur. This phenomenon causes inorganic depositions

In the recycling of waste paper, more man-made contaminants are introduced. These contaminants are Hot melts, SBR, adhesives, glue, and coating agents which are inherent to secondary fiber recycling. They cause Stickie problem as they are usually soft and amorphic; having the ability to change shape; they are not affected by pH or temperature as much as the other type of deposition. As they are hydrophobic, they grow by agglomeration over time.

. The common locations of depositions are :- Washers, Decker Face, Wire, Screen, Stock Chest, Stock Pump, Consistency regulators, Refiners, Head-box, Foils, and Forming Fabric, Felt and Dryer Fabric.

PITCH CONTROL

Earlier practice of Pitch control is with the use of Alum. Since alum is cationic, it is capable of coagulating the colloidal pitch particles and attaching it to the anionic cellulose fiber of Paper. However there is pH limitation for this pitch control approach as Alum does not ionized well under high pH condition. Fixative or fixing agents have been successfully used to solve Pitch problem. These are usually cationic polymer capable of attaching the culpable particles to the final paper sheet. Other paper maker used hydrophobic micro-adsorbents like talc and bentonite to prevent large scale agglomeration of pitch. Non-ionic polymer have also recorded success in some cases for mechanical pulp. The control principal is encapsulations.

INORGANIC DEPOSIT CONTROL

There are various method to confirm whether the deposition problem is Microbiological, Pitch, Inorganic or Stickie . These methods involved the use of IR (Infrared) GC (Gas Chromatography), TLC (Thin Layer Chromatography), EDX (Energy Dispersive X-ray) and AAS (Atomic Absorption Spectroscopy). A typical inorganic deposit would exhibit high inorganic metallic components in AAS. Upon its confirmation, the use of cheaper inorganic treatment program is warranted. In this program, since almost all deposits are caused by insoluble salts which have high solubility under lower pH, sometimes by re-locating the feed points of Alum

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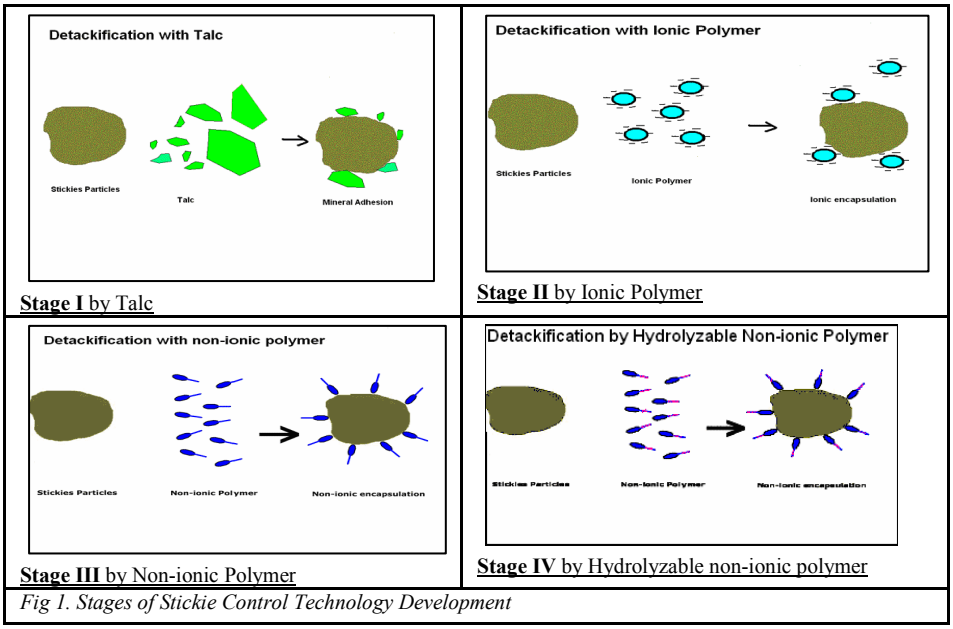
will eliminate the problem. In situations where pH needs to be high and cannot be altered, like in the pulping of Newsprint, the next viable step is to use Chelating agent to lower the electro-kinetic surface charge of the culpable particles to avert precipitations.

STICKIE CONTROL

Adsorbent technology developed some 3 decades ago is still being used today as one of the commonest chemical used in stickie control of Recycled fibre. Its advantage over other technology is that it is cheap, however its down side is that it is a powder and need to be properly dispersed before it can be used. In dispersion, surfactants are needed and they will affect wet-end chemistry of Paper making. Thus evolved are other technology which uses liquid for detackification by encapsulations of stickie particles. Initially ionic polymers were developed and used for stickie control with some degree of success. Again these cationic or anionic polymers with strong charges can influence water chemistry to the extend that the usage of other functional additives escalates. Non-ionic polymer has emerged in the last decade or so to replace the ionic type. It is proven to be a good agent for stickie control but it has its short-fall too. Its dissolution and reaction are slow and that treatment cost is un-competitive.

The latest technology for stickie control uses enzymes and hydrolysable non-ionic Polymer for dispersion and encapsulations. Enzyme acts to catalyze the dispersion of ink from fibre while the encapsulation process is still dependant on non-ionic polymer.



Stage I by Talc

Stage II by Ionic Polymer

Stage III by Non-ionic Polymer

Stage IV by Hydrolyzable non-ionic polymer

Fig 1. Stages of Stickie Control Technology Development

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