TECHNICAL TUESDAYS

DEVELOPMENTS IN RESIN FINISHING – PART III

REF: TT/ OCTOBER 2020 / WK 3

Recent trends - Formaldehyde free Resin finishing

In easy care finished fabrics there are several sources capable of releasing formaldehyde. The cellulose substrate may retain some free formaldehyde reactant during the finishing process. This formaldehyde will be released during storage of the finished fabrics. This will create formaldehyde odour issue during the garment processing of finished fabrics which have been stored for a period of time. In addition formaldehyde may be formed via the hydrolysis of the N-hydroxymethyl groups from untreated cross linking agent or from single end reacted DMDHEU molecules. Cleavage of the C-O bond of any cross links between the cellulose and the poly-functional cross linking agent will provide additional N-hydroxymethyl groups which can hydrolyze to release formaldehyde.

Formaldehyde is a toxic chemical, a severe eye irritant, a skin irritant and toxic if ingested. In recent years there has been a trend to avoid the use of formaldehyde or to eliminate formaldehyde release from the finished fabrics. This led to several researches and development of non-formaldehyde easy care finishing provides.

- **Glyoxal** with aluminum sulfate catalyst can impart a high degree of wrinkle resistance and smooth drying qualities to cotton fabric. Strength loss of the fabric can be experienced at high curing temperature. However, by using aluminum dihydroxy acetate as buffer the fabric can be treated with high curing temperature with less strength loss.
- **Poly-carboxylic acids** have shown good easy care finishing agent. A process was developed using monosodium phosphates as the curing catalyst for easy care finishing with polycarboxylic acid. The process is suitable for simple pad-dry-cure techniques. After padding with polycarboxylic acid, catalyst and softener, the fabrics was dried and cured at recommended temperature. The cured fabric is rinsed in running water and finally dried. The finished fabric has shown an excellent easy care finishing effect and good durability after washing. Breaking and tearing strength retention is also same as that in case of finishing with DMDHEU.
- **BTCA (1, 2, 3, 4 - butaneteracarboxylic acid)** is another easy care finishing. Sodium hydrosulphite is one of the most active curing catalysts for easy care finishing with BTCA. By using sodium hypophosphite as catalyst it is possible to reduce the curing time. BTCA could be the effective cross-linking agent for high quality cotton fabric.

Silicones in Resin finishing

The rigid cross-links that are formed with the DMDHEU prevent the redistribution of stress by preventing movement within the fiber microstructure. The cross linking of cellulose molecules causes stiffening of the cellulosic macromolecular network. This leads to reduction of the mechanical strength of the finished cotton fabrics. Beside cross linking, catalyst also contributes in the strength loss of finished fabrics. Magnesium Chloride is a catalyst which is used while finishing with DMDHEU also causes degradation of cellulose. Fabric strength loss also depends on both the cation and anion of the catalyst. It is therefore important to select the right catalyst and right dosage of it to optimize the tensile strength retention of the finished fabrics.
The loss in strength of the fabric is the major disadvantage of the resin finishing. This strength loss can be minimized by treating the fabric with silicone based softeners. These softeners play an important role in improvement of tear and tensile strength of the resin finished fabric.

Polyethylene emulsion is the most commonly used softener in resin finishing which improves the strength. Organo modified Polysiloxane is another softener which gives better strength improvement than polyethylene emulsions. Combination of silicone softeners are also used to minimize the strength loss.

.....To be continued.....

UNSCRAMBLE THE JUMBLE WORDS
NESIUMGAM LORCHDE
ILSICONE
OXALGLY
BARCOXYPOLYLIC ICAD

Last week`s Answers: 1) DIMENSIONAL 2) DIMETHYLOL 3) CROSS LINKING 4) STIFF

Wishing you a great week ahead!

Technical Tuesdays is a knowledge sharing initiative by Resil Chemicals Private Limited
arc@resil.com | www.resil.com.