

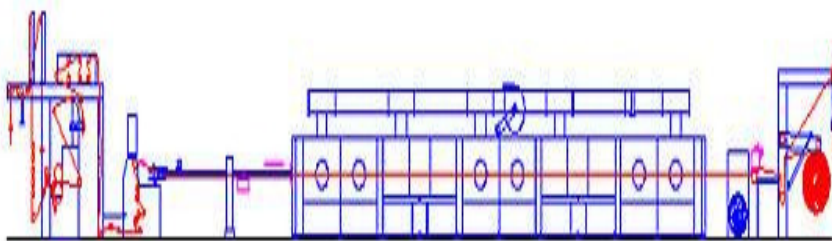
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## PROBLEMS AND THEIR REMEDIES IN POLYESTER PROCESSING

### Remedies of colouration

#### Thermosetting

Improper dyeing can be traced to improper heat setting. Good heat setting is the chief quality criterion in superior quality fabrics. The heat setting temperature should be accurately measured using an infrared sensing thermometer. The ideal range is 180-210°C, 40-50°C above the dyeing temperature. It has an effect on the equilibrium dye uptake, more in case of HT dyeing as compared to carrier dyeing.



The research shows that residual shrinkage is 0 per cent at 180°C and thus thermosetting should be carried out at this temperature only. It also shows minimum dye uptake at this temperature as number of crystals has increased and the free volume has decreased. A reverse trend is observed above this temperature - the number of small crystals agglomerates to form larger crystals; thus increasing dye uptake.

Preventive measures include:

- Heat setting the entire lot in one go, rather than in portions
- Distributions of hot air within the stenter should be checked with the help of thermo papers periodically
- Dyes sensitive to variations in heat setting should be substituted by less sensitive dyes

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## Dye dispersion

Since a small part of dye dissolves in water, the dispersing agent is added for uniform dispersion. Increasing the dispersing agent amount, results in reduced depth of shade. The dispersion stability also depends on the particle size. Hence, optimum use of dispersing agent is important. In order to ensure good dispersion stability, it is necessary to take certain precautions like:

- No auxiliary used should have cloud point below 130°C
- Carrier, if added, should not be used in the beginning of dyeing
- All impurities such as sizes, etc. should be removed from the fabric
- For higher rate of heating as well as for higher rate of liquor circulation, special dyes should be used

Besides oligomers, there are other factors that affect the dispersability of dyestuff and affect the disperse dyeability of polyester under high temperature. These complex factors are dependent on dyestuff, substrate and dyeing conditions. They include:

- Factors related to dyestuff
  - Chemical structure and related physical characteristics (the melting point, solubility in water etc.)
  - Physical characteristics of dispersed dyestuff particles
  - Type and characteristics of dispersants in dyestuff
- Factors related to substrate
  - Dyeability of the fibre
  - Density of fibre structure
  - Amount of oligomer contained in fibre
  - Presence of oil/thickener adhering to the fibre surface
- Factors related to dyeing conditions
  - Dye concentration
  - Characteristics and amount of dyeing auxiliaries (dispersant, leveling agent, carrier etc.)
  - Dye bath pH
  - Quality of water used in dyeing
  - Dyeing temperature (temperature raising conditions, simmering temperature etc.)
  - Dyeing time
  - Volume of substrate in the dye bath
  - Dye bath circulation efficiency