

TEXTILE CHEMISTRY

Paper No HSCT (102)

CC-2

Credits – 3+1=4

SEM – I(M.Sc. C.T.)

Marks : 100 + 35= 135

Objective

1. To acquaint the students about the polymers of which the textile fibers are made.
2. To understand the chemistry, production and fundamental properties of natural and synthetic fibers.
3. To familiarize with the chemical processing from designing to finishing of textiles and principals.
4. To acquaint the student with some advanced textile technology.

Unit –1 Polymer Chemistry

- a. Polymers, methods of polymerization, polymerisation process.
- b. Definition of co-polymer, oligomer, graft-co-polymer.
- c. Degree of polymerization, molecular weights of polymers and its determination.
- d. Characterization of polymers using chemical and instrumental method.
- e. Orientation and crystallinity of polymers: their influence on fiber properties.

Unit –2 Chemistry of Cellulosic Fibers

- a. Introduction to cotton, varieties, properties, longitudinal and cross sectional view.
- b. Molecular structure of cellulose, action of acids and alkalis, hydro cellulose and oxy - cellulose, mercerization, liquid ammonia treatment.
- c. Regenerated cellulosic fibers – viscose rayon, cuprammonium rayon, cellulose acetate, rayon, polynosic – their manufacture, properties and uses .

Protein Fibers – Wool & Silk

1. Chemical composition, molecular structure, physical and chemical properties, action of acids, alkalis and other chemical on protein fibers.
2. Brief description on, felting of wool, degumming and weighting of silk, shrink proofing of wool.

Unit – 3

Synthetic Fibers – Polyester, polyamide and acrylonitrile fibers.

1. Chemistry of the fibers – raw material, manufacturing process from polymer to fiber stage.
2. Physical and chemical properties of all the fibers and their uses. Examples of commercial production in India.
3. Blends of different fibers, composition and properties and uses in textiles and clothing.

Other natural and synthetic fibers.

Their chemical composition, properties and uses viz. jute, flax, hemp, tencel, polyethylene, carbon, polycarbonate, metallic, glass fiber and polyurethane fibers.

1. Classification of Textiles dyes, commercial dyes, C.I. constitution number and C.I. generic number.
 - Theory of dyeing
 - Chemical structures of various classes of dyes
 - Application of dyes on various substrates including blends.

Unit – 4 Textile finishing

- Classification of finishes
- Mechanical finishes
- Chemical finishes – Mercerisation, parchmentisation, durable press, wash 'n' wear, wrinkle recovery, chlorination.
- Resins, their application and chemistry
- Special purpose finishes
- Flame retardant, water repellent, antistatic, stain and soil release, moth proofing.

New Development in fibers manufacture

- Bicomponent and biconstituent fibers
- Special purpose fibers.

Practicals

1. Identification of fibers – cotton, polyester, viscose, polyamide, silk, wool, jute, etc. use of burning test, microscopic examination, chemical tests, solubility and staining tests.
2. Quantitative analysis of binary – polyester/cotton, polyester/viscose, polyester/wool, cotton/wool.
3. Enzymatic desizing, scouring and bleaching of cotton fabric.
4. Dyeing of cotton (yarn) with direct, reactive and vat dyes (one each) by exhaust method. Dyeing of polyester with a disperse dye in high temperature and high pressure (HTHP) dyeing technique. Dyeing of wool and silk with an acid dye by exhaust method. Dyeing of acrylic fiber with a basic cationic dye by exhaust method.
5. Use of natural dyes and mordant.
6. Determination of hardness of water.
7. Mill visit to acquaint student with modern chemical processing.

References

1. shenai, V.A. (1984): Technology of Textile Processing, Vol. -IX, Sevak Publication.
2. Cook. J. Gordon. Hand Book of Textile Fibers, Man -Made Fibers, Merrow Publicing Co. Ltd. England.
3. Moncrief : R.W. Manmade Fibers, John Willey & Sons New York.
4. Trotman, E.R. (1975): Dyeing and Chemical Technology of Textile Fibers Charies Griffino Company Ltd., London.
5. Marsh, J.T. (1979): An Introduction of Textile Finishing B.I. Publications.
6. Mark H., Wooding N.S. & Atlas, Smeeds, (1970): Chemical aft er treatment of Textiles, John Willey & Sons Inc. NY.

7. Lewin, M. and Sello, Stephen B. (1983): Handbook of Fiber Science and Technology, Vol. II Chemical Process of Fibers and Fabrics, Functional Finishes – Part A. Marcel Deker, Inc. NY and Basel.
8. Shenai, V.A. (1991): Introduction to the Chemistry of Dyestuffs, Sevak Prakashan.
9. Gulrajani M.L. and Gupta, D. (1992): Natural dyes and their Application to Textiles, IIT Delhi.
10. Mohanty, Chandramouli, Naik, (1987): Natural dyeing process of India, Ahmedabad, Calico Museum of Textiles.
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