

PC - 5 Additives and Compounding

Module I

Introduction – limitations of polymeric materials – Technological Requirements of additives for plastics and its Properties – classification – types – chemistry and mechanisms Limitations, selection criteria, general effect on properties.

Module II

Additives for plastics- Fillers – Antioxidants–ThermalStabilizers, Impact Modifiers,Lubricants-Plasticizers,Toughening-agents-Colourants- master batch – color matching-Fire retardants-Coupling agents-blowing-agents-Ultraviolet stabilizer-Antistatic agents-Anti blocking agents-Slip and antislip agents-processing aids-mould releasing agents–miscellaneous additives- Commercially available fillers and additives.

Module III

Mixing and mixing equipments- General consideration formulation methods of incorporation of additives and mixing and compounding basic concepts, mechanism of mixing and dispersion Principles of mixing– Operating characteristics – Machine construction – Specifications – Process control systems and working details of Batch mixers and continuous mixers – High speed mixer – Two roll mill – Banbury Mixer – Ribbon blender – Planetary mixers –Twin screw extruders (co rotating / counter rotating).

Mixing methodologies : Types of Mixing, Dispersive/Distributive, Agglomerates, mixing of solid additives, mixing of liquid additives, Difference between mixing and compounding, etc.

Module IV

Selection of Polymers and Compounding ingredients – Introduction, types and characteristics of compounds – polymer blends and alloys, polymer formulations, compounding practice – selection of polymer – selection of compounding ingredients – methods of incorporation of additives into polymeric materials, General objectives – possibilities and limitations of mixing and compounding – Methods of incorporation of additives into polymer materials, Mixing- continuous compounding machinery, safety precaution.

Module V

End Use Market for Blended Plastics - Principles of Material selection including consideration of conventional materials competitive with plastics. Survey and uses of plastics additives with reasons for their importance in major industries like, Agriculture, Packaging, Building, Transport, Electrical, Electronics and Telecommunications, Medical and Furniture.

Text Books

- 1.George Mathews, “Polymer mixing technology”, Applied science, London,1984
- 2.Gatcher and Muller, “Handbook of Plastics Additives”, Hanser Publishers, New York.

Reference Books

1. Al – Malaika; S. Golovoy; A and Wilkie (Eds), Chemistry and Technology of Polymer Additives, Black well Science Ltd, Oxford (1999)
2. Matthews; F.L.and Rawlings; R.D, Composite Materials, Engineering and Science

Chairman and Hall, London (1994)

3. Plastics Testing Technology Hand Books by Vishu Shah

4. Hand Book of Plastics Test Methods by Brown R.P

5. Mascia; L., The Role of Additives in Plastics, Edward Arnold Publishers Ltd., U. K. (1974).

6. Murphy; John, Additives for Plastics Handbook, 2nd Edition, Elsevier Advanced Technology, Oxford.

7. White; J.L., Coran; A.L and Moet; A., "Polymer Mixing Technology and Engineering", Hanser Gardner Publications Ltd., USA, 2001.

8. Manas Chanda and Salil K. Roy, "Plastics Technology Handbook", Marcel Dekker, New York.

9. Marcel Dekker, "Mixing in polymer processing" - Edited by Chris Rawendaal,.