

Adhesives – Concepts and terminology, functions of adhesives, advantages and disadvantages of adhesive bonding, adhesive action, development of adhesive strength, physical & chemical factors influencing adhesive action, adsorption and surface reaction. Theories of adhesion. Requirements for a good bond, criteria for selection of adhesives.

Thermodynamics of Adhesion : Contact angle, work of adhesion, acid - base considerations. Surface topography, surface features and forces, wetting and setting, thermodynamic work of adhesion - influence of constitution on adhesion – interfacial bonding – coupling agents, mechanism of adhesive action.

Characterization of Adhesives : Principle of fracture mechanics, peel, lap sheen and butt tensile tests. Pull out of an extendable fibre, various testing and evaluation of adhesives, energy dissipation - – plasticity – strength.

Adhesive Types and Industrial Adhesives: Types of adhesives, Adhesive from natural origin - Synthetic adhesives - phenolic, epoxy, polysulphide, polyurethane, polyvinyl acetate, polyvinyl alcohol, polyvinyl acetal, acrylics, cyanoacrylate, high temperature silicone adhesives, hot melt adhesives, pressure sensitive adhesives, sealants, water based adhesives, anaerobic adhesives. Inorganic adhesives - principle of compounding – role of resins – fillers – antioxidants – accelerator systems.

Applications of Adhesives: Adhesives for structural application, aerospace, automobile industry, conductive adhesives, adhesive in electrical industry.

TEXT BOOKS / REFERENCES:

1. A. J. Kinloc, Adhesion and Adhesives: Science and Technology, Springer, 1987
2. W. A. Lees, Adhesives in engineering design, Springer Verlag, Berlin, 1984.
3. D.M. Brewis and D. Briggs, Industrial adhesion problems, Wiley Interscience Publication, New York, 1985.
4. I Skeist, ed., 3rd Edition, Handbook of Adhesives, Chapman and Hall, New York, 1990.
5. A.V. Pocius, Adhesion and Adhesives Technology, Hanser, 2012
6. P. Ghosh, Adhesives and Coatings Technology, Tata McGraw-Hill Education, New Delhi, 2008.