

Chapter 22

- Synthetic Fibers:
 - A fiber is often defined as an object with a length-to-diameter ratio of at least 100.
 - The thickness of a fiber is commonly expressed in terms of denier, which is the weight in grams of a 9000-m length of the fiber.
- Fiber processing - to develop the tensile strengths and moduli, they must be drawn(stretched) to orient the molecules along the fiber axis and develop high degrees of crystallinity
 - fiber-forming polymer are crystallizable, and the polymer must have polar groups between which strong hydrogen bonding holds the chains in a crystal lattice : (e.g. polyacrylonitrile, nylons).
 - OR be sufficiently to pack closely in a lattice held together by dispersion force (e.g. i-PP)
- Dyeing - dye must either form strong secondary bonds to polar groups on the polymer, or react to form covalent bonds with functional groups on the polymer.
 - fiber are dyed after spinning, the dye must penetrate the fiber, diffusing into it from the dye bath.
 - the size of the dye molecule is such that it cannot penetrate crystalline areas of the polymer so it is mainly the amorphous regions that are dyed(e.g) polyacrylonitrile : strongly bound to each other that it is difficult for the dye to penetrate. - acrylic fibers usually contain minor amounts of plastizing comonomers to enhance dye penetration.