Polyamides

Subjects: Polymer Science

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Polyamides are polymers whose repeat unit is joined by an amide linkage, and they are produced either by the polycondensation of a diamine with a diacid or by the ring-opening polymerisation of a lactam. The amide groups form hydrogen bonds between chains, which raises the melting point and the strength relative to a polyolefin of comparable chain length [1]. Nylon 6,6 and nylon 6 are the two largest-volume grades, and they differ in melting point because the regularity of the hydrogen-bond pattern differs [2]. Water is absorbed by the amorphous regions and acts as a plasticiser, so the modulus and the dimensions of a part change with humidity [3]. Aromatic polyamides, in which the amide groups sit on benzene rings, give rigid-rod chains with a very high tensile strength and thermal stability [4]. Recycling is mainly mechanical, since hydrolysis of the amide bond requires severe conditions and the resulting monomers must be repolymerised [5].

amide linkage | hydrogen bonding | lactam | nylon | moisture absorption | aromatic polyamide | polycondensation

References

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