

Editorial Announcement

Editorial

An elastomer is a polymer with viscoelasticity (i.e., both viscosity and elasticity) and with weak intermolecular forces, generally low Young's modulus and high failure strain compared with other materials. The term, a portmanteau of elastic polymer, is often used interchangeably with rubber, although the latter is preferred when referring to vulcanisates. Each of the monomers which link to form the polymer is usually a compound of several elements among carbon, hydrogen, oxygen and silicon. Elastomers are amorphous polymers maintained above their glass transition temperature, so that considerable molecular reformation, without breaking of covalent bonds, is feasible. At ambient temperatures, such rubbers are thus relatively compliant ($E \approx 3$ MPa) and deformable. Their primary uses are for seals, adhesives and molded flexible parts. Application areas for different types of rubber are manifold and cover segments as diverse as tires, soles for shoes, and damping and insulating elements. The importance of these rubbers can be judged from the fact that global revenues are forecast to rise to US\$56 billion in 2020. IUPAC defines the term "elastomer" as a "polymer that displays rubber-like elasticity. Rubber-like solids with elastic properties are called elastomers. Polymer chains are held together in these materials by relatively weak intermolecular bonds, which permit the polymers to stretch in response to macroscopic stresses. Elastomers are usually thermosets (requiring vulcanization) but may also be thermoplastic (see thermoplastic elastomer). The long polymer chains cross-link during curing, i.e., vulcanizing. The molecular structure of elastomers can be imagined as a 'spaghetti and meatball' structure, with the meatballs signifying cross-links. The elasticity is derived from the ability of the long chains to reconfigure themselves to distribute an applied stress. The covalent cross-linkages ensure that the elastomer will return to its original configuration when the stress is removed.