

Figure 2.1 Simulated structure of high-density polyethylene (HDPE) contrasted with the structural formula of linear or normal decane.

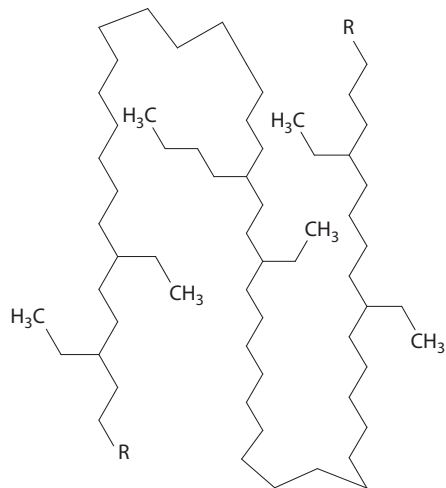


Figure 2.2 Simulated structural formula for branched low-density polyethylene (LDPE); compare with Figure 2.1 for HDPE.

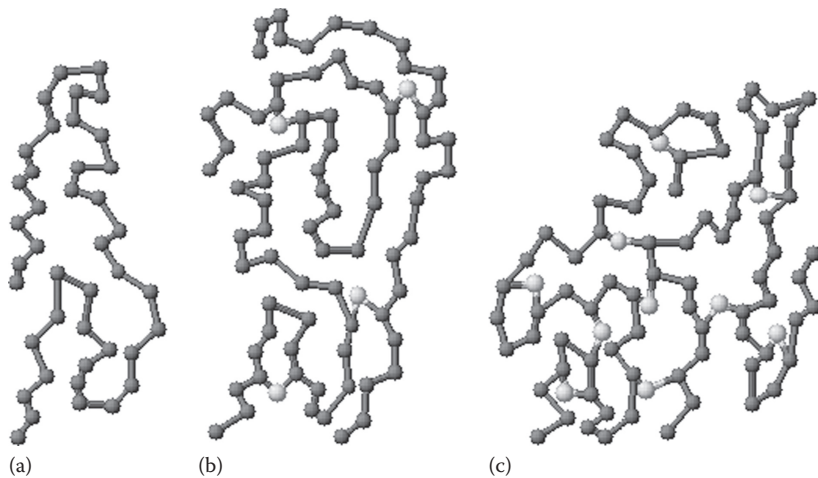


Figure 2.3 Skeletal structural formulas of a linear polymer (a), and a network (cross-linked) polymer with low-cross-linking density (b) and high-density cross-linking (c). Cross-link sites are noted by the non-darkened spheres.

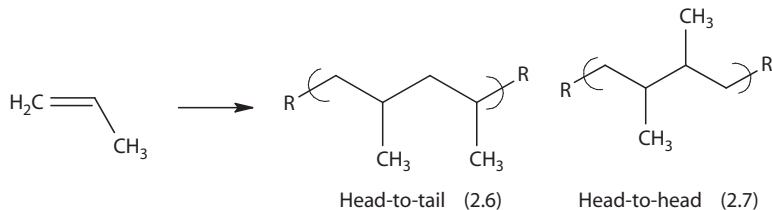


Figure 2.4 Simulated structural formulas showing the usual head-to-tail and unusual head-to-head configurations of polypropylene.

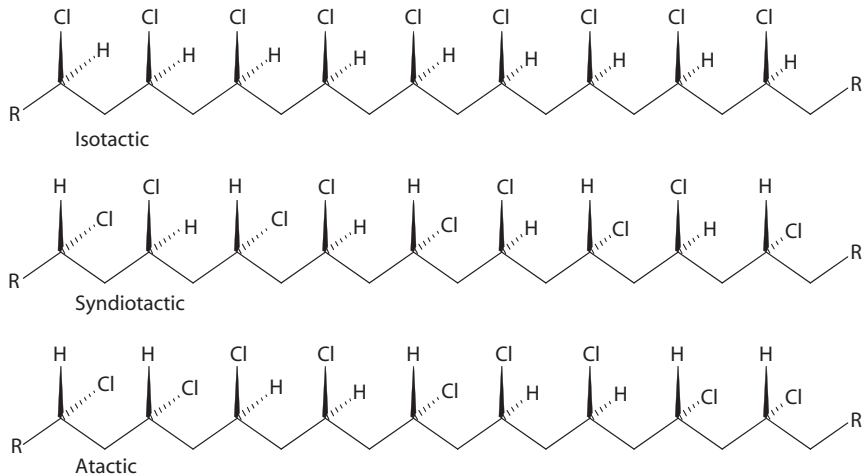


Figure 2.5 Skeletal formulas of isotactic, syndiotactic, and atactic of poly(vinyl chloride), PVC.

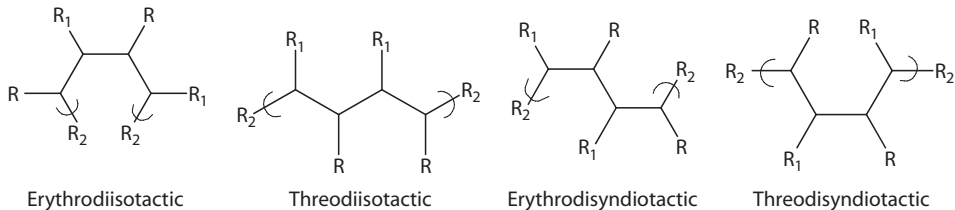


Figure 2.6 Simulated formulas of ditactic isomers where R_2 are chain extensions and R and R_1 are not hydrogen.

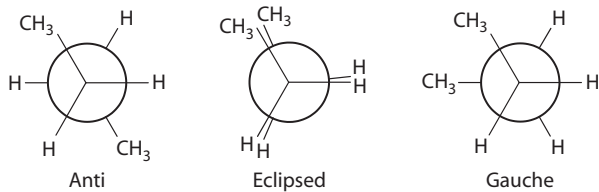


Figure 2.7 Newman projections of designated conformers of n-butane.

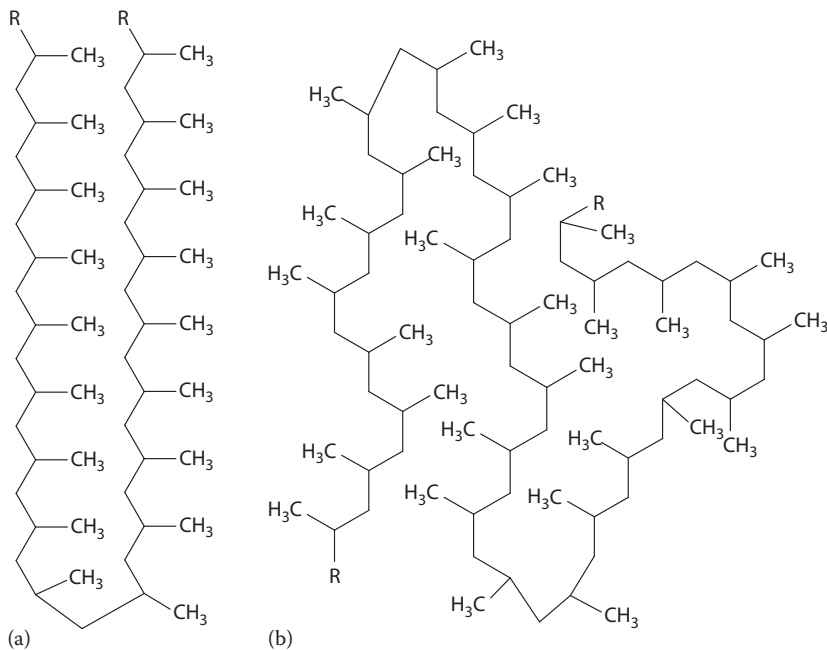


Figure 2.8 Representation of a crystalline portion from (a) isotactic polypropylene and (b) an amorphous portion from atactic polypropylene.

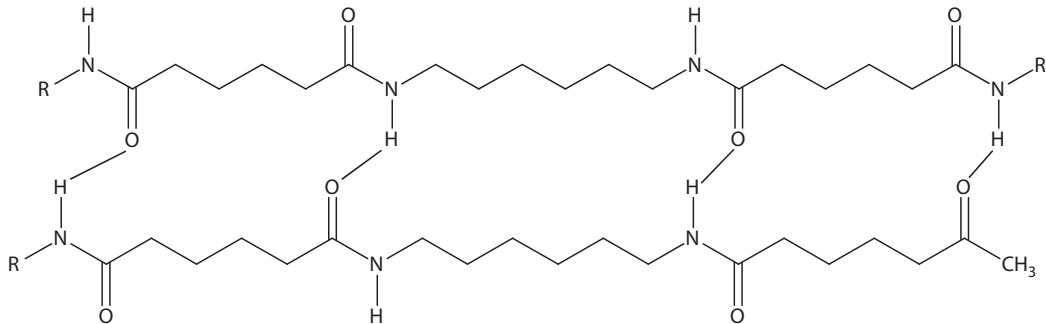


Figure 2.9 Typical hydrogen bonding (shown as “–” between hydrogen on nitrogen and oxygen for nylon 66.

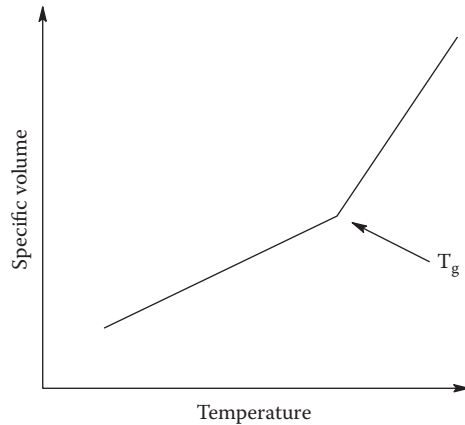


Figure 2.10 Determination of T_g by noting the abrupt change in specific volume.

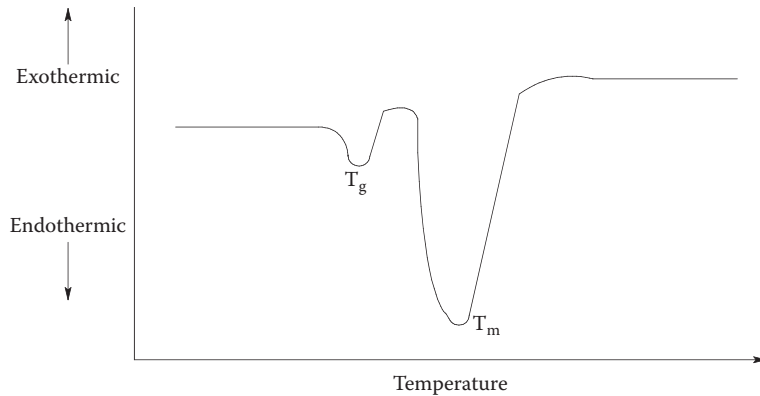


Figure 2.11 Typical DSC thermogram of a polymer.

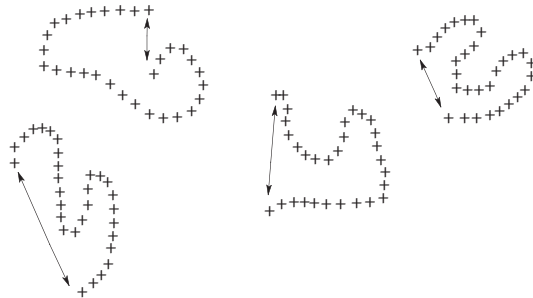


Figure 2.12 End-to-end distances for four 30-unit chains.

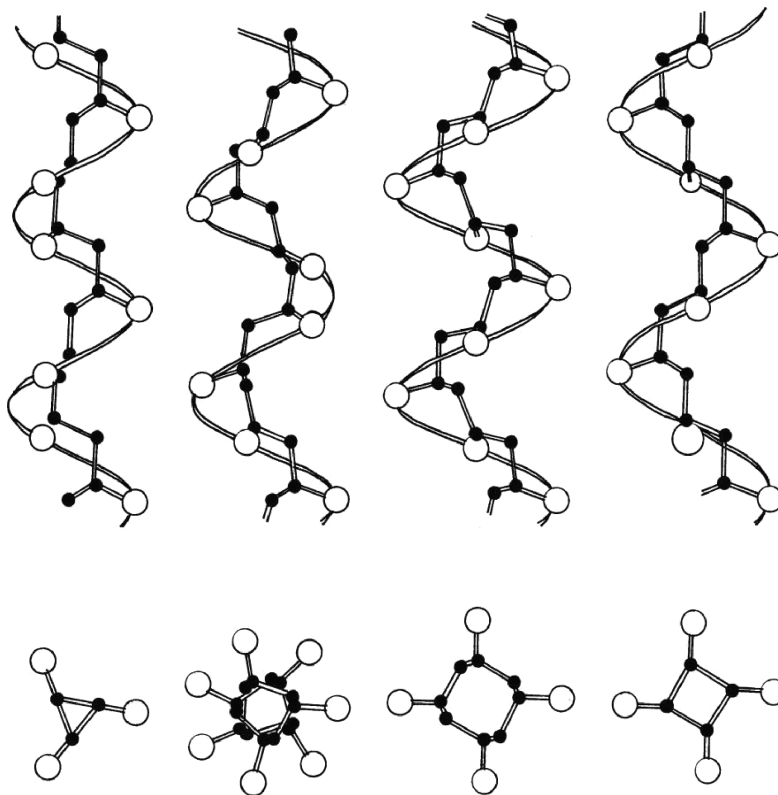


Figure 2.13 Helical conformation of isotactic vinyl polymers. (From Gaylord, N.: *Linear and Stereoregular Addition Polymers*. N. Gaylord and H. Mark, eds. Wiley, New York. 1959.)

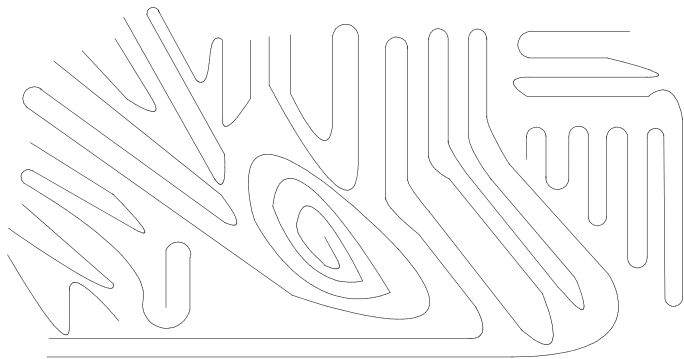


Figure 2.14 Schematic two-dimensional representation of a modified micelle model of the crystalline–amorphous structure of polymers.

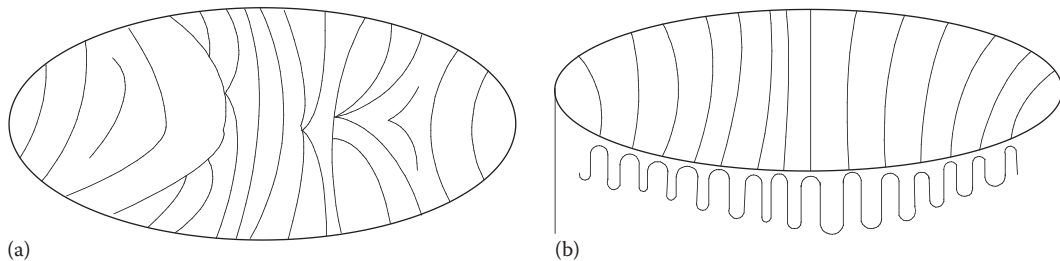


Figure 2.15 Structure of a spherulite from the bulk. (b) A slice of a simple spherulite. As further growth occurs, filling in, branch points, etc. occur as shown earlier (a). The contour lines are simply the hairpin turning points for the folded chains.

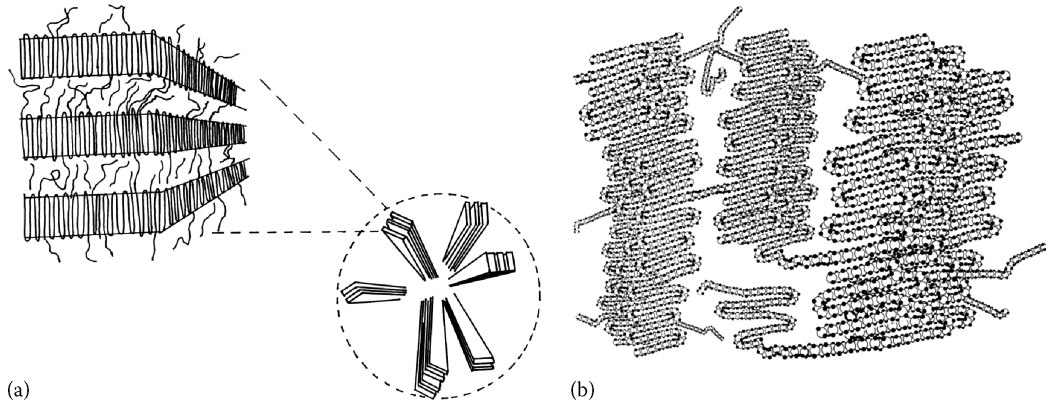


Figure 2.16 (a) Spherulite structure showing the molecular-level lamellar chain-folded platelets and tie and frayed chain arrangements and (b) a more complete model of two sets of three lamellar chain-folded platelets formed from polyethylene. Each platelet contains about 850 ethylene units as shown here.

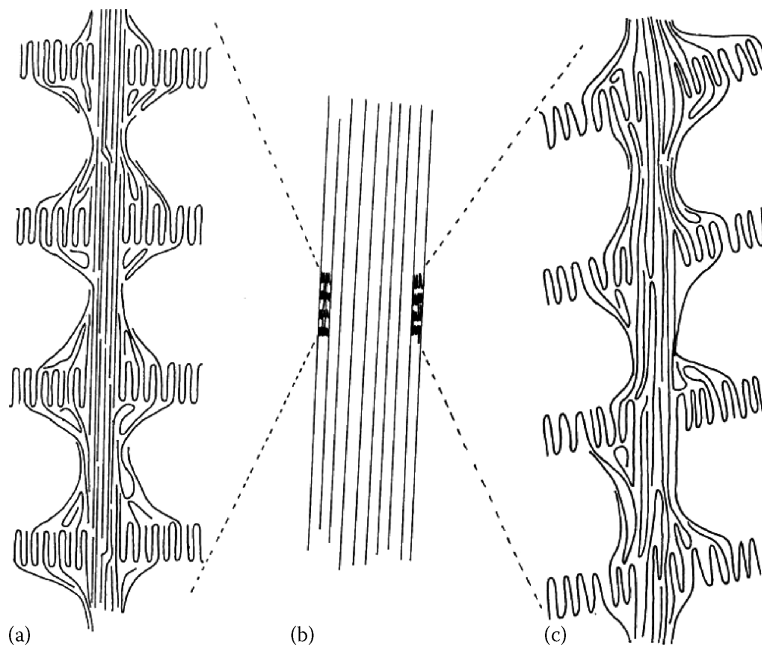


Figure 2.17 (a) Crystalline polymer structures formed under applied tension including flow conditions. (b) The tertiary mono-fibrillar structure including platelets and at the left shows these mono-fibrillar structures bundled together forming a quaternary structure fibril. (c) The distorted shish kebab formed with more rapid flow.

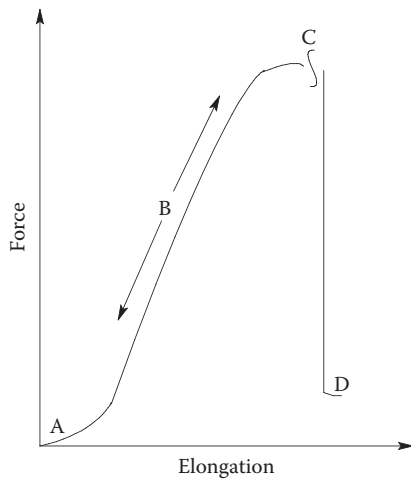


Figure 2.18 Elongation of an elastomer as a function of applied force, stress, where A is the original “relaxed” state, B represents the movement to full extension, C is the point at which the elastomer “breaks,” and D represents the force necessary to pull two separate pieces of elastomer apart.

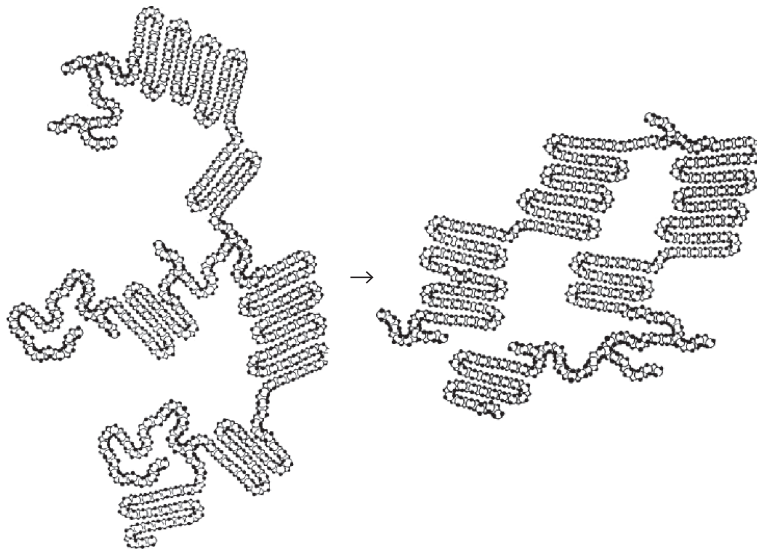


Figure 2.19 Idealized structure illustrating crystalline (ordered) and amorphous (nonordered) regions of lightly branched polyethylene chains for a prestressed and stressed orientation.

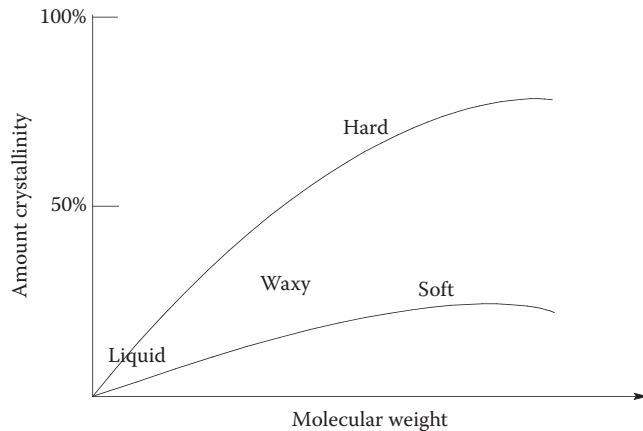


Figure 2.20 General physical states of materials as a function of crystallinity and molecular weight.

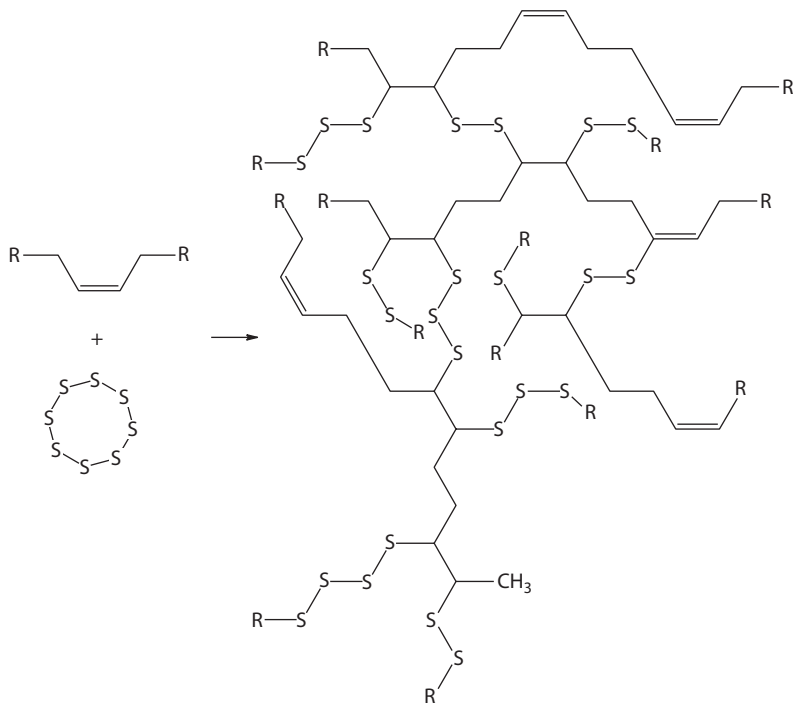


Figure 2.21 Chemical cross-linking of cis-1,4-butadiene through reaction with sulfur.

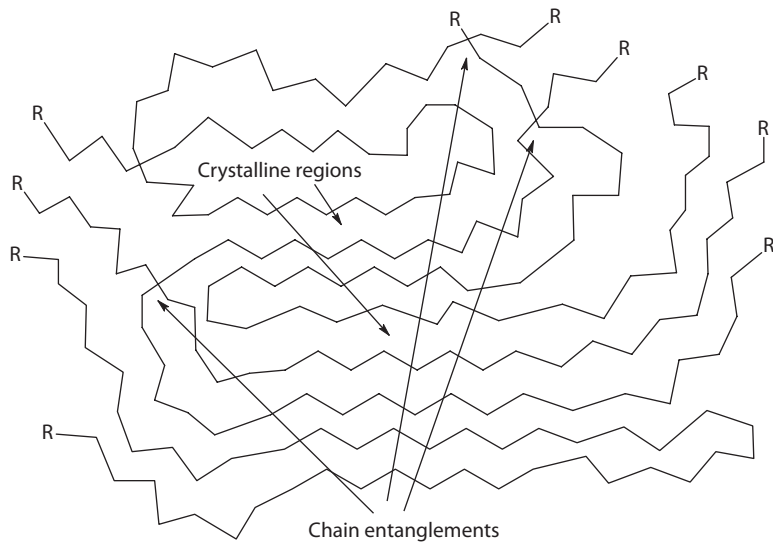


Figure 2.22 Illustration of two types of physical cross-linking—chain entanglement and crystalline regions.