Characteristics of Polymers

- Low density (1 – 1.5 g/cm^3)
- Low T_M (or T_g)
- Low thermal and electrical conductivity
- Low elastic modulus (stiffness)
- Low hardness, strength

} and much more sensitive to temperature than metals or ceramics

- Low creep resistance ("heat distortion")

Applications

- Insulators
- Flexible parts (e.g., seals)
- Pipe, packaging, toys

Thermoplastics and Thermosets

Thermoplastics become "plastic" (soften, melt) upon heating and harden upon cooling; repeatable.

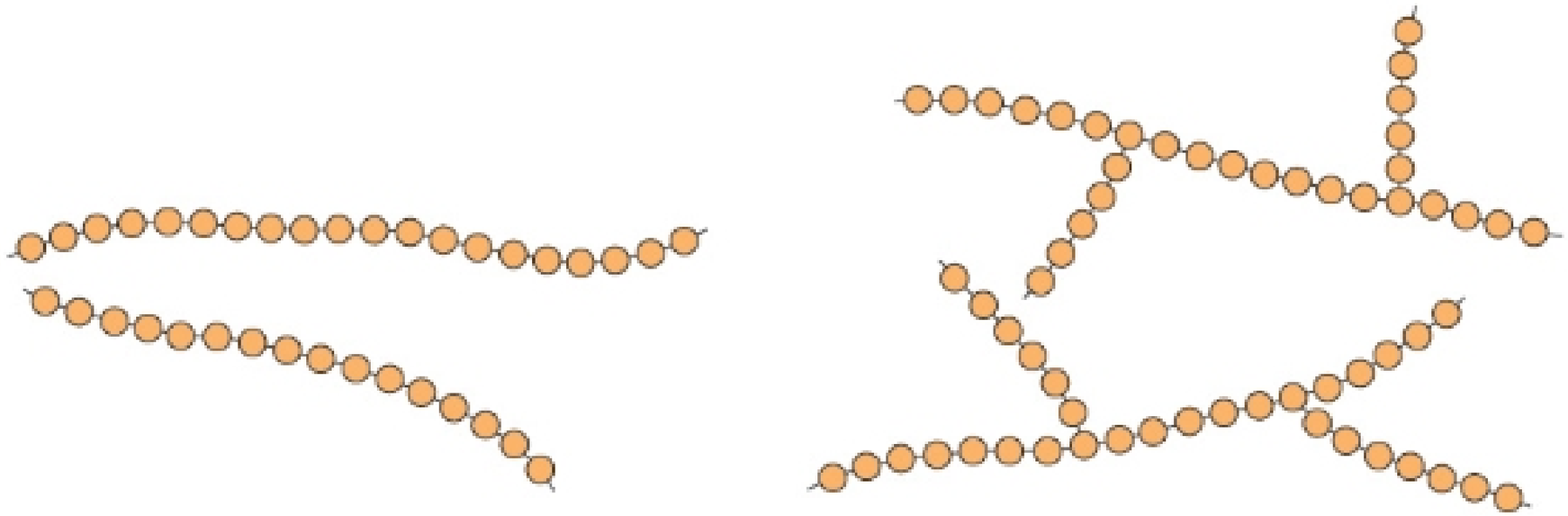
Linear or branched structures:

semicrystalline and non-crystalline

Thermosets become hard ("set") by polymerization or cross-linking (curing) usually by heating, and do not melt upon reheating.

Network structures: non-crystalline

Polymer Structures Summary



(a)

(b)

(c)

(d)