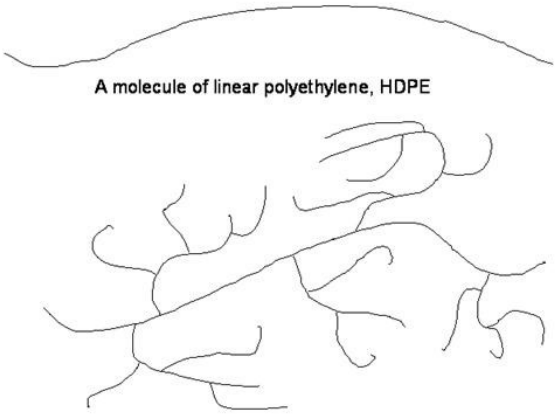
1. Branched chains

Averill Chapter 24, Section 5, Conceptual Problem 1

Why do branched-chane alkanes have lower melting points than straight-chain alkanes of comparable molecular mass?

2. Density and polymer properties

a) Polyethelyne exists either as a linear (straight-chain) polymer or as a branched polymer. Which is the high-density form? Explain.



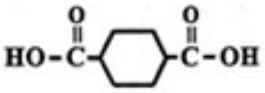
A molecule of linear polyethylene, HDPE

A molecule of branched polyethylene, LDPE

b) In visible light, high-density polyethylene (HDPE) is opaque (white) while low-density polyethylene (LDPE) is transparent. Explain.
c) Which form of PE is mechanically more flexible?
d) Which form of PE has the higher melting point?

3. Polymerization

Show how the following monomer can be polymerized. Which type of polymerization is used?



4. Polymerization

Show how $H_2C{=}CH_2$ can be polymerized. What type of polymerization is used?

5. Relative boiling points

Why do aldehydes and ketones have higher boiling points than alkanes or alkenes of comparable molecular mass? How is increasing the mass of aldehyde of ketone is going to affect its melting point? Compare boiling point of carboxylic acids to similar mass alkanes and alkenes and explain the physical reasoning for the difference.

6. Degree of polymerization

Shackelford, Introduction to Materials Science for Engineers, Chapter 12, Problem 6

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