

Answer all the questions and solve the given problems. Questions 1 to 8 carry one (1) point each. Problems Numbered 9 and 10 each carry four (4) points. Problem numbered 11 carry six (6) points.

Total points= 20

1. Name four natural polymers:
2. Hydrocarbons consists of elements _____ and _____.
3. Ethylene(C₂H₄) is a _____ at ambient temperature but when reacted under appropriate conditions it will transform to _____ which is a solid polymeric material.
4. What is the trade name for polytetrafluoroethylene (PTFE)?
5. Show the generalized form of representing a polymer:
6. Give two examples of linear polymers:
7. What kind of molecular structure Bakelite has?
8. Polymer molecules maybe characterized in terms of their size, shape, and _____.
9. If a polymer has 2 repeat units in its unit cell, its repeat unit molecular mass is 31.5 g/mol, and the unit cell volume is $10.2 \times 10^{-23} \text{cm}^3$, calculate the density of a totally crystalline structure (ρ_s) of this polymer.

10. In the above problem (Item numbered 9), if ρ_a = density of the totally amorphous polymer = 0.882 g/cm^3 and ρ_s = density of the polymer = 0.899 g/cm^3 , what is the percent crystallinity (% crystallinity) of the polymer.

11. Solve Problem 4.6, Page 143 of Callister & Rethwisch.