

1. What is the characteristic of molecule to behave as monomer?
2. Name the monomer used to prepare- (i) Hypalon and (ii) Buna-N
3. List the components used for bulk polymerization of thermoplastic polymer.
4. What is the characteristic of additive used to prolong the storage of monomer?
5. Relate the molecular weight of polymer with the ratio of molar concentration of chain transfer agent and monomer
6. Match the column A and B with proper justification.

A	B	Justification
(i) AlBr_3	(a) Used as initiator in cationic polymerization	?
(ii) Methyl hydroquinone	(b) Used as inhibitor	?
	(c) Used as initiator in addition polymerization	?

7. What is the electronic configuration of Ti^{3+} ion?
 8. Name of the catalyst used in Phillip process?
 9. Which catalyst system is used by Ziegler in his first discovery to polymerize ethylene?
 10. What is the function of diethyl aluminium chloride in the production of polypropylene?
 11. Name the monomer(s) used to prepare- (i) LLDPE and (ii) HDPE
 12. List the conditions used in the high pressure process to polymerize polyethylene.
 13. List two parameters that controls kinetic chain length of addition polymers
 14. What is the reason of branching during production of LDPE?
 15. Which condition is used (in terms of reactivity ratio) to synthesize alternate copolymer?
- Select appropriate catalyst system (from the following) to obtain isotactic methyl methacrylate
16. (i) BF_3 etherate/propane, (ii) $n\text{-C}_4\text{H}_9\text{Li}$ in alkane, (iii) $\text{TiCl}_3/\text{DEAC}$, (iv) $\text{TiCl}_4/(\text{C}_2\text{H}_5)_3\text{Al}/\text{heptane}$
 17. Compare the radical polymerization and cationic polymerization in terms of constituents used, mechanism, advantages and disadvantages.
 18. Relate initiator concentration with the reaction time (with complete derivation assuming steady state condition).
 19. Compare the α , β , γ , δ form of TiCl_3
 20. Explain the procedure to increase the efficiency of titanium catalyst
 21. Explain the reason of possessing higher efficiency of Aluminium alkyl compound with respect to Aluminium halide as co-catalyst in Ziegler Natta Process.
 22. Classify polyethylene. Elaborate manufacturing procedure of isotactic polypropylene.
 23. Differentiate HDPE and LDPE.
 24. The decomposition of benzoyl peroxide is characterized by half-life of 7.3 hr. at 70°C . Calculate the time required for the 60 % decomposition of initiator at 70°C . (Derivation of the relation is required)
 25. Compare the two processes and comment on which is more effective for high yield (Derivation of the relation is required using steady state assumption):
 - (i) 5 mmol of initiator is used to polymerize styrene for 6 hour at 60°C .
 - (ii) 10 mmol of initiator is used to polymerize styrene for 6 hour at 60°C .

[Note: Half-life of the initiator is 7.3 hours, $f = 0.4$, $K_p^2/K_t = 1.04 \times 10^{-2} \text{ L / mol.S}$ at 60°C , $1\text{mmol} = 10^{-3}\text{mol}$]
 26. Styrene is polymerized using 0.04 mol/L benzoyl peroxide as initiator at 60°C . Concentration of styrene taken is 8.65 mol/L. Calculate the kinetic chain length of the obtained polymer if gelation occurs. Assume for this calculation that the vinyl groups in both styrene and DVB are equally active and that chain termination occurs solely by coupling. [Data at 60°C : $k_d = 2.4 \times 10^{-6} \text{ s}^{-1}$; $f = 0.4$; k_p^2/k_t for styrene = $4.54 \times 10^{-4} \text{ L mol}^{-1} \text{ s}^{-1}$.] (Derivation of the relation is required)

$$\text{Kinetic chain length} = \left(\frac{k_p}{k_t^{1/2}} \right) \frac{1}{2(fk_d)^{1/2}} \frac{[\text{M}]}{[\text{I}]^{1/2}}$$