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SARDAR PATEL UNIVERSITY

M.Sc. (Semester-I) Examination

Tuesday, 12th April 2016

Course No.: PS01ECHE01, Polymer Chemistry

10:30 AM to 1:30 PM

Total Marks : 70

Q-1 **Answer the following:** **08**

(i) When non volatile solute added to solvent the freezing point of solution _____ and vapour pressure of solution_____

(a) Decreases, Increases (b) Increases, Increases
(c) Increases, Decreases (d) Decreases, Decreases

(ii) Equation for η_{sp} is

(a) $\frac{\eta}{\eta_o}$ (b) $\frac{\eta-\eta_o}{\eta_o}$ (c) $\frac{\eta_{sp}}{c}$ (d) $\ln\eta_r/C$

(iii) Azo compounds are used as initiator in

(a) Cationic polymerization (b) Anionic Polymerization
(c) Coordination Polymerization (d) Free radical Polymerization

(iv) Kinetic chain length is inversely proportional to

(a) [M] (b) [I]
(c) $[I]^{1/2}$ (d) $[M]^{1/2}$

(v) The resins which are produced by the condensation polymerization of formaldehyde with urea or melamine are called as _____resins.

(a) Amino (b) Phenolic
(c) Alkyd (d) Epoxy

(vi) The catalyst used for olefin polymerization is

(a) Raney nickel catalyst (b) Merrifield resin
(c) Ziegler-Natta catalyst (d) Wilkinson catalyst

(vii) When _____, then the copolymer formed will have an alternative arrangement of equal number of M_1 & M_2 monomeric units.

(a) $r_1 = r_2 = 1$ (b) $r_1 = 1, r_2 = 0$
(c) $r_1 = 0, r_2 = 1$ (d) $r_1 = r_2 = 0$

(viii) _____ are used to improve the adhesion between the polymer and the filler by linking them with covalent bonds.

(a) Plasticizers (b) Coupling agents
(c) Lubricants (d) Curing agents

(PTO)

Q-2 Answer the following **(ANY SEVEN):** **14**

(i) Define the terms: Organic polymers and Inorganic polymers

(ii) Draw the Block diagram of Gel Permeation Chromatography (GPC).

(iii) Define the term Functionality and give suitable examples of tetra functional compounds.

(iv) During polymerization of styrene carbon tetrachloride acts as a good chain transfer agent. Why?

(v) Define the terms: Inhibitors and Retarders

(vi) State the applications of Ion containing polymers.

(vii) Monomers containing conjugated systems are highly reactive but they will form stable and relatively unreactive radicals. Why?

(viii) Classify the additives and state its importance.

(ix) List out the different products which are obtained by making the variations in the choice of additives in rubber technology.

Q-3 (a) Discuss the method of End Group analysis with its limitations. **06**

(b) List out the weight average molecular weight determination methods and describe any one of them. **06**

OR

(b) (i) Give the difference between thermoplastic polymer and thermoset polymer. **03**

(ii) Intrinsic viscosity of myosin is $217 cm^3.g^{-1}$. Calculate the approximate concentration of myosin in water which would have flow time of solution and solvent t= 300 sec and t_0 = 200 sec respectively. **03**

Q-4 (a) Give a complete account on: Methods of Initiating Free Radical polymerization. **06**

(b) Discuss the mechanism of cationic polymerization of styrene under the action of Lewis acids in the presence of co-catalyst. **06**

OR

(b) Differentiate addition polymerization and condensation polymerization. **06**

Q-5 (a) Discuss the Polyaddition reaction with its characteristics. **06**

(b) Describe the Bead polymerization method. **06**

OR

(b) Derive the equation: $\frac{1}{(1-p)} = k_x.Co.t + 1$ and $\frac{1}{(1-p)^2} = 2ktC_0^2 + 1$ **06**

Q-6 (a) Write in brief about Flame retardants and Curing agents. **06**

(b) Derive the copolymer equation which can be used for predicting the instantaneous molar compositions of the copolymer formed with the knowledge of r_1 and r_2 and also the monomer feed ratio. **06**

OR

(b) Give the complete account on Copolymer composition and Monomer reactivity. **06**

**********BEST OF LUCK**********