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SARDAR PATEL UNIVERSITY

M.Sc. – Chemistry (First Semester) (CBCS)

Polymer Chemistry

Course Code: PS01ECHE01

Monday, 27th April, 2015

Time: 10:30 a.m. to 01:30 p.m. Total Marks: 70

Que.1 Select correct answer of the followings (08)

1 The term polymer was first used by the

(A) Berzelius (B) Charles GoodYear

(C) Ziegler Natta (D) Henry

2 Light scattering provides molecular weight, which is

(A) Number average (B) Weight average

(C) Z-average (D) viscosity average

3 Which of the following polymerization techniques offers problem of heat dissipation

(A) Solution polymerization

(B) Suspension polymerization

(C) Emulsion polymerization

(D) Bulk polymerization

4 Termination under control condition sometimes does not occur in

(A) Anionic polymerization (B) Cationic polymerization

(C) Free radical polymerization (D) Coordination polymerization

5 The mixing of two polymers yields

(A) Alternating copolymer (B) Block copolymer

(C) Polyblend or polymer alloy (D) None of the above

6 Which of the following additives is added during the polymerization

(A) Plasticizers (B) Antioxidants

(C) Thermal stabilizers (D) Chain transfer agents

7 In good solvents where solvent molecules processes an affinity for polymer molecule, the polymer coil

(A) Expands (B) Contracts

(C) Expands or contracts (D) Does not change size

8 Epoxides, alkyl resins, PVA are all examples of

(A) Antioxidants (B) Fiber

(C) Filler (D) Adhesives

Que.2 Attempt any **SEVEN** of the followings **(14)**

1. What are natural polymers? Give its two examples?
2. Give difference between natural rubber and vulcanized rubber with its examples?
3. Explain thermodynamics of ceiling temperature?
4. Ethylene is more easily polymerized by free radicals than isobutylene. Why?
5. Why does solution polymerization often result to low molecular weight polymer?
6. Polymers obtained by condensation polymerization are more crystalline than addition polymers. Why?
7. Plasticizers make the polymer flexible and rubbery. Why?
8. Why does the T_g of a polymer increase in the presence of filler?
9. Write mechanism of Ziegler Natta polymerization?

Que.3 **A** Discuss the vapour pressure method for determination of molecular weight of polymer. **(06)**

B What are homo addition polymerization and addition copolymerization? Give its suitable examples? **(03)**

B 3 gram of unknown polymer sample has a number average molecular weight 3000 gm/mole. It requires 0.1122 gram of alcoholic potassium hydroxide to reach phenolphthalein end point. Calculate the functionality of a given polymer sample. **(03)**

OR

B Why osmometric method for molecular weight determination is preferred over viscosity and GPC methods? **(03)**

B Polyethylene oxide (PEO) in water and 0.1 M $K_2SO_{4(aq)}$ at 25^0C has the following Mark-Hauwink constants, K and α ; **(03)**

	$K \times 10^3$	α
Water	16.6	0.82
Aq. K_2SO_4	130	0.5

Calculate the chain expansion factor for a PEO sample of molecular mass 50,000.

Que.4 **A** Describe kinetics of chain polymerization by free radicals. Obtain expression for rate of polymerization and degree of polymerization. **(06)**

B Write name of Ziegler Natta catalyst. How is the growing chain terminated in Ziegler Natta polymerization? **(06)**

OR

B Describe mechanism of cationic polymerization. Derive an expression for rate of polymerization. **(06)**

Que.5	**A**	Write note on emulsion polymerization technique?	**(06)**
	B	Discuss the kinetics of catalyzed and non catalyzed polycondensation reaction.	**(06)**
		OR	
	B	Discuss ring opening polymerization with suitable example?	**(06)**
Que.6	**A**	Discuss thermodynamics of polymer solubility.	**(06)**
	B	Discuss the Q-e Scheme and resonance effect of reactivity ratios.	**(06)**
		OR	
	B	Obtain expression for the kinetics of copolymerization. How does the reactivity ratio of monomers affect the copolymerization reactions?	**(06)**

BEST OF LUCK