

2018

M.Sc. Part-II Examination

CHEMISTRY

PAPER—VIII

The figures in the right-hand margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

Illustrate the answers wherever necessary.

(Physical + Organic)

New Syllabus

F.M. – 100

Time : 4 Hrs.

Answer *all* questions from Group-A
and *five* questions from Group-B

Old Syllabus

F.M. – 75

Time : 3 Hrs.

Answer any *five* questions from Group-B.

(Turn Over)

Group-A

1. Choose the correct answer :

1×15

- (i) Which of the following polymers have vinylic monomer units ?
 (a) Acrilan (b) Polystyrene (c) Nylon (d) Teflon
- (ii) Which polymers occur naturally ?
 (a) Starch and Nylon (b) Starch and Cellulose
 (c) Proteins and Nylon (d) Proteins and PVC
- (iii) Bakelite is obtained from phenol by reacting with
 (a) HCHO (b) $(\text{CH}_2\text{OH})_2$ (c) CH_3CHO (d) CH_3COCH_3
- (iv) The monomers of Buna-S rubber are
 (a) Styrene and Butadiene
 (b) Isoprene and Butadiene
 (c) Vinyl chloride and Sulphur
 (d) Butadiene
- (v) Zeigler - Natta catalyst ($\text{AlR}_3 - \text{AlCl}_3$) is used in the polymerization of
 (a) Vinyl acetate (b) Vinyl chloride
 (c) Propylene (d) Styrene
- (vi) Which of the following additive is added during the polymerization

- (a) Plasticizer (b) Antioxidant
 (c) Thermal stabilizer (d) Chain transfer agent
- (vii) Which of the following polymers are often highly crystalline
 (a) Fibres (b) Plastics
 (c) Elastomers (d) Surface coating agents
- (viii) Wool and silk are natural polymer. These are basically
 (a) Proteins (b) Polysaccharides
 (c) Polyesters (d) Polyethers
- (ix) Hardening of plastics often involves cross-linking. This process is called
 (a) Vulcanisation (b) Curing
 (c) Compounding (d) Plasticization
- (x) Plasticizers are added to polymers to decrease its
 (a) T_g (b) T_m (c) Solubility (d) Crystallinity
- (xi) The monomers in a polymer molecules are joined through
 (a) H-bond (b) Covalent bonds
 (c) Electrovalent bonds (d) Dipole-dipole interaction
- (xii) In emulsion polymerization, the initiator is
 (a) Soluble in water (b) Soluble in monomer
 (c) Insoluble in both (d) Soluble in both

- (xiii) Which of the following is thermoset
- Natural rubber
 - Unvulcanized rubber
 - Cellulose nitrate
 - Bakelite
- (xiv) The polymer used in making buckets, mugs, storage tanks, TV cabinets etc. is
- HDPE
 - Polypropylene
 - PVC
 - Polystyrene
- (xv) Which of the following polymerization techniques offers problem of head dissipation
- Solution polymerization
 - Bulk polymerization
 - Suspension polymerization
 - Emulsion polymerization

2. Answer any five questions :

2×5

- Explain why polyesters have lower melting points than polyamides ?
- Explain why Nylon 66 may be used both as fibre and plastic ?
- What is the structure of the repeating unit (mer) in
 - polypropylene and
 - poly vinyl chloride ?

- Which has the higher crosslinked density, (a) ebonite or soft vulcanized rubber ?
- Show (a) a head-to-tail and (b) a head-to-head configuration of poly vinyl alcohol.
- Show the structure of a typical portion of the chain of
 - syndiotactic PVC,
 - isotactic PVC.

Group-B

Answer any five questions.

- Differentiate between (i) monomer and mer (ii) monomer and polymer.
 - Classify the polymer on the basis of
 - Structure,
 - Tacticity,
 - Ultimate force.
 - The number average degree of polymerization of a sample of polystyrene is 800 ; calculate its number average molecular weight.
 - Explain why an absolute value of molecular weight cannot be assigned to any polymer mass ? $4+6+3+2$
- Give one example of
 - addition polymer
 - condensation polymer
 - copolymer

- (b) Draw the structure of the monomer each of the following polymers
 (i) Poly vinyl chloride (ii) Nylon-6
- (c) Write the structures of the repeat unit of the following polymer
 (i) Poly vinyl acetate
 (ii) Polyethyleneterephthalate
 (iii) Polychloroprene
- (d) What is living polymerization ?
- (e) What is biodegradable polymer ? Give example of a biodegradable polymer which was used for the first time in surgery ?
- (f) What is a thermosetting and thermoplastic polymers ? Give examples for each. $3+2+3+2+2+3$
5. (a) For step growth polymerization reaction derive the Carothers equation.
- (b) Derive the kinetic equation for step growth polymerization reaction.
- (c) What are the main features of the step growth polymerization process ? $5+5+5$

6. (a) Compare the step growth and chain growth polymerization process.
- (b) Write different steps involved in chain growth polymerization with suitable example.
- (c) How you control the molecular weight of polymer in chain growth polymerization process ?
- (d) Write the names of different initiator used in the chain growth polymerization process. $5+5+3+2$
7. For emulsion polymerization process answer the following
- (a) Steps involved in the process.
- (b) Write the raw material selection procedure for this process.
- (c) Write the advantages and disadvantages of the process. $5+5+5$
8. (a) Write the types of additives are used in the polymer industries with suitable examples.
- (b) Write the function of fillers and plasticizers used in polymer industries.
- (c) Write down the characteristics properties of a good plasticizer. Give examples of good plasticizer.

- (d) Write the advantages of blow molding over injection molding.
- (e) Write the types of injection molding machines are used.
- (f) What do you mean by engineering plastic? Give examples. 4+4+2+2+3

9. (a) Discuss the polyethylene (low pressure Ziegler) manufacturing process with flow diagram.
- (b) Describe the manufacturing process of phenol formaldehyde resin. 7+8

10. (a) Explain glass transition temperature.
- (b) Write the difference between
- (i) Addition and condensation polymerization
 - (ii) Bulk and solution polymerization.
- (c) Write a note on vulcanization of rubber.
- (d) Write the major application of polymer.

3+6+2+4