SUBJECT CODE: CH/MO/PL14

B.Sc. DEGREE EXAMINATION, NOVEMBER 2007
BRANCH IV- CHEMISTRY
FIRST   SEMESTER

REG.NO ……………………..

COURSE   : MAJOR OPTIONAL
PAPER   : POLYMER CHEMISTRY
TIME   : 30 MINUTES   MAX.MARKS : 30

SECTION – A   **(30x1=30)**

ANSWER ON THE QUESTION PAPER ITSELF

Answer all the questions.

I   **Fill in the blanks:**

1.   Polymers are classified as plastics and elastomers based on their

_____.

2.   Terylene fibers are made from the polymer _____.

3.   Polyacrylonitrile upon heating cyclizes to form a _____.

4.   Above their Tg , polymers are _____, while those below their Tg are

_____

5.   When a crystalline substance passes from the molten liquid state to the solid

crystalline state _____ take place.

6.   Low molecular weight liquid polybutadienes with specific terminal functional

groups (HTPB) is used as _____.

II   **Choose the correct answer :**

7.   This polymer is used extensively for packaging applications.

a) LDPE   b) PMMA   c) PS   d) PVC.

8.   An alternating copolymer is formed when

a) $r_1 = r_2 = 0$ b) $r_1 = r_2 = 1$ c) $r_1 > 1$ and $r_2 < 1$ d) $r_1 = r_2 = 3$

9.   In emulsion polymerization the initiator used is

      a) water soluble   b) water insoluble   c) monomer soluble   d) none

10.   As polymer crystallinity increases permeability

      a) decreases   b) increases   c) is unaffected   d) none

11.   Which will have the higher Tg .

      a) LDPE   b) atactic polypropylene

      c) Isotactic polypropylene   d) polypropylene

12.   Which of the following polymers is most biodegradable

      a) polyester   b) polyethylene   c) polystyrene   d) polypropylene

III   State true or false:

13.   Inhibitors are substances capable of inhibiting or killing the chain growth by combining with the active free radicals and forming either stable products or inactive free radicals.

14.   Ziegler – Natta catalysts are special type of coordination catalysts comprising of sodium salts and Tosyl chloride.

15.   For heterogeneous polymers, the order increases as follows:
      $\overline{M}_z < \overline{M}_n < \overline{M}_w$.

16. HDT is close to T_g for amorphous polymers and close to T_m for highly crystalline polymers.

17.   Very high crystallisability of nylon makes it suitable for making fibers.

18.   Increasing the catalyst concentration in free radical polymerisation increases the molecular weight of the polymer and decreases the yield.

IV   Match the following:

19.   Oxygen   -   Hydrolysis

20.   Azobisisobutyronitrile   -   Ziegler Natta catalyst

21.   Isotactic polypropylene   -   Inhibitor

22.   Polyvinylacetate   -   Gutta – Percha

23.   Polymer degradation   -   Radical initiator

24.   Polyisoprene   -   ultrasound waves

V   Answer in a line or two:

25.   What is cationic polymerization?

26.   What are graft copolymers?

27.   Name any 4 degradation methods for polymers.

28.   What is the repeating unit in PVC?

29.   Write the names of different mechanisms of polymerization.

30.   Define Number average molecular weight.

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TIME   : 2 ½ HOURS   MAX.MARKS : 70

SECTION – B   **(5x6=30)**

ANSWER ANY FIVE QUESTIONS

1.   Give a brief account of the need for the recycling of plastics.
2.   Write a note on the factors influencing Tg.
3.   How can the molecular weight of polymers be determined?
4.   Determine the molecular weight of a polystyrene sample which has an $'a'$ value
      of 0.60, a $'k'$ value of 1.6×10^{-4} dL/g and an intrinsic viscosity of 0.04 dL/g.
5.   With an example each, explain Addition & substitution reactions of polymers.
6.   Give a detailed account of thermal degradation of polymers using suitable
      example.
7.   Explain the process of making regenerated cellulose.

SECTION – C   **(2x20=40)**

ANSWER ANY TWO QUESTIONS

8.   i) Explain the significance of stereoregularity.
      ii) Illustrate with suitable example the relationship of polymer properties to
            molecular weight.

9.   Explain Addition, condensation, free radical and ionic mechanisms of
      polymerisation with one example each.

10.   i) Compare and discuss the crystallinity in the following set of polymers.
            HDPE & LDPE ; Poly (ethylene adipate) + Poly (ethylene terephethalate)
            Nylon and Polyethylene ; Isolactic and atactic polypropylene.
      ii) Write the type of reactions undergone by PUA and polyacrylic acid.

11.   i) What is vulcanization? How is it carried out? Explain the mechanism of
            vulcanization.
      ii) Write short notes on the industrial applications of silicones, polyurethanes and
            nylon.

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