2023

M.Sc.

4th Semester Examination

CHEMISTRY (SPECIAL)

PAPER : CEM-404

Full Marks : 40

Time : 2 hours

The figures in the right-hand margin indicate marks.

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

Illustrate the answers wherever necessary.

Answer from *any* **one** Section.

SECTION — I
(INORGANIC AND PHYSICAL CHEMISTRY)

Answer from **all** the Groups as directed.

GROUP—A

1. Answer *any* **four** questions from the following : 2×4=8

(a) Which radicals are produced by oxygen in human body? Why are they toxic?

(b) What is the effect of "Ca" on the absorption of dietary lead?

(c) In what sense is cadmium a cumulative poison?

(d) What are the toxic effects of lead and cadmium on the kidney?

(e) How blood-brain barrier is affected by mercury?

(f) What are the three basic information that can be achieved by transmission electron microscope?

GROUP—B

2. Answer *any* **four** questions from the following : 4×4=16

(a) In what respect are the chemical and toxicological characteristics of methanol unique? What is the metabolic pathway of methanol degradation? How does this result in acidosis? 2+2=4

(b) Write down the limitation of Dynamic Light Scattering (DLS). 4

(c) What are the common natural sources of cyanide? How are they converted to the toxic cyanide ion in the body? 2+2=4

(d) What type of interaction can be studied by Isothermal Titration Calorimetry (ITC)? 4

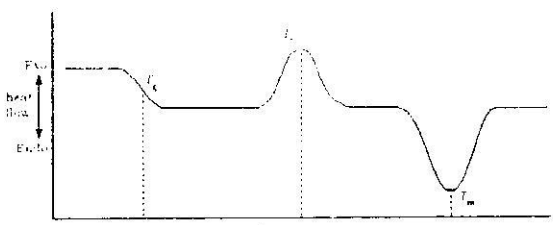
(e) What are the basic differences between an electron microscope and optical microscope? What is the relation between the 'limit of resolution', 'numerical aperture' and 'wavelength' of the light used? 2+2=4

(f) How can you control the wavelength of an electron by varying the applied voltage? What are the differences between low resolution and high resolution TEM? 2+2=4

GROUP—C

Answer *any* **two** questions from the following : 8×2=16

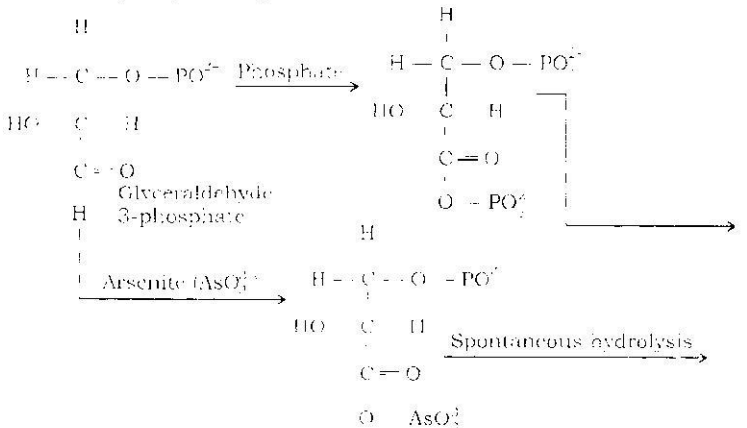
3. (a) Differential Scanning Calorimetry (DSC) thermogram of a polymer is shown below :



Explain the origin of these peaks with suitable explanation.

(b) Write down the different fields where Isothermal titration calorimetry (ITC) can be applied. 4+4=8

4. *(a)* Complete the following reactions with proper explanation :



(b) What are the chronic toxicological effects of benzene? What kind of blood abnormalities are caused by exposure to benzene? How does benzene toxicity affect white cell count? How does it affect bone marrow? 4+4=8

5. What do you mean by the term 'chain melting temperature' for a membrane bilayer? How can you measure the chain melting temperature by DSC studies? How can you obtain a solvent spread monomolecular film? What is the typical height difference between an organized lipid monolayer with respect to its surrounding fluid region? 2+2+2+2=8

6. Describe as how you can measure the binding constant of a drug-macromolecular aggregate by using Rose and Drago equation. 8

SECTION — II

(ORGANIC CHEMISTRY)

[FOOD]

GROUP—A

1. Answer *any* **four** questions from the following : 2×4=8

   (a) What is hydrogenated fat?

   (b) What is food adulteration?

   (c) What is toned milk?

   (d) Write the difference between food adulteration and food additives.

   (e) Write down the health benefits of Omega 3 fatty acids. Give an example.

   (f) What are the consequences of deficiency of fat and excess of fat in diet?

GROUP—B

2. Answer *any* **four** questions from the following : $4 \times 4 = 16$

(a) *(i)* Discuss the benefits of eating fruits and vegetables.

(ii) Write down the causes of degradation of nutritional value of fruits and vegetables.

(b) What is fruit processing? Discuss its importance.

(c) *(i)* What is Cholesterol?

(ii) Define LDL and HDL.

OR

What are 'good cholesterol' and 'bad cholesterol'?

(d) *(i)* What do you mean by Saponification?

(ii) What is Iodine value?

(e) *(i)* What are essential fatty acids? Give examples.

(ii) What are Winterization, Bleaching and Deodorization?

(iii) What are fermented and non-fermented processes during fruit processing?

(f) (i) How can Argemone oil be detected in adulterated Mustard oil?

(ii) How can starch be detected in milk? What is Babcock test?

GROUP—C

3. Answer *any* **two** questions from the following : 8×2=16

(a) What are the agencies set up by the Government of India to remove adulterants from food? Write their roles in brief. 3+5=8

(b) (i) What do you mean by Dairy Products?

(ii) What is Dairy technology?

(iii) What is Pasteurization of milk? Describe various types of Pasteurization techniques. 2+2+4=8

(c) (i) What determines the quality of milk?

(ii) What is Standardization of milk?

(iii) What do you mean by Cream Separation?

(iv) What is Lactose Intolerance? 2+2+2+2=8

(d) (i) Write down the nutrients present in cereals.

(ii) What is the difference between Brown rice and White Rice?

(iii) Discuss the process of Wheat Milling.

(iv) Discuss briefly the manufacturing processes of bread and biscuit.

2+2+2+2=8

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