2022

M.Sc.

4th Semester Examination

CHEMISTRY

PAPER—CEM-404

ORGANIC, INORGANIC AND PHYSICAL SPECIAL

Full Marks : 40

Time : 2 Hours

The figures in the margin indicate full marks.

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

Illustrate the answers wherever necessary.

(Organic Special & Food Chemistry)

1. Answer any *four* questions : 4×2

(a) What is the full form of 'PUFA'? Name two food sources of 'PUFA'.

(b) What is meant by toned milk ?

(c) What do you mean by LDL and HDL ?

(d) What do you mean by 'virgin oil' ?

(e) Mention the conditions for deodorization.

(f) What do you mean by "winterization" ?

2. Answer any *four* questions : 4×4

(a) (i) Write the difference between triglyceride and phospholipid.

(ii) Write the physical, chemical and biological significance of unsaturation in fatty acids.

(b) (i) Write the steps in the preparation of fruit juice and pulp processing.

(ii) Give the flow-sheet for clarified fruit juice production.

(c) (i) Name two enzymes used for fruit juice clarification.

(ii) What is Millard reaction ?

(d) (i) What is Gerber Test ?

(ii) What do you mean by MBR test ? How is it linked to microbiological quality of milk ?

(e) (i) Why milk is white in color ? Name one bleaching agent for milk.

(ii) Write the different conditions for Pasteurization.

(f) (i) (1) What is the full form of FSSAI and BIS ?

(2) What is adulteration ?

(ii) (1) Give the names of three adulterants of fat and oil.

(2) How can we detect the presence of such adulterant in fat and oil by chemical method ?

3. Answer any *two* questions : 2×8

(a) (i) What is food safety and why is it needed ?

(ii) Write the Babcock test for purity of milk.

(iii) How do we detect the presence of Adulterants in vanaspati Ghee ?

(iv) How to test the presence of starch in pure milk ?

4×2

(b) (i) What is saponification value ?

(ii) What is peroxide value ?

(iii) How many types of lipids are present ? Give schematic diagram.

(iv) What are the functions of fat in human body ?

4×2

(c) (i) Give the flow diagram for dehydration of fruits.

(ii) What are recombined milk, toned milk, malted milk, cream, cheese and butter ? 4+4

(d) (i) Write down the nutrients present in cereals. Write down some names of cereals and cereal products.

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

(iii) What is dough ? Discuss about various dough mixing methods.

(iv) Discuss the biscuit & bread manufacturing process. 4×2

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(Inorganic and Physical Special)

Group—A

1. Answer any *four* questions : 4×2

(a) What is the predominant function of the blood-brain barrier ? How is it affected by mercury ?

(b) What is the effect of calcium on the absorption of dietary lead ? How might this effect be explained?

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

(d) What is used as a therapeutic agent for lead poisoning ? Why this antidote is always administered with calcium ?

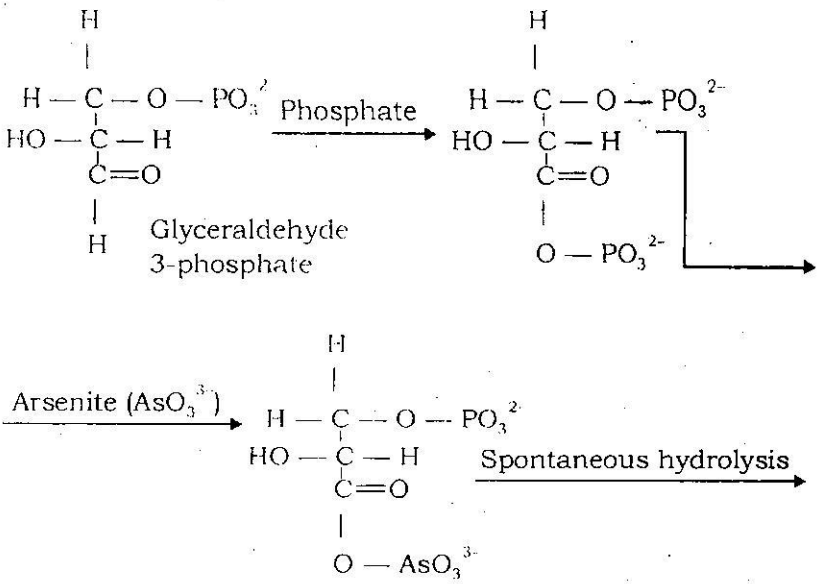
(e) What are the three basic information that can be achieved by transmission electron microscope ?

(f) Why glass lenses cannot be used in electron microscope ?

Group—B

2. Answer any *four* questions : 4×4

(a) Explain what is shown by the following figure :



(b) In what respects do antidotes to arsenic poisoning take advantage of sulfur-seeking tendencies of arsenic ? Write name and chemical formula of one such antidote.

(c) Acrtonitrile is not highly toxic. What does this say about its toxicological chemistry and metabolism in the body ?

(d) Write down the disadvantages of Dynamic Light Scattering (DLS) techniques.

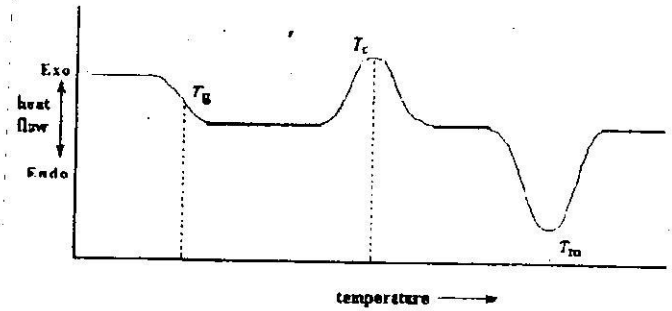
(e) What are the differences between contact mode and tapping mode of imaging in AFM ? Describe with suitable examples.

(f) Describe the surface pressure-area isotherm of DPPC at 25°C at the air-water interface.

Group—C

Answer any *two* questions. 2×8

3. (a) The differential scanning calorimetry (DSC) plot of a polymer shown below :



Explain the diagram. 4+4

(b) Discuss the advantage and disadvantage of differential scanning calorimetry (DSC).

4. (a) Write down the different fields where Isothermal titration calorimetry (ITC) can be applied.

   (b) Discuss what types of information obtained from the Isothermal titration calorimetry (ITC). 4+4

5. (a) Briefly describe the mechanism of snake venom activity that alters the oxygen carrying capability of haemoglobin.

   (b) What is surface potential ? How can it be measured for an insoluble monolayer at the air-water interface ? 4+2+2

6. (a) How can you identify the phase transition temperature of a membrane bilayer by differential scanning calorimeter ?

   (b) Briefly describe as how you can differentiate the intrinsic and extrinsic proteins in cell membranes. 4+4

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