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(May)

CHEMISTRY

(Major)

Course : 603

(Inorganic Chemistry—III)

The figures in the margin indicate full marks
for the questions

(New Course)

Full Marks : 48

Pass Marks : 14

Time : 2 hours

1. Select the correct answer :   1×5=5

   (a) Hemocyanin contains

       (i) magnesium

       (ii) iron

       (iii) copper

       (iv) zinc

(Turn Over)

(b) The DNA and RNA helices are stabilized by

   (i) Mg^{2+}

   (ii) Fe^{2+}

   (iii) Ca^{2+}

   (iv) Cu^{2+}

(c) Which of the following materials is not used as binders in TLC?

   (i) Plaster of Paris

   (ii) Starch

   (iii) Silica gel

   (iv) All of the above

(d) Which of the following is used to decolourise and deodorize vegetable and mineral oils?

   (i) Kaolinite

   (ii) Montmorillonite

   (iii) Laponite

   (iv) None of the above

(e) Which of the following belongs to ceramics?

   (i) Earthen ware

   (ii) Porcelain

   (iii) Tera cotta

   (iv) All of the above

(c) What do you mean by step-up and step-down syntheses of nano-materials? Name one method which follows step-down procedure. 2+1=3

(d) What do you mean by composite materials? Write a note on the application of nano-composite material. 1+2=3

UNIT—III

4. Answer any *three* questions : 3×3=9

(a) Describe the principle and application of thin-layer chromatography. 3

(b) Apply paper chromatography to separate a mixture of amino acids. How is R_f value calculated and what information is obtained from this value? 3

(c) What is FTIR? What kind of information do you get from it? 3

(d) Write the principle behind atomic absorption spectroscopy. Give its two applications. 1+2=3

(e) Write short notes on the following : 1½+1½=3

(i) Choice of solvent system in chromatography

(ii) Principles of column chromatography

(Continued)

UNIT—IV

5. Answer the following questions :

(a) What is Portland cement? How is it manufactured industrially? 1+3=4

(b) Discuss the health hazards which may be caused by mercury and its compounds. 4

Or

What are the hazards associated with nuclear accident? 4

(c) Write short notes on any *two* of the following : 1½×2=3

(i) Role of binder and solvent in paint industry

(ii) Ceramics

(iii) Classification of paints

(Turn Over)

(6)

(Old Course)

Full Marks : 48
Pass Marks : 19

Time : 3 hours

1. Select the correct answer :   1×5=5

   (a) The electron configuration of Fe in oxyhemoglobin is

      (i) $t_{2g}^5 \, eg^0$

      (ii) $t_{2g}^6 \, eg^0$

      (iii) $t_{2g}^3 \, eg^2$

      (iv) $t_{2g}^4 \, eg^2$

   (b) Which of the following contains molybdenum?

      (i) Aldehyde oxidase

      (ii) Ceruloplasmin

      (iii) Amine oxidase

      (iv) None of the above

   (c) Which of the following is not a clay mineral?

      (i) Benitoite

      (ii) Laponite

      (iii) Bentonite

      (iv) Kaolinite

(7)

   (d) In fluorescence spectroscopy, the emitted radiation has

      (i) a shorter wavelength

      (ii) a longer wavelength

      (iii) high energy per photon

      (iv) None of the above

   (e) Demineralized water is obtained by

      (i) Clark's process

      (ii) permutit process

      (iii) ion-exchange process

      (iv) ozonisation

UNIT—I

2. (a) Answer any three questions :

      (i) Describe the role of zinc in human body.   4

      (ii) What are the functions of hemoglobin and myoglobin? What are the principal similarities in their structures?   3+1=4

      (iii) Explain the role of alkali and alkaline earth metals in biological system.   4

(8)

(iv) Write short notes on any *two* of the
following : 2×2=4

(1) Chelation therapy

(2) Nitrogenase

(3) Cyanocobalamin

(b) Give the name of any two copper
enzymes and mention one function of
each. 2

UNIT—II

3. Answer any *three* questions : 3×3=9

(a) What do you mean by supramolecular
interaction? How is it different from
covalent interaction? Give one example.
1+1+1=3

(b) What is isomorphous replacement in
clay minerals? Give the general formula
of kaolinite clay. Mention its one
application. 1+1+1=3

(c) Write a note on polymer nanocomposite
material. 3

(d) Name two basic approaches for
synthesis of nanomaterials. Mention
the name of any two characterization
techniques for them. 2+1=3

(e) Discuss about the advantage and
application of solid-state reaction. 3

(9)

UNIT—III

4. Answer any *three* questions : 3×3=9

(a) Describe the principle and application
of thin-layer chromatography. 3

(b) What is FTIR? What kind of information
do you get from it? 3

(c) Apply paper chromatography to
separate a mixture of amino acids.
How is R_f value calculated and what
information is obtained from it? 3

(d) Write short notes on any *two* of the
following : 1½×2=3

(i) Choice of solvent system in
chromatography

(ii) Principles of column
chromatography

(iii) Atomic absorption spectroscopy

UNIT—IV

5. Answer the following questions :

(a) Mention two sources through which
lead can enter human body. Discuss
the poisoning effect of lead. 1+3=4

Or

What are the hazards associated with
nuclear accident? 4

(b) What is Portland cement? How is it manufactured industrially?   1+3=4

(c) Write short notes on any *two* of the following :   1½×2=3

   (i) Role of binder and solvent in paint industry

   (ii) Ceramics

   (iii) Classification of paints

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