

052(E)

(JULY, 2009)

Time : 3.00 Hours]

[Maximum Marks : 100

General Instructions :

- (1) There are total **60** questions and all are **compulsory**.
- (2) Begin new section strictly on **new** page and maintain order of answers.
- (3) Write your answers to the required points as instructed in questions.
- (4) Use log table or simple calculator for calculation.
- (5) Constants :

$$h = 6.626 \times 10^{-27} \text{ erg-sec.}$$

$$R = 1.987 \text{ Calorie /mole}$$

$$R = 0.082 \text{ lit. atm.}$$

SECTION - A

Questions from 1 to 16 are multiple choice type.

Each question carries 1 mark. Select the correct answer from the following. 16

1. The molecular orbital energy level given below is applicable for which of the following?

$$\sigma 1s < \sigma^* 1s < \sigma 2s < \sigma^* 2s < \sigma 2p_z < \pi 2p_x = \pi 2p_y < \pi^* 2p_x = \pi^* 2p_y < \sigma^* 2p_z$$

(A) B_2

(B) C_2

(C) N_2

(D) O_2

2. Which one of the following oxide is semi-conductor ?

(A) TiO

(B) Ti_2O_3

(C) TiO_2

(D) ReO_3

3. "The number of molecules in the same volume of different solutions will have the same osmotic pressure", states which law ?
- (A) Boyle-van't Hoff law (B) Raoult's law
(C) Henry's law (D) Avogadro-van't Hoff law

4. What will be the ΔS system when 1 mole of Benzene burnt in open air at 25°C ? Heat of combustion of Benzene is -781 K Cal/ mole .
- (A) 2620 Cal/K (B) 2620.80 Cal/K
(C) -2.62 Cal/K (D) -2620.8 Cal/K

5. $\begin{array}{c} \text{S} \\ || \\ \text{HO}-\text{S}=\text{O} \\ | \\ \text{OH} \end{array}$ is the structure of
- (A) Sulphurous acid (B) Sulphuric acid
(C) Thiosulphuric acid (D) Dithionic acid

6. Which aqueous solution of a salt is coloured ?

- (A) TiCl_2 (B) ZnCl_2
(C) CdCl_2 (D) Hg_2Cl_2

7. dsp^2 hybridisation is present in which of the following complexes ?

- (A) KMnO_4 (B) $\text{K}_2[\text{Ni}(\text{CN})_4]$
(C) $\text{K}_4[\text{Ni}(\text{CN})_4]$ (D) $\text{K}_2[\text{NiCl}_4]$

8. If a molecule has three chiral centres, the number of stereo-isomers will be

- (A) 3 (B) 2
(C) 8 (D) 9

9. Who had laid foundation for modern Stereo-chemistry ?

- (A) Van't Hoff (B) Prelog
(C) Louis Pasteur (D) Lebel

10. Which alcohol does not give Lucas test ?
(A) Ethanol (B) Isopropyl alcohol
(C) Secondary Butyl alcohol (D) Tertiary Butyl alcohol
11. Which of the following gives Carbylamine test ?
(A) Benzyl amine (B) N, N-di methyl aniline.
(C) N-methyl aniline (D) di methyl ethyl amine.
12. Which of the following is true for an organic cyanide group ?
(A) One π bond and two σ bonds .
(B) C and N is sp hybridised and has 180° bond angle of R-C-N.
(C) One σ bond and 120° bond angle of R-C-N.
(D) Three π bonds and sp hybridisation.
13. The substance used as antioxidant in Polymer is
(A) CaCO_3 (B) Oleic acid
(C) Carbon black (D) SiO_2
14. Which polymer is used as a lubricant ?
(A) Teflon (B) Orlon
(C) Decron (D) Nylon
15. Which sugar is maximum sweetner ?
(A) Alitame (B) Fructose
(C) Glucose (D) Saccharin
16. In RNA, the base thymine is replaced by which base of the following ?
(A) Uracil (B) Cytosine
(C) Adenine (D) Guanine

SECTION - B

*Questions from 17 to 32 are very short answer type, each of 1 mark.
Answer the following questions in very short.*

16

17. Write a Schrodinger's equation.
18. For MX_2 type crystal, give two different compounds with different co-ordination number.

19. What is Ferrimagnetic substance ? Give example.
20. Calculate mole fraction of solute in 2.5 m glucose aq. solution.
21. The value of ΔS_{total} is +ve or -ve for a sublimation process. Why ?
22. Give the relationship between spontaneous reaction and equilibrium constant.
23. If the order of reaction is $(n - 1)$, what is the unit of rate constant ?
24. Define : Specific area of adsorbent.
25. Silicon does not form allotrope. Why ?
26. Give the structure of a ligand having six co-ordinating sites.
27. ${}_{13}^{27}\text{Al} + \dots \longrightarrow {}_{15}^{30}\text{P} + \dots$
Complete the above nuclear reaction, when α -particles are bombarded on ${}_{13}^{27}\text{Al}$.
28. What will you do to separate isomers of di carboxylic acid $[\text{C}_4\text{H}_4\text{O}_4]$?
29. Give a chemical reaction in which an amine having one carbon less than the amide is obtained.
30. The boiling point of secondary and tertiary amine is less than that of primary amine containing same number of carbon atoms. Why ?
31. Give the two uses of PHBV.
32. Why amino acids have amphoteric properties ?

SECTION - C

Questions from 33 to 48 are short answer type, each of 2 marks.

Answer the following questions.

32

33. Explain the crystal lattice of Zinc sulphide.

34. If an ice having temperature 0°C is placed in an atmosphere having 27°C , will give water having temperature 0°C . Prove this statement.

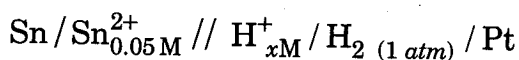
The molar heat of fusion of ice at 0°C is $1.440 \text{ Cal. K}^{-1} \cdot \text{mole}^{-1}$.

(At. wt. of $\text{H}_2\text{O} = 18 \text{ gm/ mole}$)

35. By electrolysis of water at the platinum electrodes, Hydrogen and Oxygen gases are produced. If the electrolysis is carried out with 20 ampere electric current for one hour, what will be the volume of O_2 gas liberated at anode at 25°C and 1 atmosphere pressure ? ($1 \text{ F} = 96500 \text{ coulomb}$)

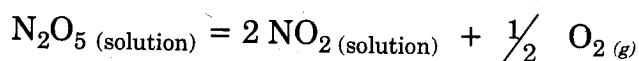
OR

Calculate pH of a cell at 25°C . $E_{\text{cell}} = 0.096 \text{ V}$



$$E^{\circ}_{\text{Sn}/\text{Sn}^{2+}} = 0.14 \text{ V}$$

36. The decomposition of N_2O_5 dissolved in Carbon tetrachloride decomposes at definite temperature as follows :



This reaction is of first order and its rate constant is $5.0 \times 10^{-4} \text{ sec}^{-1}$. If the initial concentration of N_2O_5 for the reaction is $0.25 \text{ mole. lit.}^{-1}$, after how many seconds the concentration of NO_2 will be $0.20 \text{ moles lit}^{-1}$?

37. Give the classification of colloids based on the nature of interaction between dispersed medium and dispersion phase.

OR

Explain : Emulsion and its classification.

38. Give only equation for the reaction of Sulphuric acid

- (i) in which carbohydrates (sucrose) are charred.
(ii) with Cu metal.

OR

Give only equations of $\text{Al}(\text{OH})_3$ acting as amphoteric with an acid and with a base (one of each).

39. Explain : Hume and Rothery rules for alloys. (any two rules)

OR

Explain : H_3PO_2 and H_3PO_3 both have 3H, yet their basicity (protonity) is different.

40. (i) Give IUPAC name : $\text{K}[\text{Co}(\text{H}_2\text{O})_2(\text{NH}_2)_2(\text{Ox})]$.

(ii) Give molecular formula : Iron(II) hexa nitritofarate(III).

41. A fresh sample of Carbon gives 25.5 counts per minute per gram. An old sample gives 18.5 counts per minute per gram in similar conditions. If the half life period of ^{14}C is 5770 years, calculate how many years old the sample is ?

42. Give the importance for Stereo Chemistry (any four points.)

43. Give conversion in two steps :

Di ethyl ether from Glucose.

44. Give reactions occurred of Propanone with Hydrazine in different media. State the types of these reactions.

45. Give conversion in two steps.

Ethyl isocyanide from Nitro ethane.

46. Explain : Preparation of Bakelite, give two uses.

(Equations not needed)

47. Explain Peptide bond with one suitable illustration.

48. Give names and their uses for any two Ceramics.

SECTION - D

Questions from 49 to 60 are essay type long answered questions.

Each question carries 3 marks.

36

49. Explain : Metallic bond and also conduction of electricity in metal.

50. How many millimoles of CO_2 will dissolve in 1000 ml. water when CO_2 gas is passed from water of 25°C ? Henry's constant = 6.02×10^{-4} bar and partial pressure of $\text{CO}_2 = 2 \times 10^{-18}$ bar. Also calculate solubility of CO_2 per ppm unit.
51. Draw diagram of Hydrogen fuel cell. Give its reactions taking place at anode and cathode and give its two principal uses.

OR

Explain Kohlrausch's law of independent migration of ions to determine equivalent conductance of CH_3COOH .

52. What is called activation energy ? What are the necessary conditions for a chemical reaction to occur ? (Four conditions)
53. Write a short note on mechanism of Missile formation. (Figures not required)

OR

Write a short note on Electrophoresis with diagram.

54. Write balanced reaction for the following :
- (i) In laboratory, Cl_2 is prepared by oxidation of HCl by KMnO_4 .
 - (ii) Reaction of Calcium phosphate with conc. H_2SO_4 to obtain super phosphate of Lime.
 - (iii) Reaction of Pb_3O_4 with dilute HNO_3 .
55. Explain : The production of Potassium dichromate by giving equation.
State its oxidising property by giving equation and uses.

OR

- (i) Explain : Lanthanide contraction.
- (ii) Give uses of Lanthanide elements.

56. Write short note on : Organo metallic compounds.

OR

Explain : Tendency of transition metal ion to form complex compounds.

57. Explain the stability of nucleus on the basis of N/Z ratio. What will be effect on stability of nucleus observed when an α -particle is emitted from ${}_{92}^{238}\text{U}$?

58. Explain : (i) Fries rearrangement.

(ii) Reimer-Tiemann reaction.

59. Give two chemical equation to prepare acetyl chloride and also give substitution reactions of chlorine group in acetyl chloride.

OR

Explain : Different addition reaction of Ethanal.

60. Explain : Carbon fibres and give their types and two uses.
