

I Semester B.Sc. Examination, November/December 2009
(Semester Scheme)
Paper - I : CHEMISTRY

Time : 3 Hours

Max. Marks : 60

Instruction : The question paper has two Parts. Answer both the Parts.

PART - A

Answer any six of the following questions :

(6×2=12)

1. State Hund's rule.
2. Integrate a) $x^2 dx$ b) $\frac{1}{x} dx$
3. What is photoelectric effect ?
4. Calculate the oxidation number of
 - a) Phosphorous in H_3PO_4
 - b) Sulphur in SO_2
5. Define Vant Hoff's factor.
6. What is diagonal relationship ?
7. Give IUPAC name for
 - a) $CH_3 - CH = CH - COOH$
 - b) $CH_3 - \begin{array}{c} | \\ CH \\ | \\ CH_2 \\ | \\ CH_3 \end{array} - \begin{array}{c} | \\ CH \\ | \\ CH_2 \\ | \\ CH_3 \end{array} - CH_3$
8. What is carbanion ? Give example.
9. What is inductive effect ?
10. Why is phenol more acidic than methyl alcohol ?

P.T.O.



PART - B

Answer any eight questions.

(8×6=48)

11. a) Derive an expression for the radius of First Bohr's Orbit. (4+2)
b) Calculate wave number of second line of Balmer series. ($R_H = 1.079 \times 10^7 \text{m}^{-1}$)
12. a) State Aufbau principle. (2+2+2)
b) Write electronic configuration of elements with atomic numbers 18 and 24.
c) State Heisenberg's uncertainty principle.
13. a) Derive De-Broglie's equation for matter waves. Calculate the wavelength of a particle of mass $9 \times 10^{-31} \text{ kg}$ and a velocity of $3 \times 10^8 \text{ m/s}$. (4+2)
b) Write all possible values of 'l' and 'm' when $n = 2$.
14. a) Define electronegativity. How is it calculated using Pauling method? (4+2)
b) Which of the two Fe^{2+} and Fe^{3+} has larger size, why?
15. a) How does lithium differ from other elements of first group? (4+2)
b) Define ionisation potential.
16. a) How is osmotic pressure experimentally determined by Berkely-Hartely's method? (4+2)
b) Define ebullioscopic constant.
17. a) A solution containing 2.5 g of a non-volatile substance in 25 g of water boils at 373.85 K at 1 atmospheric pressure. Calculate the molar mass of the substance. (K_b for water = 0.52 K kg/mol) (4+2)
b) Identify the oxidising and reducing agents in the following reactions.
i) $2\text{H}_2\text{S} + \text{SO}_2 \rightarrow 3\text{S} \downarrow + 2\text{H}_2\text{O}$
ii) $2\text{HBr} + \text{H}_2\text{SO}_4 \rightarrow \text{Br}_2 + \text{SO}_2 + 2\text{H}_2\text{O}$



18. Give a general method of preparation of the following compounds : (2+2+2)
- a) Alkanes b) Alkenes c) Alkynes
19. a) Explain the Sachse-Mohr's theory of strainless rings. (4+2)
- b) Complete the following reactions.
- i) $\text{CH} \equiv \text{CH} + 2\text{Cl}_2 \rightarrow \dots$
- ii) $\text{CH}_2 = \text{CH}_2 \xrightarrow[\text{KMnO}_4]{\text{Alkaline}} \dots$
20. a) Explain ozonolysis with an example. Mention its significance. (4+2)
- b) What are electrophiles ? Give any two examples.
21. a) Draw the Newmann's projection formulae of n-butane and compare their stability. (4+2)
- b) Why is cyclohexylamine more basic than aniline ?
22. a) What is Diel's-Alder reaction ? (2+2+2)
- b) Explain positional isomerism with an example.
- c) What are exact and inexact differentials ?
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