DSA – 260

First Year B.Sc. Degree Examination, Sept./Oct. 2012
(Directorate of Distance Education)
CHEMISTRY (Paper – I)

Time : 3 Hours Max. Marks : 75/85

Instructions *: 1) This paper consists of* ***five*** *Sections. Answer* ***all*** *Sections.*
2) Section ***'A'*** *contains* ***one*** *mark questions and should be answered in first* ***two*** *pages of main answer book. The questions of Section 'A' answered in any other part of answer book* ***will not*** *be valued.*
3) Write equations and neat diagrams ***wherever*** *necessary.*
4) Section ***E*** *is* ***compulsory*** *for* ***85*** *marks scheme.*

SECTION – A

Answer **all** the following questions in **a word**, **a phrase** or in **a sentence**. **(10×1=10)**

1. Write the mathematical form of uncertainty principle.
2. What is the functional group in phenols ?
3. Define critical volume.
4. What is a semipermeable membrane ?
5. State Huckel's rule.
6. What is a gel ?
7. Define cryoscopic constant of a solvent.
8. What are propellants ?
9. Define ionic radius.
10. What are nucleophiles ?

SECTION – B

Answer **any FIVE** of the following : **(5×3=15)**

11. Draw temperature-composition curve for triethylamine-water system and discuss the critical solution temperature.
12. Explain SN^2 reaction with mechanism.

P.T.O.

13. a) Write the values of all the four quantum numbers for the outermost electron of sodium atom. **2**

    b) Write the electronic configuration of copper. **1**

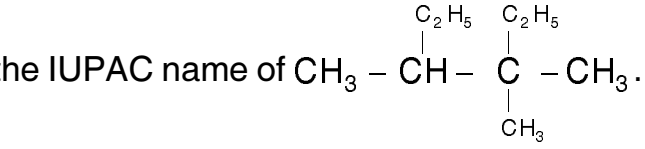
14. a) How is nitrogen present in an organic compound detected by Lassaigne's test ? **2**

    b) Give an example for substitution reaction. **1**

15. Calculate the wavelength associated with a body of mass 1 mg, moving with a velocity of 10 m/s. Given, $h = 6.63 \times 10^{-34}$ JS.

16. State Raoult's law. Derive the relationship between molar mass of a non-volatile non-electrolytic solute and relative lowering of vapour pressure. **3**

17. a) How is propene prepared by dehydrohalogenation reaction ? **2**

    b) Write the IUPAC name of  . **1**

SECTION – C

Answer **any FIVE** of the following : **(5×6=30)**

18. a) Define ionisation energy. Explain the variation of ionisation energy down a group and across a period. **4**

    b) State and explain Hund's rule of maximum multiplicity with the example of nitrogen. **2**

19. a) Explain Andrew's P.V isotherms for CO_2. **4**

    b) Explain the following :

    i) Gold number

    ii) Thixotropy. **2**

20. a) What is a carbocation ? Mention the relative stabilities of primary, secondary and tertiary carbocations. **2**

    b) Explain Wurtz reaction with an example. **2**

    c) An organic compound containing C, H and O contains 52.2 % carbon and 13.04 % hydrogen. Vapour density of the compound is 23. Find the molecular formula of the compound. **2**

21. a) State Nernst distribution law. Explain it's application in de-silverisation of lead. **3**

    b) State Hardy-Schulze rule. **1**

    c) How are emulsions classified ? Give an example to each class. **2**

22. a) Explain the formation of ethene molecule giving an account of hybridisation of carbon atoms in it. **4**

    b) How is cyclopropane synthesised by Freund's method ? **2**

23. a) The Vander Waal's constants per mole of CO_2 are a = 2.8 $Nm^4 mol^{-2}$ and b = 3.38 × 10^{-5} m^3 mol^{-1}. Calculate the values of critical temperature and critical volume. **3**

    b) Explain with reference to alkali metals

    i) Electronic configuration

    ii) Flame colouration.

    Give an example to each. **3**

24. a) Explain electrophoresis. **2**

    b) What are ortho and para hydrogens ? **2**

    c) Give any four advantages of gaseous fuels. **2**

SECTION – D

Answer **any TWO** of the following : **(2×10=20)**

25. a) State and explain Markownikoff's rule with mechanism using suitable example. **4**

    b) Write the expression for Langmuir's adsorption isotherm. Name the terms involved and give one of it's limitations. **3**

    c) Arrange the following isoelectronic ions F^-, O^{2-}, N^{3-} and Na^+ in the decreasing order of their radius. Justify your answer. **3**

26. a) How is molar mass of a non-volatile solute determined experimentally by Walker-Lumsden method ? **4**

    b) How is sulphur present in an organic compound estimated by Carius method ? **3**

    c) Explain with reference to alkaline earth metals

    i) Electropositive character

    ii) Softness and density. **3**

27. a) Explain sulphonation of benzene with mechanism. **3**

    b) The RMS velocity of oxygen molecules at 25°C is 482 ms^{-1}. Calculate the average velocity and most probable velocity of oxygen molecules at 25°C. **3**

    c) Give the composition and uses of

    i) Flint glass

    ii) Potash glass. **3**

    d) Name the pigment used in green coloured paint. **1**

28. a) Discuss the diagonal relationship between Lithium and Magnesium. **3**

    b) Draw boiling point composition curve for nearly ideal binary liquid solutions (type-I) and explain the theory of fractional distillation. **4**

    c) Organic compound containing 0.35 g of nitrogen in Kjeldahl's experiment liberated ammonia, which neutralised 11.5 ml of 1 N H_2SO_4. What is the percentage of nitrogen in the organic compound ? **3**

SECTION – E

Answer **any ONE** of the following : **(1×10=10)**

29. a) Define (i) electronegativity (ii) electron affinity. Give the relationship between electronegativity, ionisation energy and electron affinity. **3**

    b) In a process of steam distillation of aniline, the vapour pressures of water and aniline at 371 K are 92.2 KPa and 8.5 KPa respectively. If the mass of water in the distillate is 25.2×10^{-3} Kg, what is the mass of aniline in the distillate ?

    Given : Molar mass of water = 18

    Molar mass of aniline = 93. **3**

    c) What are the postulates of Baeyer's strain theory ? **4**

30. a) Explain the mechanism of addition of HCl to ethyne. **3**

    b) How is cement manufactured by dry process ? **4**

    c) In an experiment, 10 g of cane sugar (molecular mass = 342) in 10^{-3} m^3 of solution produced an osmotic pressure of 6.64×10^4 Nm^{-2} at 273 K. Calculate the value of R in SI units. **3**