Roll No

Total No. of Questions–30] [Total No. of Printed Pages–15

M–355–XI–2324

CHEMISTRY

(Theory)

Time Allowed—3 Hours Maximum Marks—60

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

Marks allotted to each question are indicated against it.

Special Instructions :

(i) You must write on your Answer-book the same question number as appears in your Question Paper.

(ii) Do not leave blank page/pages in your Answer-book.

(iii) All questions are compulsory. The question paper consists of four Sections–A, B, C and D.

(iv) Internal choices are given in some questions.

(v) Section–A contains 12 MCQ (Multiple Choice Questions) 1 to 12 of 1 mark each.

(vi) Section–B contains 9 questions from 13 to 21 of 2 marks each.

(vii) Section–C contains 6 questions from 22 to 27 of 3 marks each.

(viii) Section–D contains 3 questions from 28 to 30 of 4 marks each.

(ix) Make neat and clean diagrams where required.

(x) Attempt all the questions in serial order.

SECTION–A

1. The number of moles of Solute per litre of the Solution is known as :

   (a) Molality

   (b) Molarity

   (c) Normality

   (d) Formality. 1

2. The small portion of an atom where most of the mass of atom is densely concentrated is called ..... .

   (a) Nucleons

   (b) Nucleus.

   (c) Orbital.

   (d) Extra nuclear part.

3. The Electronic configuration ns^2np^6 ref to .....

   (a) Chalcogens

   (b) Halogens

   (c) Noble Gases

   (d) Alkali metals.

4. Which of the following molecules has zero dipo moment?

   (a) NH_3

   (b) H_2O

   (c) $CHCl_3$

   (d) CO_2.

5. The diagonal hybridisation is

(a) sp^2

(b) sp

(c) dsp^2

(d) sp^3. 1

6. The Temperature at which real gas obeys ideal gas laws over an appreciable range of pressure is known as :

(a) Critical Temp.

(b) Absolute Temp.

(c) Boyle's Temp.

(d) Kelvin. 1

7. A Thermodynamic state function is a quantity :

(a) used to determine heat changes

(b) whose value is independent of path

(c) used to determine pressure- volume work

(d) whose value depends on Temperature only. 1

8. The Equilibrium system

CO_2 (gas) $\rightleftharpoons$ CO_2(in solution),

is governed by which law?

(a) Kohlrausch's Law

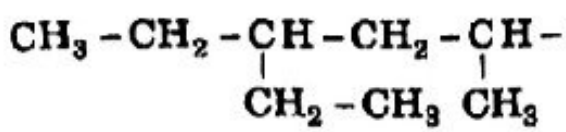
(b) Hook's Law

(c) Henry's Law

(d) Law of Chem. Eqbm. 1

27. (a) What do you mean by an Electrophile? 1

(b) Write IUPAC name of : 1



(c) Explain positional isomerism with an example. 1

SECTION-D

28. (a) Derive the relation between 'C_p' and 'C_v' for an ideal gas. 2

(b) Explain the following :

(i) Free expansion. 1

(ii) Isolated system. 1

29. (a) What do you understand by :

(i) Inert pair effect. 1

(ii) Allotropy. 1

(b) Give reason : Graphite is used as lubricant and Diamond is used as abrasive.

Or

(a) Explain the Orbital diagram of diborane. 2

(b) Why Boron is unable to form BF_6^{3-} ion? 1

(c) Why Boric acid is considered as a weak acid? 1

30. Attempt any **four** of the following :

(a) Write Chemical reaction for ozonolysis of propene followed by cleavage with Zn-H_2O. 1

(b) What happens when ethyne is passed over red hot iron at 873K ? Write Chemical Rxn. 1

21. What do you mean by 'Ozone Hole'? Write its consequences.

Or

What are major causes of Water pollution? Explain. 2

SECTION–C

22. Explain the shape of BF_3 on the basis of VSEPR theory.

Or

Draw molecular orbital diagram for N_2 molecule and explain its stability with bond order. 3

23. (a) Derive the relation between K_p and K_c for an system : 2

$$aA + bB \rightleftharpoons cC + dD.$$

(b) Write equilibrium constant 'K_c' for the eqbm. system :

$$Ni(s) + 4\,CO(g) \rightleftharpoons Ni(CO)_4(g).$$ 1

24. (a) Explain disproportionation reaction and combination reaction. 2

(b) Define Reducing agents. 1

25. (a) What happens when Sodium metal is dropped in Water and Sodium metal is heated in free supply of Air? Write Rxns. 2

(b) Define Diagonal relationship. 1

26. (a) Explain Temporary hardness of Water with Clark's method to remove it. 2

(b) Name the isotope of Hydrogen which is radioactive in nature. 1

SECTION–B

13. (a) Define a mole. 1

(b) The molecular mass of methane is ..... u. 1

14. (a) What are de-generate orbitals? 1

(b) Write the Electronic configuration of Na. 1

15. Explain Isobar and Isotopes with examples.

Or

Draw the shapes of $d_{x^2-y^2}$ and d_{xy} orbitals. 2

16. Consider the following species : 1,1

$N^{3-}, F^-, Na^+, Mg^{2+}, O^2$.

(a) What is common in them?

(b) Arrange them in the order of increasing Ionic radii.

17. A balloon is filled with hydrogen gas at room temperature. It will burst if pressure exceeds 0.2 bar, if at 1 bar pressure the gas occupies 2.27 L volume, upto what volume can the Balloon be expanded?

Or

State and explain Charle's law with graphical representation. 2

18. Define Le-chatelier's principle. Explain the effect of change in pressure and catalyst on an equilibrium. 2

19. (a) Define Catenation. 1

(b) Water gas is .....?

20. (a) Complete the reaction : 1

$$CH_2 = CH_2 + H_2 \xrightarrow{Pt/Pd/Ni} ?$$

(b) Explain Wurtz reaction with a suitable example. 1

9. Which group of elements is known as alkaline Earth metals ?

(a) Group 18

(b) Group–2

(c) Group–1

(d) Group–18. 1

10. Which carbocation is more stable ?

(a) $(CH_3)_3C-\overset{+}{C}H_2$

(b) $(CH_3)_3-\overset{+}{C}$

(c) $CH_3-CH_2-\overset{+}{C}H_2$

(d) $CH_3-\overset{+}{C}H-CH_2-CH_3$. 1

11. Complete transfer of bonded pair of π-electrons to one of the atoms joined by a multiple bond on the Demand of an attacking reagent, is known as :

(a) Hyper conjugation

(b) –I effect

(c) +I effect

(d) Electromeric effect. 1

12. Benzene reacts with methyl chloride in presence of anhydrous $AlCl_3$ to form :

(a) Chlorobenzene

(b) Benzyl chloride

(c) Xylene

(d) Toluene. 1

(c) How will you convert phenol into benzene? 1

(d) Why in Isomeric alkanes, the boiling point decreases with increase in branching? 1

(e) Write short note on β – elimination reaction. 1