

Model Question Paper

Roll No (Session-2020-21) (10+1) Class
(Chemistry)

Total no. of questions : 28

Time Allowed : 3 hrs

Maximum Marks : 60

Special Instructions:-

- (i) You must indicate on your answer book the same question no. as appears in your question paper.
- (ii) All questions are compulsory. Internal choices have been given in some questions.
- (iii) Q. No. 7,13,15,19,26 (a) and 27 (a,c) are based on PISA format.
- (iv) Marks allotted to each question are indicated against each.

1. A jug contains 2L of milk. The value of milk in m^3 is : 1
(a) $20m^3$ (b) $2 \times 10^{-2} m^3$
(c) $2 \times 10^{-3} m^3$ (d) $2m^3$
2. The total number of nodes for a 3d orbital are 1
(a) 1 (b) 2
(c) 3 (d) 0
3. The shape of a molecule is square planar, the hybridisation involved is 1
(a) sp^3 hybridization (b) sp^2 hybridization
(c) dsp^2 hybridization (d) $sp^3 d^2$ hybridisation
4. The energy of an insulated system is 1
(a) infinite (b) depends upon surroundings
(c) zero (d) constant

5. Acidic solution has an pH. 1
 (a) greater than 7 (>7) (b) less than 7 (<7)
 (c) exactly 7 (d) 7.3
6. An oxidising agent is a/an 1
 (a) acceptor of electron (s) (b) donor of electron (s)
 (c) both a and b (d) none of these
7. A single bond is always a ' σ ' bond where as multiple bonds contains both σ and π bonds. A double bond contains one σ and one π bond whereas a triple bond contains one σ and 2 π bonds. On basis of this statement calculate σ and π bonds in $\text{HC} \equiv \text{C} - \text{CH} = \text{CH} - \text{CH}_3$ 1
 (a) $\sigma = 10, \pi = 2$ (b) $\sigma = 8, \pi = 3$
 (c) $\sigma = 2, \pi = 3$ (d) $\sigma = 10, \pi = 3$
8. The strongest reducing agent among alkali metals is 1
 (a) Li (b) Na
 (c) Cs (d) K
9. The reaction 1
 $\text{CH}_3 - \text{CH} = \text{CH}_2 + \text{HBr} \xrightarrow{(\text{C}_6\text{H}_5\text{Co})_2\text{O}_2} \text{CH}_3 - \text{CH}_2 - \text{CH}_2\text{Br}$ is an
 example of 1
 (a) Markovnikov rule (b) anti Markovnikov rule
 (c) Friedel craft acylation (d) Friedel craft alkylation
10. The most serious water pollutants are disease causing agents called 1
 (a) pathogens (b) smog
 (c) acid rain (d) carcinogenics
11. Calculate amount of water in (g) produced by combustion of 16g of methane. 2

Or

Calculate the molarity of NaOH in the solution prepared by dissolving its 4g in enough water to form 250 ml of the solution. 2

12. Explain line spectrum of hydrogen atom using Bohr's model. 2

Or

A certain particle carries $.5 \times 10^{-16}$ c of static electric charge. Calculate number of electrons present in it.

13. Match Column I with Column II 2

Column I	Column II
(a) BF_3	(i) Trigonal bipyramidal
(b) CH_4	(ii) Octahedral
(c) PCl_5	(iii) Trigonal planar
(d) SF_6	(iv) Tetrahedral

14. Explain the shape of H_2O molecule on basis of VSEPR theory. 2
15. The relation between density and molar mass of a gaseous substance is

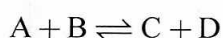
$$\rho = \frac{PM}{RT}$$
, where ρ is density of substance P is pressure of gaseous substance, M is molar mass, R is gas constant ($= 8.3 \text{ J mol}^{-1}\text{K}^{-1}$) and T is temperature in K what is the density of H_2 gas at 27°C and 249. k Pa pressure. 2

16. Explain Dalton's law of partial pressures 2

Or

Derive Ideal gas equation. 2

17. Derive a relation between C_p and C_v for an ideal gas. 2
18. Explain law of chemical equilibrium using a general reversible reaction. 2



3

Or

The following concentrations were obtained for the formation of NH_3 from N_2 and H_2 at equilibrium at 500K. 2

$$[\text{N}_2] = 1.5 \times 10^{-2} \text{ M}, [\text{H}_2] = 3.0 \times 10^{-2} \text{ M}$$

$$[\text{NH}_3] = 1.2 \times 10^{-2} \text{ M}.$$

Calculate the value of equilibrium constant.

19. In methyl carbocation $\left(\overset{+}{\text{C}}\text{H}_3 \right)$, the carbon is positively charged and is sp^2 hybridised. Thus the shape of C^+H_3 may be considered as being derived from overlap of three equivalent sp^2 hybridised orbitals. On basis of above statement draw the shape of methyl carbocation. 2
20. Why does the solubility of alkaline earth metal carbonates and sulphates in water decrease down the group? 2
21. (a) What is the lowest value of 'n' that allows 'g' orbital to exist? 1
(b) Describe effect of addition of H_2 on equilibrium of reaction. 1
$$2\text{H}_2(\text{g}) + \text{CO}(\text{g}) \rightleftharpoons \text{CH}_3\text{OH}(\text{g})$$

(c) For an isolated system, $\Delta U = 0$, What will be ΔS ? 1

Or

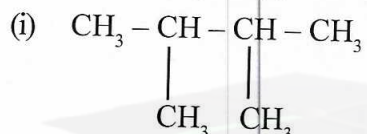
- (a) An electron is in one of the 3d orbitals. Give all possible value of n, l, m_l for this electron. 1
(b) Define enthalpy of dilution. 1
(c) What do you mean by conjugate acid base pair? 1
22. (a) What is periodicity? Explain cause of periodicity. 2
(b) Define ionic radius. 1

Or

- (a) Explain why the size of cation is smaller than the size of parent atom. 2
- (b) Write IUPAC name of the element with atomic number 113. 1
23. (a) Beryllium and magnesium do not give colour to flame where as other alkaline earth metals do so, why? 2
- (b) Find out oxidation state of sodium in Na_2O_2 . 1
24. (a) Explain why is there a phenomenal decrease in ionisation enthalpy from carbon to silicon. 2
- (b) Diamond is covalent. Yet it has high melting point Why? 1
25. (a) Explain redox reaction in terms of electron transfer reaction. 2
- (b) Explain why solubility of alkaline earth metal hydroxides in water increase down the group. 1
- Or**
- (a) Justify that the reaction $2 \text{Na} (\text{s}) + \text{H}_2 (\text{g}) \rightarrow 2\text{Na H}$ is a redox change. 2
- (b) Explain why lithium show anomalous behaviour with respect to other elements of the group. 1
26. (a) Substances which behave as an acid as well as an base are called amphoteric substances give reactions to prove that water is an amphoteric substance. 2
- (b) Explain acidic behaviour of Acetylene. 2
- (c) Give one reaction of H_2O_2 in which it acts as an oxidising agent. 1
27. (a) Alkyl halides on treatment with sodium metal in dry ethereal (free from moisture) solution. This reaction is known a Wurtz reaction. The general equation of reaction is 2

$R-X + 2Na + X-R \xrightarrow{\text{dry ether}} R-R + 2NaX$ use the statement to convert bromoethane into n-butane.

(b) Write IUPAC name of 2



(ii) Write structural formula of following compound 3,4,4,5-Tetramethyl heptane.

- (c) What do you mean by the term "acid rain"? 1
28. (a) Discuss inductive effect. 1
- (b) What do you mean by heterolytic cleavage of covalent bond? 1
- (c) Write chemical equation for Friedel craft alkylation reaction of benzene. 1
- (d) What happens when bromine is added to prop-1-yne? 1
- (e) Why is KO_2 paramagnetic? 1

Or

- (a) Discuss Homologous series. 1
- (b) What do you mean by substrate and reagent? 1
- (c) How will you convert ethene to ethane? 1
- (d) How will you obtain ethene from ethyl bromide? 1
- (e) Explain why sodium is less reactive than potassium? 1