Model Question Paper

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

(Chemistry)

Total no. of question s : 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

1

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 2π bonds. On basis of this statement calculate σ and π bonds in $HC \equiv C - CH = CH - CH_3$ 1
   - (a) $\sigma = 10, \pi = 2$
   - (b) $\sigma = 8, \pi = 3$
   - (c) $\sigma = 2, \pi = 3$
   - (d) $\sigma = 10, \pi = 3$

8. The strongest reduing agent among alkali metals is   1
   - (a) Li
   - (b) Na
   - (c) Cs
   - (d) K

9. The reaction   1

   $CH_3 - CH = CH_2 + HBr \xrightarrow{(C_6H_5 Co)_2 O_2} CH_3 - CH_2 - CH_2 Br$ 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

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

$$\int = \frac{PM}{RT}$$, where $\int$ is density of subtance P is pressure of gaseous substance, M is molar mass, R is gas constant ($= 8.3$ J mol^{-1}K^{-1}) and T is temperature is 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 Cp and Cv for an ideal gas. 2

18. Explain law of chemical equilibrium using a general reversible reaction. 2

$$A + B \rightleftharpoons C + D$$

3

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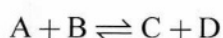
The folloiwing concentrations were obtained for the formation of NH_3 from N_2 and H_2 at equilibrium at 500K.   2

$[N_2] = 1.5 \times 10^{-2}$ M, $[H_2] = 3.0 \times 10^{-2}$ M

$[NH_3] = 1.2 \times 10^{-2}$ M.

Calculate the value of equilibrium constant.

19. In methyl carbocation $\left(\overset{+}{C}H_3\right)$, 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

    $2H_2(g) + CO(g) \rightleftharpoons CH_3OH(g)$

    (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
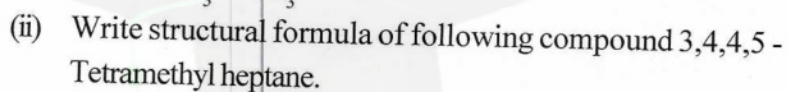
    (b) Define ionic radius.   1

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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) Berryllium 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 $2 Na (s) + H_2 (g) \rightarrow 2Na\,H$ 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

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

(b) Write IUPAC name of   2

    (i) $CH_3 - CH - CH - CH_3$

                  $\;\;|\qquad\;\;\;|$

                 $CH_3\;\;\;CH_3$

    (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

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