Sample Paper-II (Unsolved)

Subject : Chemistry

Class : IX

Time : 3 Hr . **M.M. : 70**

General In tructions :

(i) All questions are compulsory.
(ii) Marks for questions are indicated against each.
(iii) Question no. 1-8 are very short answer questions carrying 1 march each.
(iv) Questions no. 9-18 are short answer questions carrying 2 marks each.
(v) Question no. 19-27 are also short answer question carrying 3 marks each.
(vi) Question no. 28-30 are long answer questions carrying 5 marks each.
(vii) Answer should be brief and to the point.

1. Write the correct set of four quantum numbers for the valence electron of potassium (Z = 19).
2. Write the I PAC name and symbol for the element with atomic number 199.
3. What property of molecules of real gases is indicated by van der Walls constant 'a'?
4. When 430J of work was done on a system, it lost 120J of nergy as heat. Calculate the value of internal energy change (Δ) for this process.
5. Write K_p is terms of K_c for the following chemical reaction :

$$2SO_2(g) + O_2(g) \rightleftharpoons 2SO_3(g)$$

6. Given an example of disproportionation reaction.
7. Name the isotope of hydrogen which contains equal number of protons and neutrons.]
8. Write I PAC name of the following organic compund :

$CH_3 \quad C(CH_3)_2 \quad CH = CH_2$

9. A sample of drinking water was found to be severely contraminated with chloroform ($CHCl_3$), supposed to be carcinogenic in nature. The level of contamination was 15ppm (by mass).
   a) Express this in percent by mass.
   b) Determine the molality of chloroform in the water sampl

   [Given molar mass of $CHCl_3$ = 118.5g-mol ^{1} | 2

10. An electron has a speed of $40 ms^{-1}$ accurate upto 99.99%. What is the uncertainty in locating its position? [Given $m_e = 9.11 \times 10^{-3}1$ kg] 2

11. Give correct reason for the following : 2

    a) BF_3 has a zero dipole moment although the B–F bonds are plar.

    b) All carbon to oxygen bonds in CO_3^{2-} are equivalent.

12. Balance the following redox reaction by ion electron method (in basic medium) : 2

    $$MnO_4^-(aq) + I^-(aq) \rightarrow MnO_2(s) + I_2(s)$$

13. Complete the following reactions : 2

    a) $PbS(s) + H_2O_2(aq) \rightarrow$

    b) $Ca(HCO_3)_2 + Ca(OH)_2 \rightarrow$

    OR

    Account for the following :

    a) Soft water lathers with soap but not hard water.

    b) Temporary hardness of water can be removed by boiling.

14. a) Mention the type of hybridisation of each carbon in the compound $CH_3 - CN$. 2

    b) Draw the structure of 2-methylpropan-2-ol.

15. In sulphur estimation, 0.157g of an organic compound gave 0.4813g of barium sulphate. What is the percentage of sulphur in the compound? 2

16. Write the structures of products (A and B) of the following reactions : 2

    a) $HC \equiv CH \xrightarrow{Na} A \xrightarrow{CH_3Br} B$

    b) $BrH_2C - CH_2Br \xrightarrow[KOH]{Alcohol} A \xrightarrow{NaNH_2} B$

17. Arrange the following in order of property mentioned against each : 2

    a) $BeCl_2, MgCl_2, CaCl_2, BaCl_2$ [Increasing ionic character]

    b) $Mg(OH)_2, Ca(OH)_2, Ba(OH)_2, Sr(OH)_2$ [Increasing solubility in water]

18. Give reasons for the following :

    a) The enthalpy of neutralisation is always constant *i.e.*, 57.1 kJ/mol when a strong acid neutralises a strong base.

    b) Neither q nor W is a state function but $q + W$ is a state function.

19. a) State Gay Lussac's law of gaseous volumes.

b) What mass of $CaCO_3$ is required to react completely with 25ml of 0.75M HCl according to equation?

$$CaCO_3(s) + 2HCl(aq) \rightarrow CaCl_2(aq) + CO_2(g) + H_2O(l)$$

[Given atomic masses : Ca + 40u, C = 12u, O = 16u, Cl = 35.5 u and H = 1 u]

20. Account for the following :

a) Ionization enthalpy of nitrogen is more than that of oxygen.

b) A cation is always smaller then its parent atom.

21. Calculate the standard enthalphy of formation of CH_3OH (l) from the following data : 3

$$CH_3OH(l) + \frac{3}{2} O_2(g) \rightarrow CO(g) + 2H_2O(l) \quad ; \Delta_r H^0 = 726 \text{ kJ/mol}$$

$$C \text{ (graphite)} + O_2(g) \rightarrow CO_2(g) \quad ; \Delta_r H^0 = 393 \text{ kJ/mol}^{-1}$$

$$H_2(g) + \frac{1}{2} O_2(g) \rightarrow H_2O(l) \quad ; \Delta_r H^0 = 286 \text{ kJ/mol}$$

22. a) State Pauli's exclusion principle. 3

b) Account for the following :

i) Chromium has configuration $3d^5 4s^1$ and not $3d^4 4s^2$.

ii) Bohr's orbit are called stationary states.

23. Explain the following terms : 3

a) Photochemical smog

b) Acid rain

c) Eutrophication

24. a) Write the molecular orbital configuration of O_2^+. Calculate its bond order and predict its magnetic behaviour.

b) What is the state of hybridisation of nitrogen in NH_4^+ ion? 3

25. Account for the following : 3

a) Potassium carbonate cannot be prepared by Solvay process.

b) Beryllium and magnesium do not give colour to flame.

c) Alkali metals and alkaline earth metals cannot be obtained by chemical reduction methods.

OR

What happens when :

a) sodium metal is dropped in water?

b) sodium metal is heated in free supply of air?

c) sodium peroxide dissolves in water?

26. a) What would be the S.I. unit for quantity pV^2T^2/n? 3

b) Calculate the volume occupied by 8.8g of CO_2 at 31.1°C and 1 bar pressure. ($R = 0.083$ bar LK^{-1} mol^{-1}).

27. a) Arrange the following in order of property mentioned against each : 3

i) $(CH_3)_3C^{\oplus}$, $CH_3CH_2\underset{\underset{CH}{|}}{CH}^{+}$ $CH_3CH_2CH_2CH^{+}_3$ [Increasing stability order]

ii) CH_3CH_2COOH, $(CH_3)_2CHOOH$ and $(CH_3)_3CCOOH$
[Increasing acidic strength]

b) Write the name of isomerism among the following compounds :

$CH_3O\,CH_2CH_2CH_3$ and $CH_3CH_2O\,CH_2CH_3$

28. a) Write the conjugate acid of $HCOO^-$. 5

b) Calculate the pH of a 1.0×10^{-8} M solution of HCl.

c) Calculate the solubility of A_2X_3 in pure water, assuming that neither kind of ion reacts with water. The solubility product of A_2X_3 is $K_{sp} = 1.1\times10^{-23}$.

OR

a) Write the conjgate acid of NH_3.

b) Assign reason for the following :

i) A solution of NH_4Cl in water shows pH less than 7.

ii) In qualitative analysis NH_4Cl is added before adding NH_4OH for testing Fe^{3+} or Al^{3+} ions.

c) Consider the reaction $\rightleftharpoons$

$N_2(g) + 3H_2(g)$ $2NH_3 + Heat$

Indicate the direction in which the equilibrium will shift when :

i) temperature is increased.

ii) pressure is increased.

29. a) Draw the structure of B_2H_6. 5

b) What happens when :

i) Boric acid is added to water.

ii) Aluminium is treated with dilute NaOH.

c) Give suitable reason for the following :

i) $[SiF_6]^{2-}$ is known whereas $[SiCl_6]^{2-}$ not.

ii) In group 14, the tendency for catenation decreases with increasing atomic number.

OR

a) Complete the follwing chemical equations :

i) $Fe_2O_3 + 3CO \xrightarrow{\Delta}$

ii) $CaCO_3 + 2HCl \longrightarrow$

b) Write a brief account on the following :

i) Diamond is covalent, yet it has high melting point.

ii) Atomic radius of gallium (135pm) is less than that of aluminium (143pm).

iii) Graphite is a good conductor of electricity but diamond is insulator.

30. a) Explain the following reactions with suitable examples: 5

i) Wurtz reaction. ii) Friedal-Crafts alkylation reaction.

b) An alkene 'A' on azonolysis gives mixture of ethanol and pentan-3 one. Write the structure and IUPAC name of 'A'.

c) Give one chemical test to distinguish between ethene and ethyne.

OR

a) Write suitable reason for the following :

i) C–C bond length in benzene ring is 139 pm which is in between C–C single bond 154 pm and C=C double bond 133 pm.

ii) Trans-2-butene has higher melting point than cis-isomer.

b) Give a chemical test to distinguish between but-1-yne and but-2-yne.

c) How will you carry out the following conversions :

i) Ethene to benzene

ii) 1-bromopropane to 2-bromopropane.