

Sample Paper-II (Unsolved)

Subject : Chemistry

Time : 3 Hrs.

Class : IX

M.M. : 70

General Instructions :

- (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 mark 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 ($Z = 19$). 1
2. Write the IUPAC name and symbol for the element with atomic number 199. 1
3. What property of molecules of real gases is indicated by van der Waals constant 'a'? 1
4. When 430J of work was done on a system, it lost 120J of energy as heat. Calculate the value of internal energy change (ΔU) for this process. 1
5. Write K_p in terms of K_c for the following chemical reaction: 1
$$2\text{SO}_2(\text{g}) + \text{O}_2(\text{g}) \rightleftharpoons 2\text{SO}_3(\text{g})$$
6. Give an example of disproportionation reaction. 1
7. Name the isotope of hydrogen which contains equal number of protons and neutrons. 1
8. Write IUPAC name of the following organic compound : 1
$$\text{CH}_3 - \text{C}(\text{CH}_3)_2 - \text{CH} = \text{CH}_2$$
9. A sample of drinking water was found to be severely contaminated 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 sample.[Given molar mass of $\text{CHCl}_3 = 118.5\text{g}\cdot\text{mol}^{-1}$] 2

10. An electron has a speed of 40ms^{-1} accurate upto 99.99%. What is the uncertainty in locating its position? [Given $m_e = 9.11 \times 10^{-31}\text{ kg}$] 2
11. Give correct reason for the following : 2
- BF_3 has a zero dipole moment although the B–F bonds are polar.
 - 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
- $$\text{MnO}_4^- (aq) + \Gamma (aq) \rightarrow \text{MnO}_2(s) + \text{I}_2(s)$$
13. Complete the following reactions : 2
- $\text{PbS}(s) + \text{H}_2\text{O}_2(aq) \rightarrow$
 - $\text{Ca}(\text{HCO}_3)_2 + \text{Ca}(\text{OH})_2 \rightarrow$

OR

Account for the following :

- Soft water lathers with soap but not hard water.
 - Temporary hardness of water can be removed by boiling.
14. a) Mention the type of hybridisation of each carbon in the compound $\text{CH}_3 - \text{CN}$. 2
- Draw the structure of 2-methylpropan-2-ol.
15. In sulphur estimation, 0.157 g of an organic compound gave 0.4813 g 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
- $\text{HC} \equiv \text{CH} \xrightarrow{\text{Na}} \text{A} \xrightarrow{\text{CH}_3\text{Br}} \text{B}$
 - $\text{BrH}_2\text{C} - \text{CH}_2\text{Br} \xrightarrow[\text{KOH}]{\text{Alcohol}} \text{A} \xrightarrow{\text{NaNH}_2} \text{B}$
17. Arrange the following in order of property mentioned against each : 2
- $\text{BeCl}_2, \text{MgCl}_2, \text{CaCl}_2, \text{BaCl}_2$ [Increasing ionic character]
 - $\text{Mg}(\text{OH})_2, \text{Ca}(\text{OH})_2, \text{Ba}(\text{OH})_2, \text{Sr}(\text{OH})_2$ [Increasing solubility in water]
18. Give reasons for the following :
- The enthalpy of neutralisation is always constant *i.e.*, 57.1 kJ/mol when a strong acid neutralises a strong base.
 - 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?

$$\text{CaCO}_3(s) + 2\text{HCl}(aq) \rightarrow \text{CaCl}_2(aq) + \text{CO}_2(g) + \text{H}_2\text{O}(l)$$
 [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 than its parent atom.
21. Calculate the standard enthalpy of formation of $\text{CH}_3\text{OH}(l)$ from the following data : 3

$$\text{CH}_3\text{OH}(l) + \frac{3}{2} \text{O}_2(g) \rightarrow \text{CO}(g) + 2\text{H}_2\text{O}(l) \quad ; \Delta_r H^\circ = 726 \text{ kJ/mol}$$

$$\text{C}(\text{graphite}) + \text{O}_2(g) \rightarrow \text{CO}_2(g) \quad ; \Delta_r H^\circ = 393 \text{ kJ/mol}^{-1}$$

$$\text{H}_2(g) + \frac{1}{2} \text{O}_2(g) \rightarrow \text{H}_2\text{O}(l) \quad ; \Delta_r H^\circ = 286 \text{ kJ/mol}$$
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.

29. a) Draw the structure of B_2H_6 . 5
- b) What happens when :
- Boric acid is added to water.
 - Aluminium is treated with dilute NaOH.
- c) Give suitable reason for the following :
- $[SiF_6]^{2-}$ is known whereas $[SiCl_6]^{2-}$ not.
 - In group 14, the tendency for catenation decreases with increasing atomic number.

OR

- a) Complete the following chemical equations :
- $Fe_2O_3 + 3CO \xrightarrow{\Delta}$
 - $CaCO_3 + 2HCl \rightarrow$
- b) Write a brief account on the following :
- Diamond is covalent, yet it has high melting point.
 - Atomic radius of gallium (135pm) is less than that of aluminium (143pm).
 - Graphite is a good conductor of electricity but diamond is insulator.
30. a) Explain the following reactions with suitable examples: 5
- Wurtz reaction. ii) Friedal-Crafts alkylation reaction.
- b) An alkene 'A' on ozonolysis 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 :
- C-C bond length in benzene ring is 139 pm which is in between C-C single bond 154pm and C=C double bond 133 pm.
 - 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 :
- Ethene to benzene
 - 1-bromopropane to 2-bromopropane.