CBSE Board
Class XI Chemistry
Sample Paper - 10

Time: 3 Hours   **Marks: 70**

General Instructions

1. All questions are compulsory.
2. Question nos. 1 to 8 are very short answer type questions and carry 1 mark each.
3. Question nos. 9 to 18 are short answer type questions and carry 2 marks each.
4. Question nos. 19 to 27 are also short answer type questions and carry 3 marks each.
5. Question nos. 28 to 30 are long answer type questions and carry 5 marks each.
6. Use log tables if necessary, use of calculators is not allowed.

Q1. Give an example of a basic buffer.

Q2. Which of the two is more acidic and why? Acetic acid and chloroacetic acid

Q3. What happens to the ionic product of water if some acid is added to it?

Q4. What is the approximate molecular mass of dry air containing 78% N_2 and 22% O_2? (Atomic mass N = 14, O =16 u)

Q5. Give an example of a decomposition redox reaction.

Q6. Give the molecular formula of two gases responsible for depletion of ozone layer.

Q7. Write the name and atomic number of the second transition element.

Q8. Why does H_2 behave as an inert gas?

Q9. Why is acid rain considered to be a threat for Taj Mahal? Explain with chemical reaction.

Q10. What is the hybridization of B in BF_3 and N in NH_3? How does hybridization change when both compounds react to a coordinate bond?

Q11. Predict the shape of following molecules on the basis of VSEPR theory
    a) XeF_4 b) ClF_3

Q12.
    a) What is Boyle's temperature?
    b) What type of intermolecular forces exist between HCl molecules in liq.HCl?

Q13. Balance the following equation by the half reaction method (acidic medium):
    $C_2H_5OH + MnO_4^- \rightarrow Mn^{2+} + CH_3COOH$

Q14.
  a) Calculate the mass of one atom of oxygen.
  b) How many He atoms are present in 4u of He.

Q15. Calculate the mass percentage composition of copper pyrites($CuFeS_2$)

Q16.
  a) Give equation for lab preparation of Hydrogen peroxide.
  b) Give a use of hydrogen peroxide.

Q17. Predict the effect of addition of 2 moles of an ideal gas
  a) At constant volume
  b) At constant pressure on the equilibrium:
      $Na_2CO_3(s) + SO_2\ (g) + \frac{1}{2}O_2\ (g) \rightleftharpoons Na_2SO_4(s) + CO_2\ (g)$

OR

 Q17.
   a) What is the condition required for precipitation to occur?
   b) In which of the two solutions, solubility of sodium sulphide be more: solution with pH 3.7 or with pH 4.2?

Q18. Calculate the root mean square and average speed of oxygen molecules at 27^0C.

Q19.
  a) An electron in which orbit of Li^+(Z=3) would have same energy as the electron in second orbit of H atom?
  b) State Aufbau's principle

OR

Q19. Calculate the wavelength, frequency and wave number of a light wave whose period is 2.0×10^{-10} s.

Q20.
  a) Second ionization enthalpy of Na is more than Mg.Why?
  b) Arrange the following in the increasing order of radius. N, O, P
  c) Write the general outer electronic configuration of transition elements.

Q21. Give reason:
  a) Be and Mg do not impart colour to the flame.
  b) Li^+ is heavily hydrated in water.

Q22. Calculate the volume of 1.0 M aq.NaOH that is neutralized by 200 mL of 2.0 M aq.HCl. Also calculate the mass of NaCl produced.

Q23.
  a) Which of the two has higher ionic character and why? NaCl or NaI
  b) Write the molecular orbital configuration of C_2.Predict its magnetic behaviour.
  c) H_2O is a liquid at room temperature.Why?

Q24. In an equilibrium, $A + B \rightleftharpoons C + D$, A and B are mixed in a vessel at a temperature T. The initial concentration of A was twice the initial concentration of B. After equilibrium was attained, concentration of C becomes thrice the equilibrium conc. of B. Calculate K_c.

Q25.
    a) Give values for all 4 quantum numbers for unpaired electron of Cl (Z=17).
    b) Which quantum number defines orientation of an electron?
    c) How many electrons in Cr (Z=24) have l =1?

Q26. After entering a closed coal mine area, Ravi found difficulty in breathing, also felt nausea.
    a) What could be the reason for this?
    b) How could Ravi estimate the level of the pollutant?
    c) As a citizen of the country what should be his course of action further?

Q27.
    a) Write the IUPAC name of:
       i. $HOOCCH_2CH_2COCH_2CH_3$ ii. $CH_3CH_2CONHCH_3$
    b) Arrange the following free radicals in decreasing order of stability: $CH_3^{.}$, $(CH_3)_3C^{.}$, $(CH_3)_2CH^{.}$, $CH_3CH_2^{.}$

Q28.
    a) Standard enthalpies of combustions of C_6H_{10} ,H_2 and C_6H_{12} are -3880, -241,-3920 kJ mol^{-1} resp. Calculate the standard enthalpy of hydrogenation of C_6H_{10}.

    b) Calculate the work done when 1 mole of an ideal gas expands freely in vaccuum.
    c) What is the difference between H-H bond enthalpy and enthalpy of formation of H atom?

OR

Q28.
    a) Calculate the enthalpy change for the reaction:
       $C_2H_4 + H_2 \rightarrow C_2H_6$
       Given enthalpies of combustions of C_2H_4, H_2 and C_2H_6 are -1401, -1550,-286 kJ mol^{-1} respectively.
    b) Identify the state and path functions in the expression given: ΔU=q+w
    c) Predict the sign of ΔG for the following processes:
      i. Melting of ice below 0°C
     ii. Flow of heat from high to low temperature.

Q29.
    a) Give the formulae of components of borax bead.
    b) Why does Si not show catenation to the extent as carbon does?
    c) Al_2Br_6 is a poor conductor of electricity. Why?
    d) $N(CH_3)_3$ is pyramidal while $N(SiH_3)_3$ is planar.Why?

OR

Q29.
   a) Why does B resemble Si in its properties?
   b) Pb (IV) chloride is a good oxidising agent. Why?
   c) Which of the following is acidic and Why? SiO_2, Al_2O_3, PbO_2
   d) B-F bond length in BF$_3$ is more than in $[BF_4]^-$ .Why?

Q30.
   a) Which type of isomerism is observed in xylenes?
   b) Predict the major products of the following:

   i. $C_6H_6 \xrightarrow{\text{H}_2\text{SO}_4}$

   ii. $CH_3CH_2CH(Br)CH_3 \xrightarrow{\text{Alc.KOH}}$

   c) Name the reagent used to distinguish between following pairs of compounds
     i. propane and propene
     ii. but-1-yne and but-2-yne

OR

Q30.
   a) Alkanes with even number of carbon atoms have higher melting point than the corresponding ones with odd number. Why?
   b) Name the two conformations of ethane. Which of the two is more stable?
   c) A hydrocarbon 'A' has a vapour density 36. It forms a single monochloro substitution product. Predict the structure of 'A'. Justify your answer.
   d) Convert acetic acid to methane.