CBSE Board
Class XI Chemistry
Sample Paper - 9

Time: 3 Hours **Total 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. Which quantum number/s define energy of an electron in a multielectron atom?

Q2. Which phenomenon explains the spherical shape of falling liquid drops?

Q3. What is the name of element with atomic number 115?

Q4. What is the IUPAC name of allyl alcohol?

Q5. What is the value of ionisation constant of water at 298K?

Q6. Write the conditions in terms of ΔH and ΔS when a reaction would be always spontaneous?

Q7. Which of the two is more stable- Secondary carbocation or tertiary carbocation? Why?

Q8. Calculate the oxidation number of B in $NaBH_4$.

Q9.

a) Why does F have lower electron gain enthalpy than Cl?
b) Why is Ga smaller in size than Al?

Q10. Alkali metals impart colour to the flame.Why?

Q11. Define the terms -:

a) Gibbs free energy change
b) Enthalpy of formation

OR

Q11. Explain Hess's law of constant heat summation with the help of an example.

Q12.

a) Li is the best reducing agent inspite of having high ionisation enthalpy.Why?
b) Cs is used in photoelectric cells.

Q13. Give IUPAC name and structure of major product formed when:
a) 1,1,2,2-Tetrabromoethane is treated with Zn
b) Cold dilute potassium permanganate is added to but-2-ene

Q14. Give reason:
a) Tl (III) is less stable than Tl (I).
b) BCl_3 molecule has zero dipole moment.

Q15. Balance the given redox reaction in acidic medium.
$MnO_4^- + SO_2 \rightarrow Mn^{2+} + HSO_4^-$

Q16. What is the maximum number of emission lines obtained when the excited electron of a H atom in n=5 drops to the ground state?

Q17. Calculate the bond order of O_2 and O_2^{2-}. Predict their magnetic behaviour.

Q18. Blue coloured solution of alkali metals in liquid ammonia is a good conductor of electricity.Why?

Q19.
a) Calculate the molarity of oxalic acid in the solution prepared by dissolving its 2.52 g in enough water to form 250 mL of the solution.
b) Round off the following in three significant figures
(i) 3289 (ii) 0.03265

Q20.
a) Configuration of N is given as $1s^2\ 2s^2\ 2p_x^2\ 2p_y^1$. Which rule of electronic configuration is violated?
b) Write the electronic configuration of Co^{3+}. Count the number of unpaired electrons present in it. (Given: Atomic number of Co = 27)

Q21. Calculate the enthalpy of combustion of ethylene gas to form carbon dioxide and water at 298 K and 1 atm pressure. The enthalpies of formation of CO_2, H_2O & C_2H_4 are -393.5, -241.8 & +52.3 $kJmol^{-1}$ respectively.

Q22. Explain the following.
a) Which of the two is expected to have higher value of BOD - drinking water or sewage water?
b) Name two greenhouse gases.
c) What are secondary pollutants?

Q23.
a) What are electrophiles? Write with an example.
b) Define position isomerism with an example.

Q24. Vanita is doing an experiment in laboratory. According to the observations, 0.50 g of an organic compound was Kjeldahlised and the ammonia obtained was passed into 100 mL of M/10 H_2SO_4. The excess acid required 160 mL of M/10 NaOH for neutralization. The volume of acid used by ammonia is 2 mL. She was asked to calculate the percentage of nitrogen in the compound. According to vanita, the percentage required is 13% but her friend sunita says it is 11.2%.

a) Which one is the correct answer?
b) What values do you get from this?

Q25.

a) Predict the shapes of following molecules on the basis of VSEPR theory.
PCl_5, XeO_3
b) All bond C-C lengths in benzene are equal inspite of presence of single and double bonds. Why?

OR

a) What is the hybridization of S atom in SF_4 and SO_4^{2-}?
b) Water has a high boiling point of 373K.Why?

Q26.

a) Explain the physical significance of van der Waals parameter. Also give their units.
b) In terms of Charles' law explain why -273°C is the lowest possible temperature?

Q27. In three moles of ethane (C_2H_6), calculate the following:-

i. Number of moles of carbon atoms.
ii. Number of moles of hydrogen atoms.
iii. Number of molecules of ethane.

Q28.

a) Give reason
i. H_2S should be passed in the presence of HCl for Group II analysis
ii. HF is a stronger acid than water
b) K_p = 0.04 atm at 899K for the equilibrium shown below. What is the equlibrium concentration of C_2H_6 when it is placed in a flask at 4.0 atm pressure and allowed to come to equilibrium?

$$C_2H_6\,(g) \rightleftharpoons C_2H_4\,(g) + H_2\,(g)$$

OR

Q28.

a) What will happen to the pH of a solution of weak acid when small amount of its salt with a strong base is added? Give reason.
b) Write expression for K_c for the reaction

$$CaCO_3\,(s) \rightleftharpoons CaO(s) + CO_2\,(g)$$

c) Discuss the effect of catalyst & addition of SO_3 gas for the reaction

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

Q29.

a) Write the IUPAC names of the product obtained by the ozonolysis of following compound 2-ethyl but-1-ene.

b) Why is Wurtz reaction not preferred for alkanes containing odd number of carbon atoms? Illustrate your answer by taking one example.

c) Which electrophile is generated to attack the benzene ring during Friedal Craft's acylation?

d) Name the product obtained when ethyne is reacted with hydrogen in the presence of Na in liq. ammonia.

OR

Q29.

a) Complete the following equations

i. $CH_3\text{-}CH{=}C\text{-}(CH_3)_2 + H_2O \xrightarrow{H^+/Hg^{2+}}$

ii. $CH_3\text{-}CH_2\text{-}CH{=}CH_2 + HBr \xrightarrow{\text{Peroxide}}$

iii. $C_6H_6 + Cl_2 \xrightarrow{\text{Anhy. } AlCl_3}$

b) What are the necessary conditions for any system to be aromatic?

Q30.

a) Assign reason for each of the following

i. Ga(I) undergoes disproportionation reaction.

ii. Anhy. $AlCl_3$ used as catalyst

iii. Boron is unable to form $[BF_6]^-$ ion. Explain.

b) Complete the following equation.

i. $Sn + H_2O \xrightarrow{\Delta} ?$

ii. $BF_3 + NaH \rightarrow ?$

OR

Q30.

a) Write equation to justify amphoteric nature of aluminium.

b) Give reasons:

i. Conc HNO_3 can be stored in aluminium container

ii. Ionization enthalpy decreases from carbon to silicon.

iii. Boric acid is a weak acid