Final Paper (8 March 2016)
Class XI
Paper- CHEMISTRY
(Set-A)

Time: 3hrs. **M.M. 70**

i) **All questions are compulsory.**
ii) **Q 1 – 5 carry 1 mark each.**
iii) **Q 6 – 10 carry 2 mark each.**
iv) **Q11 – 22 carry 3 marks each.**
v) **Q 23 carry 4 mark.**
vi) **Q24 – 26 carry 5 marks each.**

Q1. Why has trans-isomer higher melting point than cis-isomer?

Q2. $(CH)_3 C^+$ is more stable than $(CH_3)_2 CH^+$. Explain.

Q3. What are intensive properties? Give examples.

Q4. Indicate the number of σ *and* π bonds in the molecule $CH_2 = C = CH_2$.

Q5. What is difference between vapour & gas.

Q6. Why BF_3 has zero dipole moment although the B-F bonds are polar.

Q7. Explain the shapes of the following on the basis of VSEPR theory.

a) $BeCl_2$ b) SF_6

Q8. What do you mean by ideal gas and real gas? Why do real gases deviate from ideal behaviour?

Q9. 2.9g of gas at 95^0C occupied the same volume as 0.184g of dihydrogen at 17^0C at the same pressure. What is molar mass of the gas?

Q10. Boron trihalides (BX3) act as Lewis acids.

OR

PbCl4 is a powerful oxidizing agent.

Q11. Explain the following:

a) Friedel-Crafts acylation
b) Wurtz-Fittig reaction
c) Kolbe's electrolytic method

Q12. Draw the structures for the following compounds:

a) 2,2-Dimethylpentane
b) Heptan-4 one
c) Isopropyl alcohol

Q13. Complete the following reactions:

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

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

Q14. Write balanced equations for:

a) $BF_3 + LiH \rightarrow$

b) $B_2H_6 + H_2O \rightarrow$

c) $NaH + B_2H_6 \rightarrow$

Q15. Give reasons for the following statements:

a) Boron is unable to form BF_6^{3-}

b) Stability of +1 oxidation state progressively increases for the heavier elements of Group 13.

c) Is Boric acid a protic acid? Explain.

Q16. Balance the following equation in basic medium by oxidation number method.

$$P_4(s) + OH^-(aq) \rightarrow PH_3(g) + H_2PO_2^-(aq)$$

OR

Balance the following redox reaction by ion-electron method.

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

Q17. a) Write the anode, cathode and net cell reaction for the following cell:

$$Zn(s)\ \ Zn^{2+}(aq) \,||\, Br^-(aq)\ \ Br_2(g), Pt$$

b) What is oxidation state of Fe in $Fe(CO)_5$.

Q18. Dihydrogen gas is obtained from natural gas by partial oxidation with steam as per following endothermic reaction:

$$CH_4(g) + H_2O(g) \rightleftharpoons CO(g) + 3H_2(g);$$

a) Write an expression of K_p for the above reaction.

b) How will the value of K_p and composition of equilibrium mixture be affected by:

i) Increasing the pressure.

ii) Increasing the temperature.

iii) Using a catalyst?

Q19. a) Although both CO_2 and H_2O are triatomic molecules, the shape of H_2O molecule is bent while that of CO_2 is linear. Explain this on the basis of dipole moment.

b) Which hybrid orbitals are used by carbon atoms in CH_3-CHO?

Q20. For real gases, the relation between P, V and T is given by van der Waal's equation:

$$\left(P + \frac{an^2}{V^2}\right)(V - nb) = nRT$$

i) Arrange the following gases in the increasing order of 'b'. Give reasons. O_2, CO_2, H_2 and He.

ii) Arrange the following gases in the decreasing order of magnitude of 'a'. Give reason.

CH_4, O_2 and H_2.

Q21. i) Define the following:

First law of thermodynamics.

ii) Standard heat of formation of hydrazine $[N_2H_4(l)]$, hydrogen peroxide $[H_2O_4(l)]$, and water $[H_2O(l)]$ are -50.4, -193.2 and -242.7 kj/mole respectively. Calculate the standard heat of formation for the following reaction.

$$N_2H_4(l) + 2H_2O_2(l) \rightarrow N_2(g) + 4H_2O(l)$$

Q22. i) Classify the following processes as reversible or irreversible:

a) Dissolution ofr sodium chloride

b) Evaporation of water at 373 K and 1 atm pressure

c) Mixing of two gases by diffusion.

d) Melting or ice without rise in temperature.

ii) When an ideal gas expands in vacuum, there is neither absorption nor evolution of heat. Why?

Q23. Scientists of U.K. have invented cars running on hydrogen fuel cells instead of petrol engines. Hydrogen is used in fuel cells for generating electrical energy. It has many advantages over the conventional fossil fuels and electric power generation.

i) What is the advantage of hydrogen?

ii) What is the other advantage of Hydrogen?

iii) What is the efficiency of fuel cell as comparison to other conversational fuels?

iv) What are the values possessed by scientists of U.K.?

Q24. i) For the reaction:

$N_2(g) + 3H_2(g) \rightleftharpoons 3NH_3(g)$, the value of K_p is 3.6×10^{-2} at 500 K. Calculate the value of K_c for the reaction at the same temperature R = 0.083 L bar K^{-1} mol^{-1}.

ii) What do you understand by:

a) Common ion effect

b) Buffer solution

OR

i) Write the conjugate acid of $HCOO^-$.

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

iii) 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, $K_{sp} = 1.1 \times 10^{-23}$)

Q25. a) What are electrophiles? Give one example of electrophilic substitution reaction.

b) Write the chemistry of Lassaigne's test for qualitative analysis of Halogens.

c) Give one example of position isomerism.

OR

a) Suggest a method used to purify the liquids which have high boiling points and decompose below their boiling points.

b) How will you separate a mixture of ammonium chloride and common salt?

c) Will CCl_4 give white precipitate of AgCl on heating with silver nitrate? Give reason for your answer.

d) In the estimation of sulphur, 0.157g of an organic compound gave 0.4813g of $BaSO_4$. What is the percentage of sulphur in the compound? (At. Wt. of Ba = 137, S=32, O = 16u)

Q26. Write the major products of the following:

OR

Out of benzene and toluene, which will undergo nitration easily, and why?

i) Identify 'A', 'B', 'C' and 'D'