CBSE Board
## Class XI Chemistry
Sample Paper - 3

Time: 3 Hours   **Total Marks: 70**

General Instructions

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

Q. 1 Which of these contain the largest number of atoms – 1.0 g Li(s) and 1g

Na(s)? [1]

Q. 2 HI is put in a sealed glass bulb and is then heated to decompose HI into H_2

and I_2? What type of system does the reaction mixture represent? [1]

Q. 3 What is the difference between a vapour and a gas? [1]

Q. 4 Calculate the maximum number of electrons in f subshell with same spin. [1]

Q. 5 What is the direction of flow of electrons and of conventional current in the

following cell? [1]

$$Zn(s)|Zn^{2+}(aq)||Ag^+(aq)|Ag(s)$$

Q. 6 Give IUPAC name of allyl alcohol. [1]

Q. 7 Calculate the pH of 0.001M NaOH. [1]

Q. 8 State "Law of multiple proportions" [1]

Q. 9 Convert [2]

(a) C and H_2 to benzene

(b) Calcium carbide to oxalic acid

Q. 10 Give reason for the following [2]

(a) F has lower electron gain enthalpy than Cl.

(b) Ionization enthalpy of N is higher than O

Q. 11 Arrange the following in increasing order of size. Give reason for your

answer. [2]

Mg^{2+} O^{2-} Na^+ F^- Al^{3+}
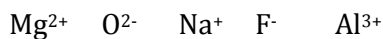
Q. 12 Write balance equation for: [2]

(i) BF_3 is reacted with ammonia.

(ii) Al is treated with dilute NaOH

Q. 13 Which of the two is steam volatile and why? o-nitrophenol or p-

nitrophenol. [2]

OR

Which of the two as higher dipole moment and why? NF_3 or NH_3.

Q. 14 Calculate the enthalpy change when 2.38g of CO vaporizes at its normal

boiling point? Enthalpy of vaporization of CO is 6.04 kJ/mol. [2]

Q. 15 Balance the following equation in acidic medium by half reaction method.

$$Cr_2O_7^{2-} + C_2H_4O \rightarrow C_2H_4O_2 + Cr^{3+}$$ [2]
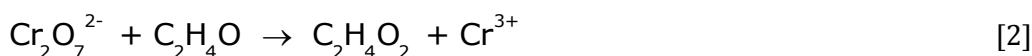
Q. 16 Explain [3]

(a) LiCl is more covalent than KCl

(b) In aqueous solution Li^+ has lowest mobility.

Q. 17 In the estimation of sulphur by Carius method, 0.468 g of an organic [2]

sulphur compound afforded 0.668 g of barium sulphate. Find out the

percentage of sulphur in the given compound.

Q. 18 How many neutrons and protons are there in following nuclei? [2]

(a) $^{56}_{26}Fe$

(b) $^{88}_{38}Sr$
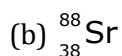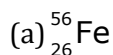
Q. 19 [3]

(i)   Which of the two is more stable and why? H_2^+ or H_2^-
(ii) All bonds in PCl_5 are not equal. Explain.
(iii) Which of the two is more ionic and why? NaCl or NaI

Q. 20 Give reasons: [3]

(i)   Evaporation causes cooling
(ii) Falling liquids drops are spherical.
(iii) Vapour pressure of acetone is less than that of ether at same temperature.

Q. 21 The combustion of one mole of methanol takes place at 298 K and 1 atm.

After combustion CO_2 (g) and $H_2O(l)$ are produced and 726 kJ of heat is

liberated. Calculate the standard enthalpy of formation of one mole of

$CH_3OH(l)$. Standard enthalpies of formation of $CO_2(g)$ and $H_2O(l)$ are -393

kJ mol^{-1} and -286 kJ mol^{-1} respectively. [3]

Q. 22 [3]

(a) Name the class of hydrides to which H_2O and NaH belong.
(b) What is understood by hydride gap ?
(c) What do you mean by 15 volume H_2O_2 solution?

Q. 23 Comment on each of the following observations: [3]

(a) Lithium forms a nitride directly like magnesium. Give equation involved.
(b) BaO is soluble but $BaSO_4$ is insoluble in water.

Q. 24 (a)Explain: [3]

(i) Boron is unable to form BF_6^{3-} ion.
(ii) $[SiF_6]^{2-}$ is known whereas $[SiCl_6]^{2-}$ not known.
(iii)Conc. HNO_3 can be stored in aluminium container.

Q. 25 How much energy is required to ionize a H – atom if the electron occupies

n = 5 orbit? Compare your answer with the ionization enthalpy of H – atom

(energy required to remove the electron from n = 1 orbit). [3]

OR

(a) Lifetimes of the molecules in the excited states are often measured by using pulsed radiation source of duration nearly in the nano second range. If the radiation source has the duration of 2 ns and the number of photons emitted during the pulse source is 2.5 x 10^{15}, calculate the energy of the source.
(b) Calculate the wavenumber for the longest wavelength transition in the Balmer series of atomic hydrogen

Q. 26 The density of 3M solution of NaCl is 1.25g/mL. Calculate the molality of

the solution. [3]

Q. 27 Manju and her father were going in a boat in the river. Manju's father

threw away the cell used in watches and hearing aids into the water.

Manju prevented him from doing so. [3]

a. As a student of chemistry, why would you advise Manju's father not to

throw the cell in the water body.

b. What is the value associated with the above decision?

Q.28 (a) The species H_2O, HCO_3, HSO_4^- and NH_3 can act both as Bronsted acids

and bases. For each case give the corresponding conjugate acid and base.

(b) Consider the following endothermic reaction: [5]

$$CH_4(g) + H_2O(g) \rightleftharpoons CO(g) + 3H_2(g)$$
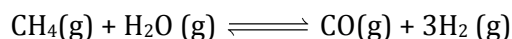
(i) Write expression for K_p for the above reaction.
(ii) How will the equilibrium be affected by 1. Increasing the pressure 2. Using a catalyst?

OR

(a) Predict the acidic, basic or neutral nature of the following salt :
NaCN, KBr, $NaNO_2$, NH_4NO_3

(b) How many grams of KBr be added to 1 L of 0.05 M solution of silver nitrate just to start the precipitation of AgBr? K_{sp} of AgBr = 5.0×10^{-13}

Q. 29   [5]

(a) In which C-C bond of $CH_3CH_2CH_2Br$, the inductive effect is expected to be least?
(b) (b)Which of the following compound shows geometrical isomerism?
(i) Pent-1-ene
(ii) Pent-2-ene
(iii)2-Methylbut-2-ene
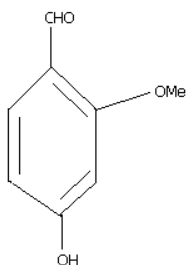(c) What type of isomerism is present in the following pairs?

(i)
$$CH_3CH_2CH_2OH \text{ and } CH_3\overset{\overset{\displaystyle OH}{|}}{C}H\ CH_3$$

(ii) $CH_3CH_2COCH_2CH_3$ and $CH_3COCH_2CH_2CH_3$

(iii) CH_3CH_2OH and CH_3OCH_3

OR

(a) Identify the functional groups in the following:

(b) Draw the bondline formula of heptan-4-one

(c) How many isomers are possible for mono substituted and di substituted benzene?

Q. 30   [5]

(a) Do the following conversions:

(i) Benzene to p-nitrobromobenzene

(ii) Ethyl chloride to ethene

(b) Give mechanism of addition of HBr to propene.

(c) Write a note on Friedel-Crafts alkylation.

OR

(a) Out of n-hexane and ethyne which will be more acidic. Also give reason for this behaviour.

(b) Explain with example

(i) Wurtz reaction

(ii) Acidic dehydration

(c) Convert propyne to propanone