

**INDIAN SCHOOL MUSCAT**  
**DEPARTMENT OF CHEMISTRY**  
**CLASS – XI**  
**SAMPLE PAPER 2**

**TIME:3 Hrs**

**MAX MARKS:70**

**General Instruction:**

- (a) All questions are compulsory.
- (b) Section A: Q.no.1 to 20 are very short answer questions (objective type) and carry 1 mark each.
- (c) Section B: Q.no.21 to 27 are short answer questions and carry 2 marks each.
- (d) Section C: Q.no. 28 to 34 are long answer questions and carry 3 marks each.
- (e) Section d: Q.no. 35 to 37 are also long answer questions and carry 5 marks each.
- (f) There is no overall choice. However, an internal choice has been provided in two questions of two marks, two questions of three marks and all the three questions of five marks weightage. You have to attempt only one of the choices in such questions.
- (g) Use log tables if necessary, use of calculators is not allowed.

**SECTION-A**

**Read the given passage and answer the questions 1 to 5 that follows:**

During the detection of elements by Lassaigne's test the covalent compounds are converted into ionic compounds by fusion with metallic sodium. The N, S and X present in organic compounds are converted into  $CN^-, S^{2-}, X^-$ , which are then detected by usual test. During detection of nitrogen, if only N is present, Prussian blue color is produced and if both N and S are present blood red color is obtained in the Lassaigne's test. Phosphorous in organic compound is detected by fusing it with  $Na_2O_2$  and  $Na_3PO_4$  thus formed is detected by heating with con. $HNO_3$  and ammonium molybdate.

- Q.1 Write the formula of the substance that gives Prussian blue colour in Lassaigne's test?
- Q.2 Give the reaction for the formation of blood red colored substance.
- Q.3 Name the yellow precipitate formed when phosphorus is detected in an organic compound
- Q.4 Sodium nitroprusside reacts with sulphide to give purple color due to the formation of .....
- Q.5 The Lassaigne's extract is boiled with dil.  $HNO_3$  before testing for halogens. Why?

**Questions 6 to 10 are one-word answers:**

- Q.6 Which series of lines of the hydrogen spectrum lie in the visible region'?
- Q.7 Write the IUPAC name and Symbol for the element having atomic number 120.
- Q.8 Name the molecular theory that can explain magnetic character of molecules.
- Q.9 Write the relationship between  $\Delta H$  and  $\Delta S$ .
- Q.10 Define redox couple. Give one example.

**Questions 11 to 15 are multiple choice questions:**

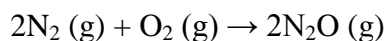
- Q.11 The shape of  $\text{XeF}_4$  molecule according to VSEPR theory is  
(a) Square planar (b) Square pyramid (c) Tetrahedral (d) Pyramidal
- Q.12 Which statement is true for reaction?  $\text{H}_2(\text{g}) + \text{Cl}_2(\text{g}) \rightarrow 2\text{HCl}(\text{g})$   
(a)  $\Delta S = +ve$  (b)  $\Delta H > \Delta U$  (c)  $\Delta H < \Delta U$  (d)  $\Delta H = \Delta U$
- Q.13 Water gas is a mixture of  
(a)  $\text{CO} \& \text{N}_2$  (b)  $\text{CO} \& \text{H}_2$  (c)  $\text{CO}_2 \& \text{N}_2$  (d)  $\text{CO}_2 \& \text{H}_2$
- Q.14 The solubility of metal halides depends on their nature, lattice enthalpy and hydration enthalpy of the individual ions. Amongst fluorides of alkali metals, the lowest solubility of  $\text{LiF}$  in water is due to  
(a) Ionic nature of lithium fluoride (b) High Lattice enthalpy  
(c) High hydration enthalpy of lithium atom (d) Low ionization enthalpy of lithium atom
- Q.15 The most stable halide is  
(i)  $\text{AlCl}$  (ii)  $\text{GaCl}$  (iii)  $\text{TlCl}$  (iv)  $\text{InCl}$

**Question 16 to 20:**

- (A) Both assertion and reason are correct statements and reason is the correct explanation of the assertion.  
(B) Both assertion and reason are correct statement, but reason is not the correct explanation.  
(C) Assertion is correct but reason is wrong statement.  
(D) Assertion is wrong but reason is correct statement.
- Q.16 Assertion: Electron gain enthalpy of  $\text{Cl}$  is more negative than  $\text{F}$ .  
Reason:  $\text{F}$  is more electronegative than  $\text{Cl}$  atom.
- Q.17 Assertion:  $\text{Pi}$  bond is never formed alone. It is formed along with a sigma bond  
Reason:  $\text{Pi}$  bond is formed by axial overlap of p- orbitals only.
- Q.18 Assertion: if both  $\Delta H^0$  and  $\Delta S^0$  are positive then the reaction will be spontaneous at high temperature  
Reason: All processes with positive entropy change are spontaneous.
- Q.19 Assertion: Density of ice is less than water.  
Reason: Ice has open cage structure.
- Q.20 Assertion: If aluminum atoms replace a few silicon atoms in three-dimensional network of silicon dioxide, the overall structure acquires a negative charge.  
Reason: Aluminum is trivalent while silicon is tetravalent.

**SECTION: B**

- Q.21 45.4 L of dinitrogen reacted with 22.7 L of dioxygen and 45.4 L of nitrous oxide was formed.  
The reaction is given below:



Which law is being obeyed in this experiment? Write the statement of the law.

(OR)

Calculate the percent of carbon, hydrogen and oxygen in ethanol ( $\text{C}_2\text{H}_5\text{OH}$ ).

- Q.22  $\text{HCl}$  is a covalent compound but it ionizes in the solution. Give reason.
- Q.23 What will be the minimum pressure required to compress  $500 \text{ dm}^3$  of air at 1 bar to  $200 \text{ dm}^3$  at  $30^\circ\text{C}$ .

Q.24 Derive the relationship  $C_p - C_v = R$ .

Q.25 What do you understand by term 'autoprotolysis' of water? What is its significance?

(OR)

Write chemical reactions to justify that hydrogen peroxide can function as an oxidizing as well as reducing agent.

Q.26 Arrange the hybrids of group 14 elements in increasing order of :

(a) Thermal stability (b) Reducing power.

(OR)

Account for the following:

(a)  $\text{CO}_2$  is a gas while  $\text{SiO}_2$  is solid at room temperature.

(b)  $\text{CO}_2$  is a gas whereas  $\text{SiO}_2$  is a high melting solid.

Q.27 (a) How is phosphorus estimated in an organic sample

(b) Draw the structural formulae of the following compounds:

(i) Ethoxypropane (ii) But-1-en-3-yne (iii) 3,4,4-Trimethylhex-1-yne

(iv) But-2-enoic acid

(OR)

Give reason:

(a) A tertiary butyl carbocation is more stable than isobutyl carbocation. Justify.

(b) Aniline is purified by steam distillation

### SECTION:C

Q.28 A compound contains 4.07% hydrogen, 24.27% carbon and 71.65% chlorine. Its molar mass is 98.96 g. What are its empirical and molecular formulas?

Q.29 Account for the following:

(a) Noble gases have very large atomic radii

(b) The electron gain enthalpy of Cl ( $Z = 17$ ) is more negative than that of Fluorine ( $Z = 9$ ).

(c) Ionization enthalpy of Nitrogen ( $Z = 7$ ) is more than that of oxygen ( $Z = 8$ ).

(OR)

Explain the following:

(a) Modern Periodic law (b) Electro-negativity (c) Shielding effect

Q.30 (a) Why the compounds of group 17 with group 13 elements are more ionic and stable than with (group 1) elements?

(b)  $\text{Na}_2\text{O}$  is more ionic than  $\text{Li}_2\text{O}$ . why?

Q.31 A 20g chunk of dry ice is placed in an empty 0.75 litre wire bottle tightly closed what would be the final pressure in the bottle after all  $\text{CO}_2$  has been evaporated and temperature reaches to  $25^\circ\text{C}$ ?

Q.32 Permanent ion ( $\text{MnO}_4^-$ ) reacts with sulfur dioxide gas in acidic medium to produce  $\text{Mn}^{2+}$  ion and hydrogen sulphate ion. Write ionic equation and balance by ion electron method.

Q.33 (i) Why alkaline earth metals cannot be obtained by reduction of their oxides?

(ii) Alkaline earth metals forms ionic salt having bivalent cations. Explain. Why?

Q.34 Write the mechanism of nitration of benzene.

### SECTION:D

- Q.35 (a) Define Heisenberg uncertainty principle.  
(b) What is the similarity between de-Broglie and Heisenberg principle?  
(c) Why energy of electron in a given subshell is negative?  
(OR)

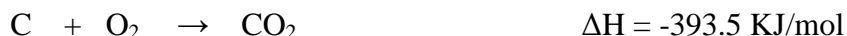
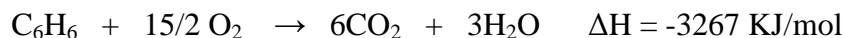
Give formula for the following:

- (i) Energy of electron.  
(ii) Maximum number of electrons in a sub shell  
(iii) Maximum number of electrons in an orbit  
(iv) Radial nodes  
(v) Angular nodes
- Q.36 (a) Define  
(i) Residual entropy (ii) Second law of thermodynamics  
(b) Calculate the  $\Delta_f H$  for the process  $\text{CCl}_4(\text{g}) \rightarrow \text{C}(\text{g}) + 4\text{Cl}(\text{g})$  and also C-Cl bond enthalpy, given that  $\Delta_{\text{vap}} H$  of  $\text{CCl}_4 = 30.5$ ,  $\Delta_f H(\text{CCl}_4) = -135.5$ ,  $\Delta_a H(\text{C}) = 715$ ,  $\Delta_a H(\text{Cl}_2) = 242$  in KJ/mol.

(OR)

Define Hess's law

Calculate the enthalpy of formation of benzene ( $\text{C}_6\text{H}_6$ ) from the following data



- Q.37 (a) State Markownikov's rule. Using this rule, predict the product when propene reacts with  
(i) HCl (ii)  $\text{H}_2\text{O}$ .  
(b) What are the conditions for a compound to be aromatic according to Huckel's rule?  
(OR)

- (a) Explain the mechanism of electrophilic addition reaction.  
(b) An organic compound 'A' with molecular formula  $\text{C}_4\text{H}_9\text{Br}$  on treatment with alcoholic KOH gave two isomeric compounds 'B' and 'C' with formula  $\text{C}_4\text{H}_8$  on dehydrohalogenation. Ozonolysis of 'B' gave only one product  $\text{CH}_3\text{CHO}$  while 'C' gave two different products,  $\text{CH}_3\text{CH}_2\text{CHO}$  and  $\text{HCHO}$ . Identify A, B and C.