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INDIAN SCHOOL SALALAH  
FIRST TERM EXAMINATION – SEPTEMBER 2025



Class: XI

CHEMISTRY (043)

Date: 30/09/2025

Time: 3Hours

Maximum Marks: 70

General Instructions:

*Read the following instructions carefully.*

- (a) *There are 33 questions in this question paper with internal choice.*
- (b) *SECTION A consists of 16 multiple-choice questions carrying 1 mark each.*
- (c) *SECTION B consists of 5 short answer questions carrying 2 marks each.*
- (d) *SECTION C consists of 7 short answer questions carrying 3 marks each.*
- (e) *SECTION D consists of 2 case-based questions carrying 4 marks each.*
- (f) *SECTION E consists of 3 long answer questions carrying 5 marks each*
- (g) *All questions are compulsory.*
- (h) *Use of log tables and calculators is not allowed*

$h = 6.63 \times 10^{-34} \text{Jsec}$ ,  $R_H = 1.09 \times 10^7 \text{ m}^{-1}$ , mass of electron =  $9.1 \times 10^{-31} \text{Kg}$ ,

Charge on electron =  $1.6 \times 10^{-19} \text{C}$ , Speed of light =  $3 \times 10^8 \text{ m/s}$ ,

At mass: Mn = 55, H = 1, O = 16, Na = 23, S = 32, C = 12, He = 4, Cl = 35.5, Ca = 40]

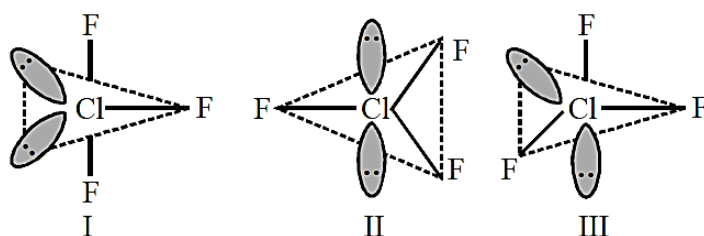
**SECTION – A**

**The following questions are multiple-choice questions carrying 1 mark each.**

- 1 n grams of substance X reacts with m grams of substance Y to form p grams of substance R and q grams of substance S. This reaction can be represented as,  $X + Y = R + S$ .  
The relation which can be established in the amounts of the reactants and the products will be
- (A)  $n - m = p - q$  (B)  $n + m = p + q$   
(C)  $n = m$  (D)  $p = q$
- 2 How many atoms are contained in one mole of sucrose ( $C_{12}H_{22}O_{11}$ )? 1
- (A)  $20 \times 6.02 \times 10^{23}$  atoms/mol (B)  $45 \times 6.02 \times 10^{23}$  atoms/mol  
(C)  $5 \times 6.02 \times 10^{23}$  atoms/mol (D) None of these

- 3 Which of the following statements indicates that law of multiple proportion is being followed. 1
- (A) Sample of carbon dioxide taken from any source will always have carbon and oxygen in the ratio 1 : 2.
- (B) Carbon forms two oxides namely  $\text{CO}_2$  and  $\text{CO}$ , where masses of oxygen which combine with fixed mass of carbon are in the simple ratio 2 : 1.
- (C) When magnesium burns in oxygen, the amount of magnesium taken for the reaction is equal to the amount of magnesium in magnesium oxide formed.
- (D) At constant temperature and pressure 200 mL of hydrogen will combine with 100 mL oxygen to produce 200 mL of water vapour.
- 4 2.5 litres of  $\text{NaCl}$  solution contain 5 moles of the solute. What is the molarity? 1
- (A) 5 molar (B) 2 molar  
(C) 2.5 molar (D) 12.5 molar
- 5 Which is **not true** with respect to cathode rays? 1
- (A) Can be deflected by magnetic fields (B) Charged particles  
(C) Move with speed same as that of light (D) A stream of electrons
- 6 Which of the following represents correct set of the four quantum numbers for an electron in a  $4d$  subshell? 1
- (A) 4, 2, 1, 0 (B) 4, 2, 1,  $-1/2$   
(C) 4, 3, 2,  $+1/2$  (D) 4, 3,  $-2$ ,  $-1/2$
- 7 The correct sequence which shows decreasing order of the ionic radii of the elements is 1
- (A)  $\text{Al}^{3+} > \text{Mg}^{2+} > \text{Na}^+ > \text{F}^- > \text{O}^{2-}$   
(B)  $\text{Na}^+ > \text{Mg}^{2+} > \text{Al}^{3+} > \text{O}^{2-} > \text{F}^-$   
(C)  $\text{Na}^+ > \text{F}^- > \text{Mg}^{2+} > \text{O}^{2-} > \text{Al}^{3+}$   
(D)  $\text{O}^{2-} > \text{F}^- > \text{Na}^+ > \text{Mg}^{2+} > \text{Al}^{3+}$
- 8 Which of these statement(s) is/are correct? 1
- (i) Metals will be found on the right side of the periodic table.  
(ii) The element P, S and O belong to the same period.
- (A) (i) only (B) (ii) only  
(C) Both (i) and (ii) (D) Neither (i) nor (ii)

- 9 In which of the compounds does 'manganese' exhibit highest oxidation number? 1  
 (A)  $\text{MnO}_2$  (B)  $\text{Mn}_3\text{O}_4$   
 (C)  $\text{K}_2\text{MnO}_4$  (D)  $\text{MnSO}_4$
- 10 The oxidation number of an element in a compound is evaluated on the basis of certain 1  
 rules. Which of the following rules is **not correct** in this respect?  
 (A) The oxidation number of hydrogen is always + 1.  
 (B) The algebraic sum of all the oxidation numbers in a compound is zero.  
 (C) An element in the free or the uncombined state bears oxidation number zero.  
 (D) In all its compounds, the oxidation number of fluorine is – 1.
- 11 Which of the following structure is most stable? 1



Choose the correct option.

- (A) Only I (B) Only II  
 (C) Only III (D) All three have same stability
- 12 Which of the following is polar molecule? 1  
 (A)  $\text{SiF}_4$  (B)  $\text{XeF}_4$   
 (C)  $\text{BF}_3$  (D)  $\text{SF}_4$

**For Questions number 13 to 16, two statements are given — one labelled as Assertion (A) and the other labelled as Reason (R). Select the correct answer to these questions from the codes (A), (B), (C) and (D) as given below.**

- (A) **Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).**  
 (B) **Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A).**  
 (C) **Assertion (A) is true, but Reason (R) is false.**  
 (D) **Assertion (A) is false, but Reason (R) is true.**

- 13 **Assertion (A):** The empirical mass of ethane is half of its molecular mass. 1  
**Reason (R):** The empirical formula represents the simplest whole number ratio of various atoms present in a compound.

- 14 **Assertion (A):** Atomic size increases along a period. 1  
**Reason (R):** Effective nuclear charge increases as the atomic number increases resulting in the increased attraction of electrons to the nucleus.
- 15 **Assertion (A):** Smaller the size of an atom greater is the electronegativity. 1  
**Reason (R):** Electronegativity refers to the tendency of atom to share electrons with another atom.
- 16 **Assertion (A):** The reaction  $\text{CaCO}_3(\text{s}) \xrightarrow{\Delta} \text{CaO}(\text{s}) + \text{CO}_2(\text{g})$  is an example of decomposition reaction. 1  
**Reason (R):** Above reaction is not a redox reaction.

### SECTION B

**The following questions are very short answer type and carry 2 marks each.**

- 17 An organic compound contains carbon, hydrogen and oxygen. Its elemental analysis gave C= 38.71% and H= 9.67%. Find empirical formula of the compound. 2
- 18 (a) The number of electrons, neutrons and protons in a species are equal to 10, 8 and 8 respectively. Give proper symbol of the species. 2  
 (b) Find the number of unpaired electrons in  ${}_{28}^{58}\text{Ni}^{2+}$ .
- 19 (a) Predict the formula of binary compound that would be formed by silicon and oxygen. 2  
 (b) Write the IUPAC name and symbol for the element with atomic number 109.
- 20 Find the oxidation number of P in  $\text{H}_3\text{PO}_4$  and C in  $\text{C}_2\text{O}_4^{2-}$  2
- 21 **A.** Define disproportionation reaction. Give one example. 2

**OR**

**B.**  $\text{MnO}_4^{2-}$  undergoes disproportionation reaction in acidic medium but  $\text{MnO}_4^-$  does not. Give reason.

### SECTION C

**The following questions are short answer type and carry 3 marks each.**

- 22 (a) State Hund's rule. 3  
 (b) Write the electronic configuration of  ${}_{29}^{63}\text{Cu}$ .  
 (c) Name the scientist who discovered nucleus.
- 23 Using proper structures explain why does bond angle in ammonia is more than in water. 3
- 24 The energy difference between the ground state of an atom and its excited state is  $4.4 \times 10^{-4}$  J, Calculate the frequency and wavelength of photon required to produce the transition. 3

25 A. Following are the elements of period 2 – Li, Be, B, C, N, O, F.

3

Pick out the element:

- i. With the highest first ionisation enthalpy.
- ii. With highest electronegativity.
- iii. With largest atomic radius.
- iv. That is most reactive non-metal.
- v. That is most reactive reactive metal.
- vi. With lowest electron gain enthalpy.

**OR**

B. Give reason:

- (a) Metallic character increases down the group.
- (b) Anionic radius is always more than that of neutral atom.
- (c) Ionisation enthalpy of phosphorus is more than that of sulphur.

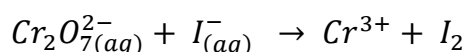
26 Draw structures of the following organic compounds:

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- (a) 4-hydroxypentanoic acid
- (b) Benzaldehyde
- (c) 3-phenylbutan-2-one

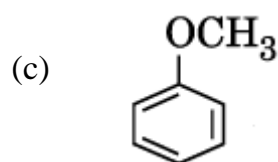
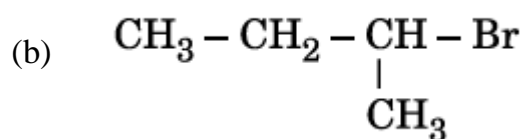
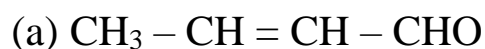
27 Balance the redox equation in acid medium:

3



28 Write IUPAC names of the following compounds:

3



## SECTION D

**The following questions are case-based questions. Read the case carefully and answer the questions that follow :**

- 29 Study the table of electron gain enthalpies ( in KJ/mol) of some main group elements and answer the questions that follow:

Group 1	$\Delta_{eg}^H$	Group 16	$\Delta_{eg}^H$	Group 17	$\Delta_{eg}^H$	Group 0	$\Delta_{eg}^H$
H	- 73					He	+ 48
Li	- 60	O	- 141	F	-328	Ne	+ 116
Na	- 53	S	- 200	Cl	-349	Ar	+ 96
K	- 48	Se	- 195	Br	-325	Kr	+ 96
Rb	- 47	Te	- 190	I	-295	Xe	+ 77
Cs	- 46	Po	- 174	At	-270	Rn	+ 68

(a) Define electron gain enthalpy. Why do group 1 elements have low electron gain enthalpy? 2

(b) Electron gain enthalpy of fluorine is less negative than that of chlorine. Why? 1

(c) (i) Noble gases have positive electron gain enthalpy. Why? 1

**OR**

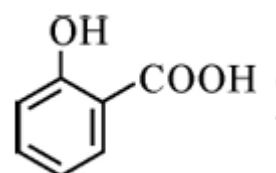
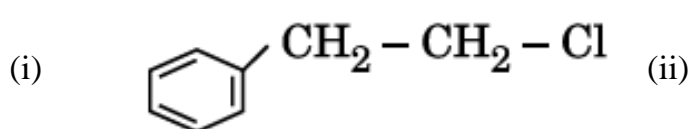
(c) (ii) Generally electron gain enthalpy decreases down the group. Why? 1

- 30 For IUPAC nomenclature of substituted benzene compounds, the substituent is placed as prefix to the word benzene. If benzene ring is disubstituted, lowest possible numbers are assigned to them. In trisubstituted, base compound is assigned number 1 and then direction of numbering is chosen such that next substituent gets lowest number when a benzene ring is attached to an alkane with functional group, it is considered as substituent, instead of parent. The name of benzene as substituent is phenyl also abbreviated as Ph. 1, 2 is called as *ortho*, 1, 3 is called as *meta*, 1, 4 is called as *para* in common system in case of disubstituted benzene.

(a) Draw structures of (i) ortho methylphenol and (ii) para dinitrobenzene.

(b) What is the suffix used for  $-\text{CONH}_2$ .

(c) Write IUPAC name of **any one** of the following: 2



1

## SECTION – E

The following questions are long answer type and carry 5 marks each.

- 31 A. (a) Define molality. 5  
(b) Calculate mole fraction of glucose in its 20% aqueous solution by mass.  
(c) Calculate number of nitrogen atoms in 34 grams of ammonia gas.

OR

- B. (a) Define molar mass.  
(b) Find number of atoms in 1 gram of sodium.  
(c) Methane burns in oxygen to carbon dioxide and water vapours. Calculate the mass of carbon dioxide formed by reaction of 20 grams of methane with 32 grams of oxygen.
- 32 A. (a) A particle carries  $2.5 \times 10^{-16}C$  of static electric charge. Calculate the number of 5  
electrons present in it.  
(b) Find the de Broglie wavelength of a tennis ball of mass 60 g moving with a velocity of 10 metres per second.  
(c) Write one chemical specie that is isoelectronic to  $K^+$ .

OR

- B. (a) Using s, p, d notations, describe the orbital with the following quantum numbers.  
(a)  $n = 2, l = 0$ ; (b)  $n = 3, l = 2$   
(b) Calculate the frequency of radiation emitted when an electron falls from  $n = 4$  to  $n = 1$  in a hydrogen atom.  
(c) Write Pauli exclusion principle.
- 33 A. 5

- (a) Write favourable factors for the formation of ionic bonds.  
(b) Define Lattice enthalpy.  
(c) Draw shapes of following molecules: (i)  $BeCl_2$       (ii)  $PH_3$       (iii)  $BF_3$

OR

- B.  
(a) Explain why  $BeH_2$  molecule has a zero dipole moment.  
(b) Ionic compounds are generally soluble in water. Give **two** examples of ionic compounds that are **not** soluble in water.  
(c) Write resonating structures of nitrate ion.

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