

**MAV SCHOOL**  
**PRE-MODEL EXAMINATION**  
**CHEMISTRY – 10**  
**(SCIENCE PAPER – 2)**

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*Maximum Marks: 80*

*Time allowed: Two hours*

*Answers to this Paper must be written on the paper provided separately.*

*You will not be allowed to write during  
first 15 minutes. This time is to be spent  
in reading the question paper.*

*The time given at the head of this Paper is the time allowed for writing the  
answers.*

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*Section A is compulsory. Attempt any four questions from Section B. The  
intended marks for questions or parts of questions are given in brackets [ ].*

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**SECTION A**

*(Attempt all questions from this Section.)*

**Question 1**

**[15]**

**Choose the correct answers to the questions from the given options. (Do not copy the question, write the correct answers only.)**

- (i) The correct order of increasing volatility of the acids is \_\_\_\_\_.  
(a)  $\text{HCl} < \text{CH}_3\text{COOH} < \text{HNO}_3$   
(b)  $\text{CH}_3\text{COOH} < \text{HCl} < \text{HNO}_3$   
(c)  $\text{CH}_3\text{COOH} < \text{HNO}_3 < \text{HCl}$   
(d)  $\text{HCl} < \text{HNO}_3 < \text{CH}_3\text{COOH}$
- (ii) A compound P is heated in a test tube with sodium hydroxide solution. A red litmus paper held at the mouth of the test tube turns blue. Which of the following could compound P be?  
(a) zinc sulphate  
(b) copper sulphate  
(c) ferrous sulphate  
(d) ammonium sulphate

- (iii) The atomic masses of sulphur (S), oxygen (O), and helium (He) are approximately 32, 16, and 4 respectively.

Which of the following statements regarding the number of atoms in 32g of sulphur, 16 g of oxygen, and 4 g of helium is correct?

**P.** 16 g of oxygen contains four times the number of atoms as 4 g of helium.

**Q.** 16 g of oxygen contains half the number of atoms as 32 g of sulphur.

(a) only P

(b) only Q

(c) both P and Q

(d) neither P nor Q

- (iv) **Assertion (A):** Hall Heroult's process is used to get pure aluminium from its oxide.

**Reason (R):** Aluminium generally is not found in aluminium oxide form.

(a) Both **A** and **R** are correct.

(b) **A** is correct, but **R** is not a true explanation of **A**.

(c) **A** is correct, and **R** is a true explanation of **A**.

(d) Both **A** and **R** are incorrect

- (v) Ammonia gas is passed through quicklime and then collected in a jar. Red and blue litmus papers are placed in the jar. W, X, Y and Z are the four observations.

Which of the above observations correctly shows the reaction of the litmus papers to ammonia?

	Red litmus paper	Blue litmus paper
<b>W</b>	turns blue	remains blue
<b>X</b>	remains red	remains blue
<b>Y</b>	remains red	turns red
<b>Z</b>	turns blue	turns red

(a) W

(b) X

(c) Y

(d) Z

(vi) Glucose reacts with concentrated sulphuric acid to give a very pure form of carbon called sugar charcoal. The reaction taking place is:

- (a) oxidation
- (b) combustion
- (c) dehydration
- (d) combination

(vii) The basicity of oxalic acid is:

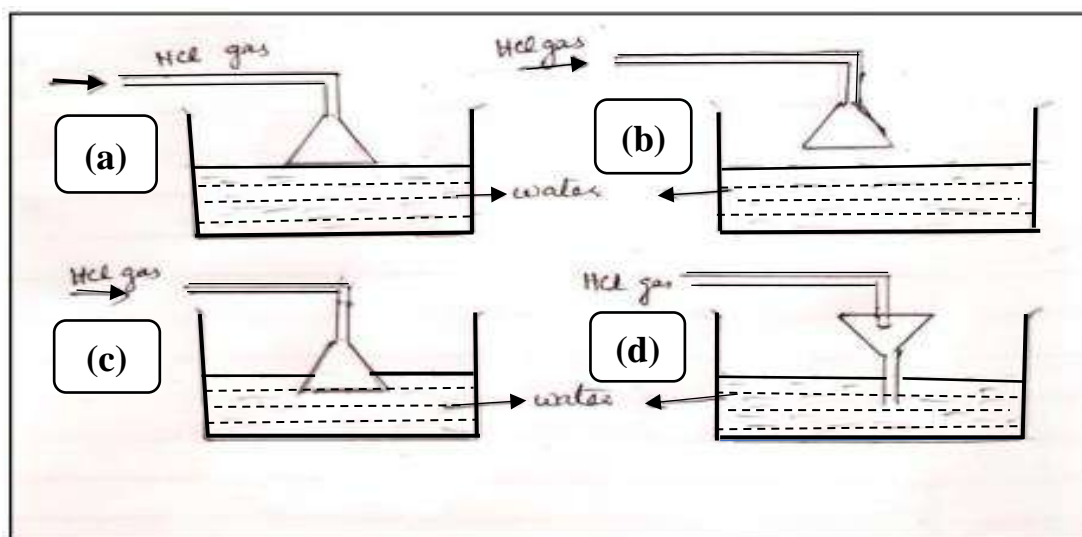
- (a) 1
- (b) 2
- (c) 3
- (d) 4

(viii)  $A \rightarrow A^{+3}$ ;  $B \rightarrow B^{-1}$

Number of electrons present in the outermost shell of atoms A and B respectively are:

- (a) 5, 1
- (b) 3, 1
- (c) 3, 7
- (d) 5, 7

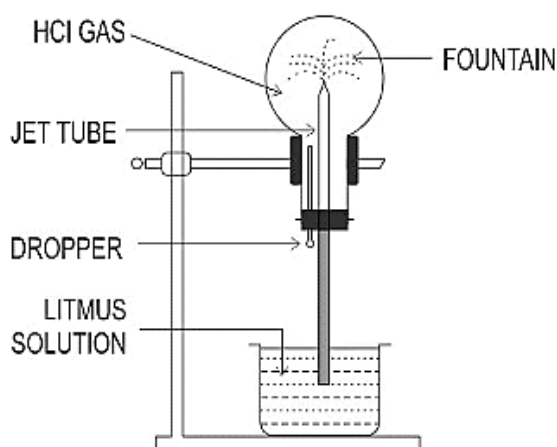
(ix) Given below are four different illustrations of preparing hydrochloric acid drawn by students. Which of these is the correct?



- (x) A \_\_\_\_\_ solution is observed after placing Magnesium metal in a solution of Copper sulphate for half an hour.
- Blue
  - Colourless
  - Reddish brown
  - Dirty green
- (xi) An element with atomic no. \_\_\_\_\_ will form an acidic oxide.
- 3
  - 17
  - 11
  - 13
- (xii) A student reacts copper turnings with cold dilute nitric acid in a test tube. He tests the gas given off with moist red and blue litmus paper. What is the name of the gas that evolved and what is the final colour of the litmus paper?
- | Gas                  | Final colour of the litmus paper                  |
|----------------------|---|
| (a) NO               | No change in blue and red litmus paper            |
| (b) NO <sub>2</sub>  | Blue litmus turns red and no change in red litmus |
| (c) N <sub>2</sub>   | No change in blue and red litmus paper            |
| (d) N <sub>2</sub> O | No change in blue and red litmus paper            |
- (xiii) The process of electrolysis is an example of:
- Oxidation reaction
  - Reduction reaction
  - Redox reaction
  - Displacement reaction
- (xiv) The catalyst used in Ostwald's process is \_\_\_\_\_.
- Finely divided iron
  - Graphite
  - Vanadium pentoxide
  - Platinum
- (xv) **Assertion (A) :** Electron affinity refers to an isolated atom's attraction for an additional electron while, electronegativity is the ability of an atom of an element to attract electrons towards itself in a shared pair of electrons.  
**Reason (R) :** Electron affinity is a relative number and electronegativity is experimentally measurable.
- Both **A** and **R** are correct.
  - A** is correct, but **R** is not a true explanation of **A**.
  - A** is correct, and **R** is a true explanation of **A**.
  - Both **A** and **R** are incorrect.

## Question 2

- (i) The setup shown below is that of the fountain experiment with hydrogen chloride gas in the flask. [5]



The fountain starts when a few drops of water from the dropper are introduced into the flask. Instead of the drops of water, Pooja started the fountain by introducing a few drops of Sodium hydroxide into the flask.

- (a) Explain why the litmus solution gets sucked up when Sodium hydroxide is used.
- (b) What will be the colour of the fountain when Sodium hydroxide is used? Justify your answer.
- (c) If instead of HCl gas, ammonia gas is filled in the flask and water is introduced from the dropper, will there be a different observation? Justify your answer.
- (ii) List one contains metals / alloys 1, 2, 3, 4, 5 and the list two contains their uses A, B, C, D, E and F. Match the column. An answer may be used once.

[5]

	List one		List two
1.	Stainless steel	A.	Screws and handles
2.	Brass	B.	Aircrafts
3.	Aluminium	C.	Surgical instruments.
4.	Duralumin	D.	Electrical fuse.
5.	Solder	E.	Electrical cables.
		F.	Bearing and coins

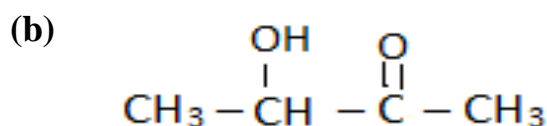
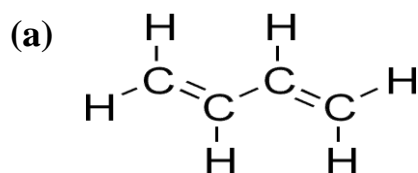
(iii) Complete the following by choosing the correct answers from the bracket: [5]

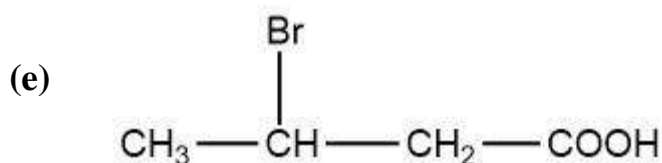
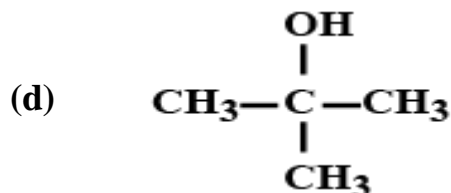
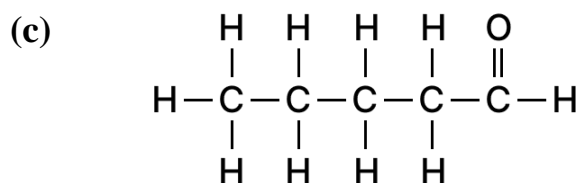
- (a) If an element has seven electron in the outermost shell then it is likely to have the \_\_\_\_ [smallest/ largest] atomic size amongst all the elements in the same period.
- (b) \_\_\_\_\_ [sulphuric acid/ hydrochloric acid] does not form an acid salt.
- (c) A \_\_\_\_\_ [reddish brown/ dirty green] coloured precipitate is formed when ammonium hydroxide is added to a solution of ferric chloride.
- (d) An \_\_\_\_\_ [alkaline/acidic] solution will turn methyl orange solution yellow.
- (e) Nikita wanted to gift her friend a decorative piece that is quite hard and strong, doesn't get corroded and can be polished. She selected a statue that matched her criteria as it was made of an alloy whose main constituent was \_\_\_\_\_. [copper/zinc]

(iv) Identify the following: [5]

- (a) A type of metal which gives hydrogen gas on reacting with both dilute acid and alkali.
- (b) A salt formed by the incomplete neutralization of an acid by a base.
- (c) A neutral gas which formed when ethanol reacts with sodium.
- (d) The property by virtue of which the compound has the same molecular formula but different structural formulae.
- (e) Essential product formed when Hydrogen sulphide gas reacts with an oxidizing agent.

(v) Write IUPAC names of the following organic compounds [5]



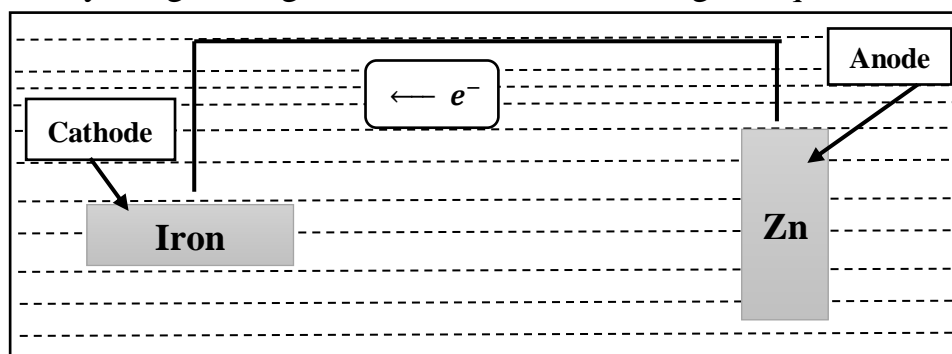


### SECTION – B

(Attempt *any four* questions.)

#### Question 3

- (i) Identify the reactant and write the balanced equation for the following:  
Nitric acid reacts with compound Q to give a salt  $\text{Ca}(\text{NO}_3)_2$ , water and sulphur dioxide. [2]
- (ii) What property of Sulphuric acid is exhibited in each of the following cases:
  - (a) In the preparation of  $\text{HNO}_3$  when it reacts with  $\text{KNO}_3$ .
  - (b) When conc. Sulphuric acid reacts with Copper to produce Sulphur dioxide gas. [2]
- (iii) For construction work the alloy of Aluminium i.e. Duralumin is used rather than pure Aluminium. Give two valid reasons. [2]
- (iv) Study the given figure below and answer the given questions:



- (a) Identify the application of electrolysis demonstrated above.
- (b) Which metal is protected in the above process?
- (c) Why should the metal be protected?
- (d) Name the process taking place. [4]

#### Question 4

- (i) Name the alloy which is made up of:  
(a) Copper, Zinc and Tin  
(b) Lead and Tin [2]
- (ii) An organic compound 'P' of molecular formula  $C_2H_6O$  is a constituent of wine. This compound on oxidation, gives acidic compound 'Q'. The compound 'P' reacts with 'Q' on warming in the presence of **Conc.  $H_2SO_4$**  to give a fruity-smell substance 'R'.  
(a) Identify P, Q, and R.  
(b) Write balanced equation for  $P + Q \rightarrow R$   
(c) State the name of the reaction taking place in the above. [5]
- (iii) 10g of a commercial sample of calcium carbonate gave, on treatment with excess of hydrochloric acid; 3.3g of carbon dioxide. Calculate the percentage purity of the of the sample.  
$$CaCO_3 + 2HCl \rightarrow CaCl_2 + H_2O + CO_2$$
  
{ Ca = 40; C = 12; O = 16; Cl = 35.5; H = 1 } [3]

#### Question 5

- (i) A, B and C are three elements which undergo chemical reactions according to the following equations:  
$$A_2O_3 + 2B \rightarrow B_2O_3 + 2A$$
$$3CSO_4 + 2B \rightarrow B_2(SO_4)_3 + 3C$$
$$3CO + 2A \rightarrow A_2O + 3C$$
  
Answer the following questions:  
(a) Which element is the most reactive?  
(b) Which element is the least reactive? [2]
- (ii) Equation for the reaction when compound A is bubbled through bromine dissolved in carbon tetrachloride is as follows :
- $$A \xrightarrow{Br_2/CCl_4} \begin{array}{c} CH_2Br \\ | \\ CH_2Br \end{array}$$
- (a) Draw the structure of A.  
(b) State your observation during this reaction [2]
- (iii) Write the observation for the following:  
(a) Conc. Sulphuric acid is added to sugar crystals.  
(b) Nitrogen dioxide gas is passed through acidified  $FeSO_4$  solution.  
(c) Ammonia reacts with excess of chlorine. [3]



- (iv) Nita's father bought a basket of ripe mangoes. While opening it she found a small sachet containing a white crystalline powder along with the mangoes. She was told that it is a chemical that releases a gas when it comes in contact with moisture, that induces ripening of fruits.
- (a) Name the chemical powder in the sachet.
  - (b) Name the gas.
  - (c) Give a balanced chemical equation for the reaction that results in the evolution of this gas. [3]

### Question 6

- (i) Name the following:
- (a) The ore of Zinc containing its sulphide .
  - (b) The most commonly used oxide ore of Iron. [2]
- (ii) Write the favorable conditions requires for the formation of ammonia in Haber's process. [2]
- (iii) Seema takes a blue crystalline salt **P** in a test tube. On heating it produces a white anhydrous powder. **P** is dissolved in water. Zinc is added to one part of the solution and to another part of the solution Barium chloride is added.
- (a) Name the compound **P**.
  - (b) Mention one observation when zinc is added to the solution of **P**.
  - (c) State the colour of the precipitate formed when barium chloride is added to the solution of **P**. [3]
- (iv) Write the main reactions taking place in different chambers/tower of Ostwald's process by mentioning each chamber/tower name clearly. [3]

### Question 7

- (i) Write two main conditions required for the formation of ionic bond. [2]
- (ii) Write the equations for the following reactions which result in the formation of ammonia.
- (a) A mixture of ammonium chloride and slaked lime is heated.
  - (b) Magnesium nitride and warm water. [2]
- (iii) Give reason why
- (a) Pure acetic acid is also called glacial acetic acid.
  - (b) In industry HCl is used for pickling of steel.
  - (c) Lithium hydroxide is used by astronauts in their spaceship. [3]

- (iv) Study the information given in the table below and answer the questions that follow. (Note- the letters do not represent the actual symbols of the elements)

Element	Electronic configuration	I.E. (kJ/mol)
X	2,2	900
Y	2,8,2	738
Z	2,8,8,2	590

- (a) Explain why element X has highest Ionisation energy.  
 (b) To which period does Z belong?  
 (c) Draw the electron dot structure of the compound formed between Z and oxygen. [3]

### Question 8

- (i) Draw the electron dot diagram of the following:  
 (a) Magnesium chloride  
 (b) Water [2]
- (ii) Vidya conducts a flame test on two salts P and Q and she observes a blue flame from salt P and brick red flame from Q. What cation are present in salt P and Q? [2]
- (iii) The empirical formula of an organic compound is  $C_3H_4N$ . Its molecular weight is 108. Find the amount of carbon in one mole of the compound. Show all the steps involved. (Atomic weights: C - 12; H - 1; N -14) [3]
- (iv) In the contact process for large scale preparation of Sulphuric acid,  
 (a) Why sulphur trioxide formed from the oxidation of sulphur dioxide is not directly dissolved in water to form Sulphuric acid?  
 (b) Write the equations taking place in contact process for the formation of Sulphuric acid from sulphur trioxide. [3]

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