



ཤེས་རིག་ལྷན་ཁག།  
མུ་ཏིག་ཐང་འབྲིང་རིམ་སློབ་གྲྭ་གོང་མ།



**MOTITHANG HIGHER SECONDARY SCHOOL  
THIMPHU THROMDE**

“Every child is **inspired** to learn and **empowered** with **wisdom** to excel in life”  
**TRIAL EXAMINATION 2020**

Class:10  
Chemistry

Writing time: 2 Hours  
Total marks: 100

Name:.....Roll no.....Class.....Section.....

Invigilator's Initial

**Read the following directions carefully.**

1. Do not write for the first 15 minutes. This time is to be spent reading over the questions. After having read over the questions, the time given at the top of this paper is the time allowed for writing the answers.
2. On the space provided above, write your name, class and roll number.
3. In this paper there are two sections – A and B. Section A is **compulsory** and you are expected to attempt **any five questions** from Section B.
4. The intended marks for questions or parts of the questions are given in the bracket.
5. Read the directions to each questions carefully and write all your answers neatly in the space provided in the question booklet itself.

For Teachers use only													
	Section A (50)						Section B (50)						
Question Number	Question 1						Qn2	Qn3	Qn 4	Qn 5	Qn 6	Qn 7	Total
	a	b	c	d	e	f							
Marks	25	5	5	5	5	5	10	10	10	10	10	10	
Total Marks Awarded													
Teacher's Initial													

## Section A (50 Marks)

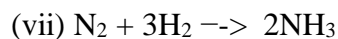
*Compulsory: Attempt all questions*

### Question 1

- a. For each question there are four alternatives: A, B, C and D. Choose the correct alternative and circle it. Do not circle more than ONE alternative. If there is more than one choice circled, NO score will be awarded.

[1x25=25]

- (i) Alcohols are formed by attachment of
- A OH group to hydrocarbon
  - B HX group to hydrocarbon
  - C O group to hydrocarbon
  - D R group to hydrocarbon.
- (ii) The value of PV for 2.5 moles of a gas at 273K is
- A 76
  - B 56
  - C 46
  - D 40
- (iii) A gas sample contains 16g O<sub>2</sub>, 14g of N<sub>2</sub>, 44g of CO<sub>2</sub> and 71g of Cl<sub>2</sub>. What is the total number of moles of gas in the sample?
- A 5 moles
  - B 4 moles
  - C 3 moles
  - D 2 moles
- (iv) The type of bond formed when electrons are shared between two atoms is
- A covalent bond.
  - B electrovalent bond.
  - C hydrogen bond.
  - D metallic bond.
- (v) In ideal gas equation:  $PV = nRT$  where, R is the molar gas constant. The value of R is
- A 0.8201 litreatm K<sup>-1</sup> mol<sup>-1</sup>
  - B 0.8121litreatm K<sup>-1</sup> mol<sup>-1</sup>
  - C 0.0821litreatm K<sup>-1</sup> mol<sup>-1</sup>
  - D 0.8021litreatm K<sup>-1</sup> mol<sup>-1</sup>
- (vi) The relative molecular mass of H<sub>2</sub>SO<sub>4</sub> (H= 1, S= 32, O=16) is
- A 98 amu
  - B 96amu
  - C 90amu
  - D 88 amu



How many moles of ammonium are produced when 3 moles of nitrogen react with hydrogen?

- A. 6 moles Ammonium
  - B. 1.5 moles ammonium
  - C. 9 moles ammonium
  - D. 9 moles hydrogen
- (viii) The current flow through electrolyte is due to the movement of
- A movement of electron
  - B movement of ions
  - C movement of protons
  - D movement of atoms
- (ix) In what state or medium does NaCl conduct electricity?
- A Solid
  - B liquid
  - C molten
  - D aqueous
- (x) The positive value of  $\Delta H$  indicates that the reaction is
- A exothermic.
  - B endothermic.
  - C reversible.
  - D irreversible.
- (xi) Which of the following weight is equal to one mole of the substance?  
(C=12, O=16, H = 1, N= 14, Cl=35.5)
- A 22g of  $\text{CO}_2$ .
  - B 9g of  $\text{H}_2\text{O}$ .
  - C 17g of  $\text{NH}_3$ .
  - D 35.5g of  $\text{Cl}_2$ .
- (xii) The byproduct obtained from the fermentation of glucose is
- A water.
  - B ethanol.
  - C oxygen.
  - D carbondioxide.
- (xiii) The constant quantity of Boyle's Law is
- A. Only mass of the gas
  - B. Only temperature of a gas
  - C. Mass and Pressure of a gas
  - D. Mass and temperature of a gas

- (xiv) Which of the following gases occupies the maximum volume?  
(N=14, H=1, S=32, C=12, O=16)
- A 32g of SO<sub>2</sub>
  - B 22g of CO<sub>2</sub>
  - C 17g of NH<sub>3</sub>
  - D 14g of CO
- (xv) When an atom of halogen combines with an atom of alkali metal, the nature of bond formed in the molecule will be
- A. electrovalent bond.
  - B. coordinate bond.
  - C. covalent bond.
  - D. hydrogen bond.
- (xvi) The electronic configuration of  ${}_{26}\text{Fe}$  is
- A.  $1s^2 2s^2 2p^6 3s^2 3p^6 4s^0 3d^8$
  - B.  $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^6$
  - C.  $1s^2 2s^2 2p^6 3s^2 3p^6 4s^1 3d^7$
  - D.  $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^5$
- (xvii) If the pressure is increased by 2 times of a certain amount of gas at a fixed temperature, then what would be its final volume?
- A. Double
  - B. One half
  - C. Triple
  - D. One fourth
- (xviii) Percentage of Ca in Ca (OH)<sub>2</sub> is  
(Ca= 40, O = 16, H = 1)
- A 30%
  - B 45%
  - C 54%
  - D 64%
- (xix) Evaporation of water is
- A. An exothermic change
  - B. A chemical energy is produced
  - C. An endothermic change
  - D. No heat change occurs

- (xx) The equation given below represents  
$$\text{N}_2 + \text{O}_2 \rightarrow 2\text{NO} \text{ ---Heat}$$
- A exothermic reaction as it releases heat.  
B endothermic reaction as it releases heat.  
C exothermic reaction as it absorbs heat.  
D endothermic reaction as it absorbs heat.
- (xxi) Which of the following pair would react more readily?
- A K+Br  
B K+I  
C K+F  
D K+Cl
- (xxii) Which one of the following is the general formula of alkane?
- A  $\text{C}_n\text{H}_{2n}$   
B  $\text{C}_n\text{H}_{2n+2}$   
C  $\text{C}_n\text{H}_{2n-2}$   
D  $\text{C}_n\text{H}_{2n+1}\text{OH}$
- (xxiii) When concentrated sodium chloride solution is electrolyzed using platinum electrodes, the reaction which would take place at the cathode is
- A  $\text{Cl}^- \rightarrow \text{Cl} + \text{e}^-$   
B  $\text{H}^+ + \text{e}^- \rightarrow \text{H}$   
C  $\text{Na}^+ + \text{e}^- \rightarrow \text{Na}$   
D  $\text{OH}^- \rightarrow \text{OH} + \text{e}^-$
- (xxiv) The number of moles in 34g of  $\text{NH}_3$  is
- A 5moles  
B 3moles  
C 2moles  
D 1mole
- (xxv) The products formed as a result of reaction between ethanol and vinegar is
- A. ethyl ethanoate + water.  
B. diethyl ether + water.  
C. ethane + water.  
D. ethoxide + water.

- b. Match each item under Column A with the most appropriate item in Column B. Rewrite the correct matching pairs in the answer sheet provided. [5]**

Column A	Column B
1. Charles' law	a. Sulphur trioxide
2. Contact process	b. $6.023 \times 10^{23}$ particles.
3. Negative oxidation state	c. Filling up of orbitals.
4. Avogadro's law	d. Ammonia.
5. Aufbau's principle	e. Volume- temperature relationship
	f. Flourine

Column A	Column B
1. Charles' law	
2. Contact process	
3. Negative oxidation state	
4. Avogadro's law	
5. Aufbau's principle	

- c. Fill in the blanks by writing suitable word/s. [5]**

- (i) An enzyme in yeast that converts maltose into glucose is.....
- (ii) All halogens have .....electrons in the valence shell.
- (iii) During electrolysis the oxidation reaction takes place at.....
- (iv) The compounds containing .....metals are usually coloured.
- (v) The amount of heat absorbed or evolved when one mole of solute dissolves in its solvent is called as the heat of.....

- d. State whether the following statements are true or false. Rewrite the false statements in correct form in the answer sheet provided. [5]**

- (i) Cations are positively charged particles that move towards anode during electrolysis.

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- (ii) Halogens require two electrons to acquire its noble gas configuration.

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(iii) The general formula of alcohol is  $C_nH_{2+n}OH$

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(iv) In electro refining of metal, pure metal is made the anode.

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(v) At a constant temperature, when the volume of the gas decreases, the pressure decreases.

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**e. Answer the following questions[5]**

(i) State Boyle's law

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(ii) In Haber's process, which conditions favour a high yield of ammonia at equilibrium?

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(iii) State one use of ethanol based on its antiseptic property.

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(iv) Name the halogen used in sterilizing swimming pool.

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(v) Describe how pressure changes as the volume of air increases at constant temperature.

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**f. Write down one difference between the following:** [5]

(i) Relative atomic mass and relative molecular mass.

Relative atomic mass	Relative molecular mass.

(ii) Oxidation and reduction reaction

Oxidation reaction	Reduction reaction

(iii) Molecular formula and structural formula

Molecular formula	Structural formula

(iv) Paramagnetic and diamagnetic substance.

Paramagnetic substance	Diamagnetic substance



(v) Endothermic and exothermic reaction.

Endothermic reaction	Exothermic

**Section B (50 marks)**

Attempt any *five* questions.

**Question 2**

a. Answer the following question based on the electrolysis of concentrated sodium chloride using graphite electrodes. [3]

(i) Write cathode reaction.

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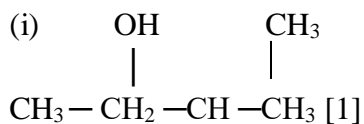
(ii) Write anode reaction

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(iii) Write dissociation reaction

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b. Write the IUPAC name for the following alcohols:



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(ii)  $\text{CH}_3\text{—CH}_2\text{—CH}_2\text{—CH}_2\text{—OH}$  [1]

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c. Name the following: [3]

(i) A transition metal used in light bulb.

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(ii) A halogen used as antiseptic.

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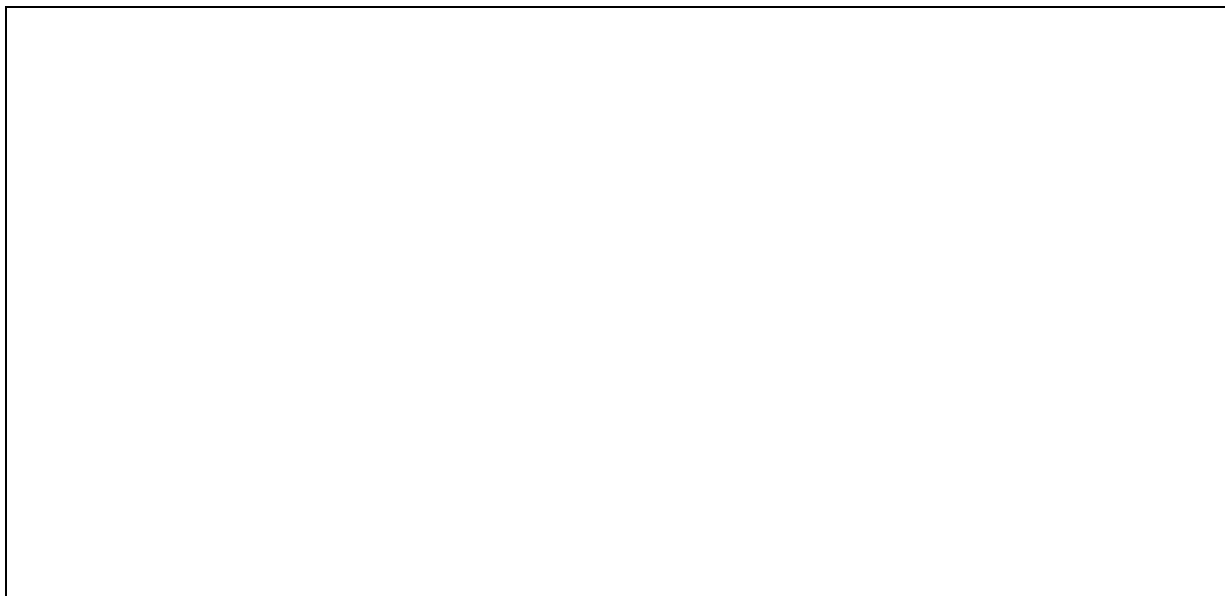
(iii) An alloy used for making air ships.

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d. A gas occupies a volume of 120 ml at a pressure of a pressure of 0.75 atm and a temperature of 22°C. What will the volume be at a pressure of 1.25 atm and a temperature of 70°C? [2]

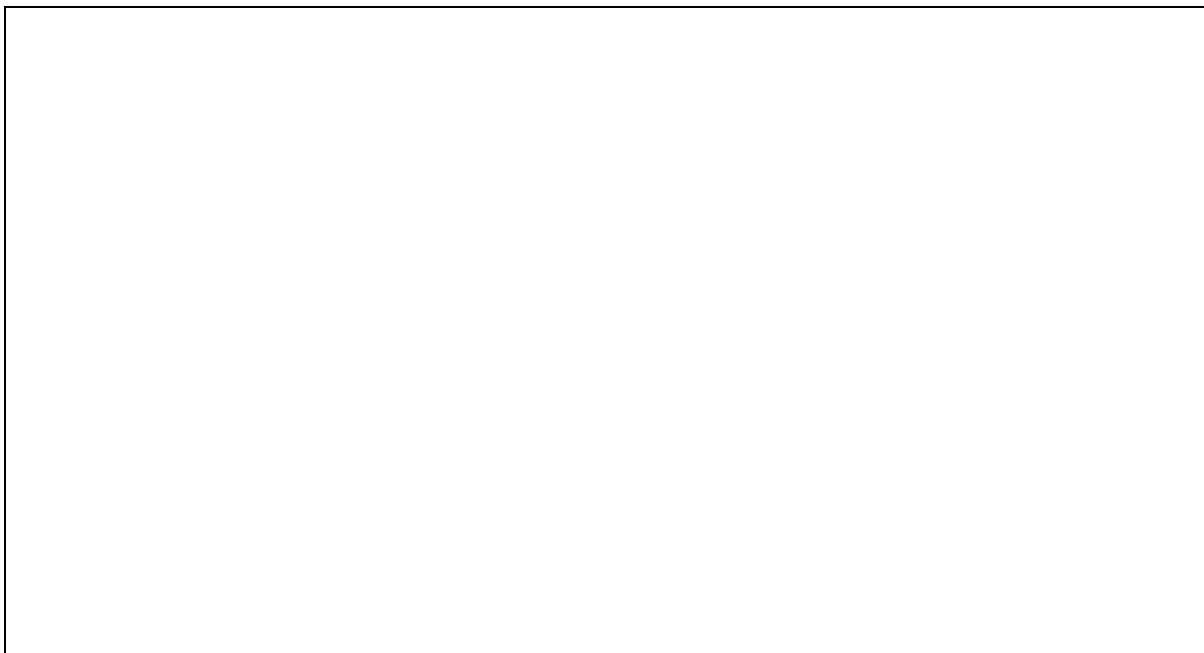
### Question 3

a) Two reagent bottles A and B containing solutions of potassium chloride and potassium iodide respectively have lost their labelling. Devise a chemical test to identify the solution. [2]



b) If 16.4 gram of calcium nitrate is heated as shown in the reaction:  $2\text{Ca}(\text{NO}_3)_2 \rightarrow 2\text{CaO} + 4\text{NO}_2 + \text{O}_2$

i) Calculate the volume of nitrogen dioxide produced at STP. [1]



ii) Calculate the weight of calcium oxide obtained. [1]

c) Write down the electronic configuration in s, p, d, f notation for the following elements: [2]

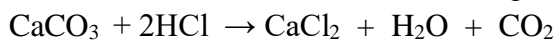
i)  ${}^{63.5}_{29}\text{Cu}$

ii)  ${}^{60}_{27}\text{Co}$

d) Mention two factors that affect electrolysis. [1]

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e) Calcium carbonate reacts with dilute HCl according to the equation.



(Ca= 40, C= 12, O= 16, H= 1, Cl= 35.5)

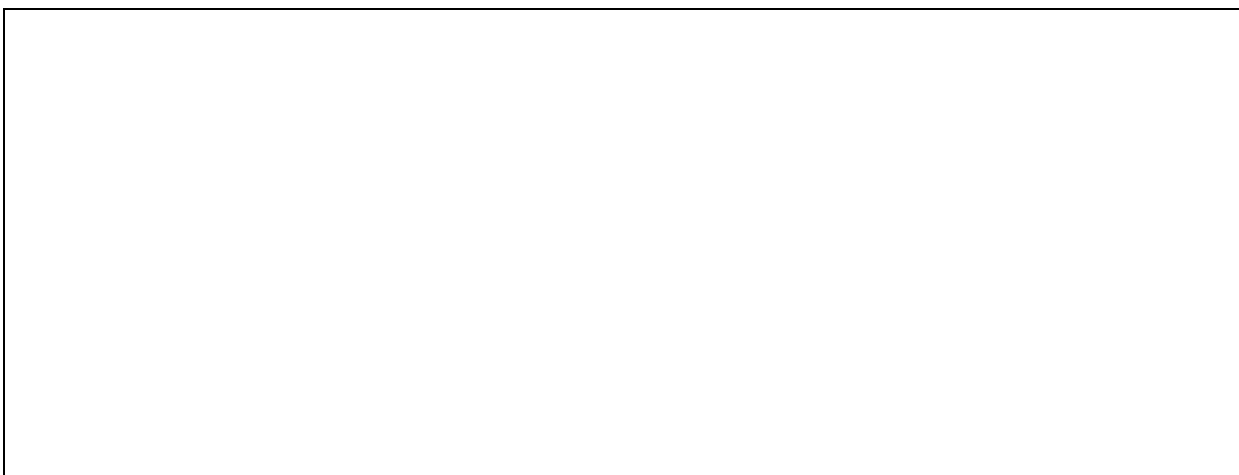
Calculate

i) The weight of  $\text{CaCl}_2$  obtained from 10g of  $\text{CaCO}_3$  [2]



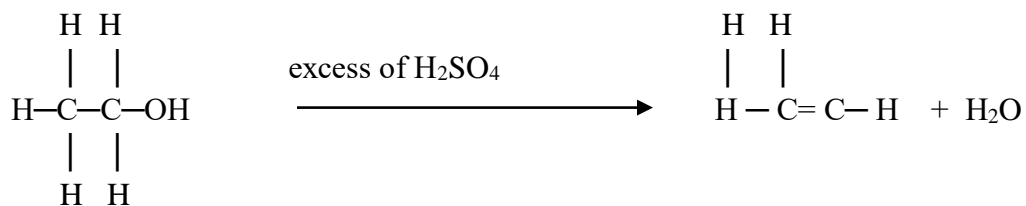
ii)The volume of CO<sub>2</sub> obtained from 10g of CaCO<sub>3</sub> at STP.

[1]



#### Question 4

a)The equation given below represents a hydration reaction of alcohol. Refer to the equation and answer the questions that follow:



i)Identify and write the functional groups present in reactant and product molecules.[1]

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ii) Write down the IUPAC and common name for the reactant. [1]

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iii) Give the condensed formula for the product molecule. [1]

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b) Give reasons for the following:

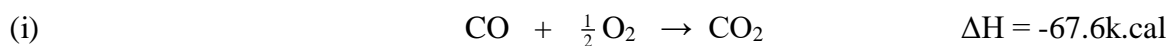
i) Zinc and scandium are not transition elements although they are the members of d-block elements. [1]

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ii) 4s orbital is filled before 3d orbital according to Aufbau's principle. [1]

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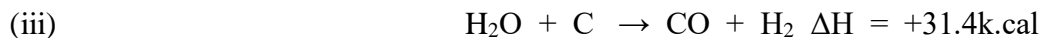
c) Classify whether following reaction are exothermic or endothermic reaction: [2]



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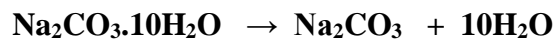
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d)Washing soda has the formula  $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$ . What is the mass of anhydrous sodium carbonate left when all the water of crystallization is expelled by heating 50g of washing soda.

[3]



(Na=23, C=12, O=16, H=1)

### Question 5

a)Consider following ions to be present in an electrolyte:  $\text{Na}^+$ ,  $\text{K}^+$ ,  $\text{H}^+$ ,  $\text{SO}_4^{2-}$ ,  $\text{Cl}^-$ ,  $\text{OH}^-$ .

i)If platinum electrodes are used in its electrolysis, name:[1]

A.the ion that would be discharged at cathode.

.....

B.the ion that would be discharged at anode.

.....

ii)Write down the ionic reaction at the

A.Cathode.[1]

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B.Anode. [1]

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b) Explain with reasons for the following:

i) Chlorine is used as a bleaching agent in paper industry. [1]

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ii) The size of bromine ion is larger than the bromine atom. [1]

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c) Calculate the volume of 3.2 g of Sulphur dioxide (SO<sub>2</sub>) at STP. [3]

(S=32, O= 16)

d) What is breathalyzer? How is the presence of alcohol in breath confirmed? [2]

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**Question 6**

a) Iron exhibits variable valencies forming Fe<sup>2+</sup> and Fe<sup>3+</sup> ions. Write down the name and formula of each compound that iron can form with chlorine. [2]

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b) If atomic mass of Na atom is 23amu, find the number of atoms present in 10g of Na. [2]

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c) A compound of carbon, hydrogen and oxygen is found to contain 40% of carbon, 6.7% of hydrogen and 53.3% of oxygen.

1. Determine its empirical formula. [2]

2. If its vapour density is 30, find its molecular formula. [2]

d) 15L of a gas is collected at 32°C and 700mmHg. What is the volume at STP? [2]

**Question 7**

a) Define metal activity series. Why do gold and silver not corrode easily?[2]

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b) Why is ethanol considered as carbon neutral to the environment? Explain.[2]

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c) Calculate the percentage composition of water of crystallization in  $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ .  
( Ca= 40, S= 32, O=16, H=2) [2]

d) Explain the following [2]

i) The atomic radius of chloride ion is larger than chlorine atom

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ii) Halogen becomes less reactive down the group

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e)What can you do to minimize alcohol related issues as a responsible citizen of GNH country?[2]

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