ICSE CLASS 10 EXAMINATION

PRACTICE QUESTION PAPER

CHEMISTRY (SCIENCE PAPER – 2)

Chapter 5: Mole Concept and Stoichiometry

Maximum Marks: 40 ***Time allowed: One hour***

1. *Answers to this Paper must be written on the paper provided separately.*
2. *You will not be allowed to write during the first **10** minutes. This time is to be spent in reading the question paper.*
3. ***The time given at the head of this Paper is the time allowed for writing the answers.***
4. ***Section A** is compulsory. Attempt **any two** questions from **Section B**.*
5. *The intended marks for questions or parts of questions are given in brackets [ ].*

Data: Atomic masses: H = 1, C = 12, N = 14, O = 16, Na = 23, S = 32, Cl = 35.5, Ca = 40, Zn = 65. Molar volume at STP = 22.4 dm^3. Avogadro's number = 6×10^{23}.

SECTION A (20 Marks)

*(Attempt **all** questions from this Section.)*

Question 1

Choose the correct answers to the questions from the given options. [8]
(Do not copy the question, write the correct answers only.)

(i) How many moles are present in 22 g of carbon dioxide (CO_2)?

(a) 0.25 mole

(b) 0.5 mole

(c) 1.0 mole

(d) 2.0 moles

(ii) The volumes of four different gases P, Q, R and S, measured at the same temperature and pressure, are given in the table below. Which gas contains the **greatest number of molecules**?

Gas	P	Q	R	S
Volume	250 cm^3	0.2 dm^3	0.3 litre	150 mL

(a) P

(b) Q

(c) R

(d) S

(iii) What is the mass of 5.6 dm^3 of methane (CH_4) at STP?

(a) 4 g

(b) 8 g

(c) 2 g

(d) 16 g

(iv) Acetylene burns according to the equation: $2C_2H_2 + 5O_2 \rightarrow 4CO_2 + 2H_2O$. What volume of oxygen is required to burn 10 cm^3 of acetylene completely under the same conditions?

(a) 10 cm^3

(b) 20 cm^3

(c) 50 cm^3

(d) 25 cm^3

(v) A gas has a vapour density of 32. Which of the following gases is it?

(a) Oxygen (O_2)

(b) Sulphur dioxide (SO_2)

(c) Carbon dioxide (CO_2)

(d) Ammonia (NH_3)

(vi) **Assertion (A):** One mole of any gas occupies 22.4 dm^3 at STP.
Reason (R): Equal volumes of all gases under the same conditions of temperature and pressure contain the same number of molecules.

(a) (A) is true but (R) is false.

(b) (A) is false but (R) is true.

(c) Both (A) and (R) are true, and (R) is the correct explanation of (A).

(d) Both (A) and (R) are true, but (R) is not the correct explanation of (A).

(vii) What is the empirical formula of glucose, $C_6H_{12}O_6$?

(a) CH_2O

(b) CHO

(c) C_2H_4O

(d) $C_3H_6O_3$

(viii) How many oxygen atoms are present in 0.5 mole of carbon dioxide?

(a) 3×10^{23}

(b) 1.2×10^{24}

(c) 2.4×10^{24}

(d) 6×10^{23}

Question 2

(i) Complete the following sentences by choosing the correct option from the brackets: [3]

(a) One mole of any gas at STP occupies _____ dm^3. (11.2 / 22.4)

(b) The relative molecular mass of a gas is equal to _____ × its vapour density. (2 / 4)

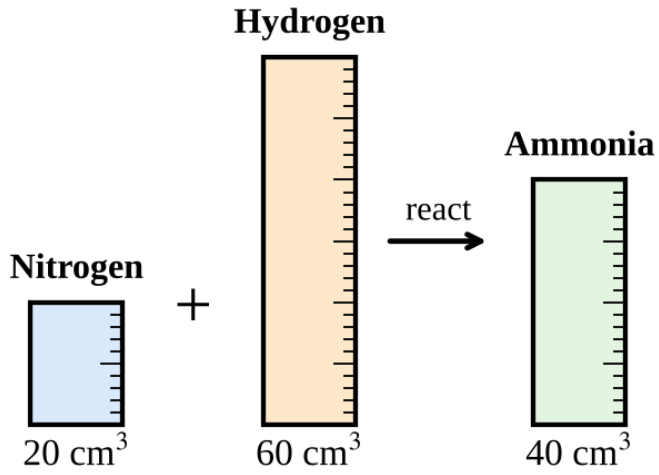
(c) Under the same conditions of temperature and pressure, equal volumes of all gases contain the same number of _____. (atoms / molecules)

(ii) Match Column A with Column B. (Write the answers as (a)–(number), and so on.) [3]

Column A	Column B
(a) Volume of 0.5 mole of oxygen at STP	1. 22.4 dm^3
(b) Number of molecules in 2 g of hydrogen (H_2)	2. 6×10^{23}
(c) Mass of 0.1 mole of sodium hydroxide (NaOH)	3. 4 g
	4. 11.2 dm^3

Question 3

(i) The diagram below shows the volumes of nitrogen and hydrogen which combine completely to form ammonia gas. [3]



(All volumes measured at the same temperature and pressure)

(a) Name the law illustrated by these volumes and state it.

(b) What volume of hydrogen will combine completely with 50 cm^3 of nitrogen under the same conditions?

(c) If 20 cm^3 of nitrogen contains y molecules, how many molecules are present in 40 cm^3 of ammonia? Name the law you have used.

(ii) Calculate: [3]

(a) the number of moles in 9.8 g of sulphuric acid (H_2SO_4).

(b) the volume occupied at STP by 8.8 g of carbon dioxide.

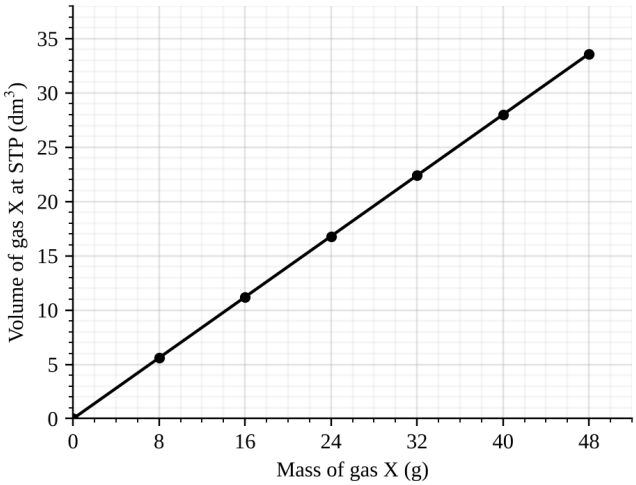
(c) the number of molecules in 3.6 g of water.

SECTION B (20 Marks)

*(Attempt **any two** questions from this Section.)*

Question 4

The graph below shows how the volume of a gas X at STP varies with its mass. Study the graph and answer the questions that follow.



(i) Answer the following questions based on the graph: [4]

(a) What is the volume of 16 g of gas X at STP?

(b) Find the gram molecular mass of X.

(c) Calculate the number of molecules in 16 g of X.

(d) Find the vapour density of X.

(ii) The gas X is made up of atoms of an element whose atomic mass is 16. [3]

(a) Find the atomicity of X.

(b) Calculate the number of atoms in 16 g of X.

(c) Calculate the volume of 8 g of X at STP.

(iii) 40 cm^3 of methane is burnt in 100 cm^3 of oxygen according to the equation: $CH_4(g) + 2O_2(g) \rightarrow CO_2(g) + 2H_2O(l)$. All measurements are made at room temperature and pressure. [3]

(a) What volume of oxygen is used up?

(b) What volume of carbon dioxide is formed?

(c) What is the total volume of the gaseous mixture left after the reaction? Name the gases present.

Question 5

A hydrocarbon contains 85.7% carbon and 14.3% hydrogen by mass. Its vapour density is 28. The table below is used to find its empirical formula.

Element	Percentage by mass	Atomic mass	Relative number of moles	Simplest whole number ratio
Carbon	85.7	12	(a)	(c) .....
Hydrogen	14.3	1	(b)	(d) .....

(i) Answer the following questions based on the table: [4]

(a) Calculate the values (a) and (b), the relative number of moles of carbon and hydrogen.

(b) Write the values (c) and (d) of the simplest whole number ratio.

(c) Write the empirical formula of the hydrocarbon.

(d) Calculate the empirical formula mass.

(ii) Find the molecular formula of the hydrocarbon: [3]

(a) Calculate its relative molecular mass.

(b) Find the value of n, where molecular formula = (empirical formula)$_n$.

(c) Write the molecular formula.

(iii) Ammonium sulphate, $(NH_4)_2SO_4$, is used as a fertiliser. [3]

(a) Calculate its relative molecular mass.

(b) Find the mass of nitrogen present in one mole of it.

(c) Calculate the percentage of nitrogen in ammonium sulphate (correct to one decimal place).

Question 6

Zinc reacts with dilute hydrochloric acid according to the equation below. The table shows the quantities of the substances taking part in the reaction, as given by the balanced equation.

	Zn	**+**	**2HCl**	**→**	**$ZnCl_2$**	**+**	**H_2**
Moles	1		2		1		1
Mass (g)	65		(a)		(b)		2
Volume at STP	–		–		–		(c) .....
Number of molecules ($N_A = 6 \times 10^{23}$)	–		–		–		(d) .....

(i) Complete the table by finding the values (a), (b), (c) and (d): [4]

(Chlorine: Cl = 35.5; molar volume at STP = 22.4 dm^3.)

(ii) Using the information in the table, calculate for the production of 5.6 dm^3 of hydrogen at STP: [3]

(a) the mass of zinc required.

(b) the mass of hydrogen chloride required.

(c) the mass of zinc chloride formed.

(iii) 25 g of calcium carbonate is heated strongly: $CaCO_3 \rightarrow CaO + CO_2$ [3]

(a) Calculate the mass of calcium oxide formed.

(b) Calculate the volume of carbon dioxide evolved at STP.

(c) If only 12.6 g of calcium oxide is actually obtained, calculate the percentage yield.

****** END OF PAPER ******