

GRADE 11 CHEMISTRY

SOME BASIC CONCEPTS OF CHEMISTRY

QUESTION BANK

1. A measured temperature on Fahrenheit scale is 200°F. What will this reading be on Celsius scale?
- (a) 40°C
 - (b) 94°C
 - (c) 93.3°C
 - (d) 30°C

Ans: c

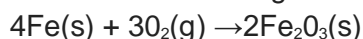
2. If 500 mL of a 5 M solution is diluted to 1500 mL, what will be the molarity of the solution obtained?
- (a) 1.5 M
 - (b) 1.6 M
 - (c) 0.017 M
 - (d) 1.59 M

Ans: (b)

3. Which of the following statements about a compound is incorrect?
- (a) A molecule of a compound has atoms of different elements.
 - (b) A compound cannot be separated into its constituent elements by physical methods of separation.
 - (c) A compound retains the physical properties of its constituent elements.
 - (d) The ratio of atoms of different elements in a compound is fixed.

Ans: (c)

4. Which of the following statements is correct about the reaction given below?



- (a) Total mass of iron and oxygen in reactants = total mass of iron and oxygen in **product**, therefore it follows law of conservation of mass.
- (b) Total mass of reactants = total mass of product; therefore, law of multiple proportions is followed.
- (c) Amount of Fe_2O_3 can be increased by taking any one of the reactants (iron or oxygen) in excess.
- (d) Amount of Fe_2O_3 produced will decrease if the amount of any one of the reactants (iron or oxygen) is taken in excess.

Ans: (a)

5. Which of the following reactions is not correct according to the law of conservation of mass?

- (a) $2\text{Mg(s)} + \text{O}_2\text{(g)} \rightarrow 2\text{MgO(s)}$
- (b) $\text{C}_3\text{H}_8\text{(g)} + \text{O}_2\text{(g)} \rightarrow \text{CO}_2\text{(g)} + \text{H}_2\text{O(g)}$
- (c) $\text{P}_4\text{(s)} + 5\text{O}_2\text{(g)} \rightarrow \text{P}_4\text{O}_{10}\text{(s)}$
- (d) $\text{CH}_4\text{(g)} + 2\text{O}_2\text{(g)} \rightarrow \text{CO}_2\text{(g)} + 2\text{H}_2\text{O(g)}$

Ans: (b)

6. Which of the following statements indicates that law of multiple proportions is being followed?

- (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 CO_2 and 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.

Ans: (b)

7. Calculate the mass percent of different elements present in sodium sulphate (Na_2SO_4).

Ans: Mass percent of sodium = 32.39%

Mass percent of sulphur = 22.4 %

Mass percent of oxygen = 45.07%

8. In three moles of ethane (C_2H_6), calculate the following:

(i) Number of moles of carbon atoms (ii) Number of moles of hydrogen atoms

Ans: (i) 6 moles (ii) 18 moles

9. What is the concentration of sugar ($\text{C}_{12}\text{H}_{22}\text{O}_{11}$) in mol L^{-1} if its 20 g are dissolved in enough water to make a final volume up to 2 L?

Ans: 0.0923 M

10. If the density of methanol is 0.793 kg L^{-1} , what is its volume needed for making 2.5 L of its 0.25 M solution?

Ans: 25.22 mL

11. What is the symbol for the SI unit of the mole? How is the mole defined?

Ans: The symbol for the SI unit of the mole is mol

One mole is defined as the amount of a substance containing the same number of particles or entities as there are atoms in exactly 12 g (0.012 kg) of the C – 12 isotope.

12. What is the difference between molality and molarity?

MOLARITY	MOLALITY
The molarity of a given solution is defined as the total number of moles of solute per litre of solution	Molality is defined as the total moles of a solute contained in a kilogram of a solvent.
Depends on the volume of the whole solution.	Depends on the mass of the solvent.
Unit sign expressed as (M).	Unit sign expressed as (m).
Molarity has a unit of mol/litre.	Molality has units of mol/kg.
$M = (\text{g} \times 1000)/(\text{W} \times \text{V})$.	$m = (\text{g} \times 1000)/(\text{W} \times \text{m})$.

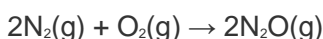
13. Calculate the mass percent of calcium, phosphorus and oxygen in calcium phosphate $\text{Ca}_3(\text{PO}_4)_2$

Ans: % Calcium = 38.71%

% Phosphorus = 20%

% Oxygen = 41.29%

14. 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.

Ans: The volumes of dinitrogen and dioxygen that combine (i.e., 45.4 L and 22.7 L) have a simple ratio of 2: 1. As a result, it follows Gay Lussac's law of gaseous volumes.

According to this law, "when gases combine or are produced in a chemical reaction, they do so in a simple volume ratio provided all gases are at the same temperature and pressure."

15. If two elements can combine to form more than one compound, the masses of one element that combine with

a fixed mass of the other element, are in a whole-number ratio.

1. Is this statement true?
2. If yes, state according to which law?
3. Give one example related to this law.

Ans:

1. Yes, the statement is true.
2. According to the law of multiple proportions.
3. Consider the example,
 $\text{H}_2 + \text{O}_2 \rightarrow \text{H}_2\text{O}$
 $\text{H}_2 + \text{O}_2 \rightarrow \text{H}_2\text{O}_2$

16. Calculate the average atomic mass of hydrogen using the following data:

Isotope	% Natural abundance	Molar mass
^1H	99.985	1
^2H	0.015	2

Ans: 1.00015 U

17. Hydrogen gas is prepared in the laboratory by reacting dilute HCl with granulated zinc.

The following reaction takes place.



Calculate the volume of hydrogen gas liberated at STP when 32.65 g of zinc reacts with HCl. 1 mol of a gas occupies 22.7 L volume at STP; atomic mass of Zn = 65.3 u.

Ans: 11.35L

18. The density of the 3 molal solution of NaOH is 1.110 g mL^{-1} . Calculate the molarity of the solution.

Ans: 2.97 M

19. Volume of a solution changes with change in temperature, then, will the molality solution be affected by temperature? Give reason for your answer.

Ans: The temperature has no effect on the molality of the solution because molality is expressed in mass, and mass remains constant as temperature changes.

20. If 4 g of NaOH dissolves in 36 g of H_2O , calculate the mole fraction of each component in the solution. Also, determine the molarity of solution (specific gravity of solution is 1 g mL^{-1})

Ans: Mole fraction of water = 0.95

Mole fraction of NaOH = 0.047

Molarity = 2.5 M

21. The reactant which is entirely consumed in the reaction is known as a limiting reagent.

In the reaction $2\text{A} + 4\text{B} \rightarrow 3\text{C} + 4\text{D}$, when 5 moles of A react with 6 moles of B, then

- (i) Which is the limiting reagent?
- (ii) Calculate the amount of C formed?

Ans: According to the above equation, 2 moles of 'A' require 4 moles of 'B' for the reaction. As a result,

the moles of 'B' required for 5 moles of 'A' are 10 moles.

- (i) The limiting agent is B, as 5 moles of A requires 10 moles of B but only 6 moles are present.
(ii) 4.5 moles

22. Assertion (A): Combustion of 16 g of methane gives 18 g of water.

Reason (R): In the combustion of methane, water is one of the products.

- (i) Both A and R are true but R is not the correct explanation of A.
(ii) A is true but R is false
(iii) A is false but R is true.
(iv) Both A and R are false.

Ans: (iii)

23. A box contains some identical red coloured balls, labelled as A, each weighing 2 grams. Another box contains identical blue coloured balls, labelled as B, each weighing 5 grams. Consider the combinations AB, AB₂, A₂B and A₂B₃, and show that a law of multiple proportions is applicable.

Ans:

Combination	Mass of A (g)	Mass of B (g)
AB	2	5
AB ₂	2	10
A ₂ B	4	5
A ₂ B ₃	4	15

When two elements combine to form two or more compounds, the different masses of one element that combine with a fixed mass of the other bear a simple ratio to one another, according to the law of multiple proportions

The mass of B when combined with a fixed mass of A (say 1g) is 2.5g, 5g, 1.25g, and 3.75g. They have a 2:4:1 ratio, which is a simple whole-number ratio. Hence. The multiple proportions law is applicable

24. Calculate molarity of water if its density is 1.00 g mL⁻¹.

Ans: 55.5 M

25. What is the molarity of a 10mL solution in which 3.7g KCl are dissolved?

Ans: 5M

26. Calculate the molarity of NaOH in the solution prepared by dissolving its 4 g in enough water to form 250 mL of the solution.

Ans: 0.4 M

27. The density of 3 M solution of NaCl is 1.25 g mL⁻¹. Calculate molality of the solution.

Ans: 2.8 m

28. A black dot used as a full stop at the end of a sentence has a mass of about one attogram. Assuming that the dot is made up of carbon, calculate the approximate number of carbon atoms present in the dot. [Hint : 1 attogram = 10^{-18} g]

Ans: Number of particles in a mole = 6.022×10^{23}

1 attogram = 10^{-18} g

Number of carbon atom = 1

Atomic mass of carbon = 12

12 g of carbon contain = $1 \times 6.022 \times 10^{23}$ carbon atoms

\therefore 10^{-18} g of carbon contains

5.02×10^4 carbon atoms

30. A compound made up of two elements A and B has A = 70%, B = 30%. Their relative number of moles in the compound is 1.25 and 1.88, calculate :

(i) Atomic masses of the elements A and B

(ii) Molecular formula of the compound , if its molecular mass is found to be 160.

Ans: (i) 56 and 16 (ii) A_2B_3
