



IV. Long Answer Type Questions

Question 1. (a) How do atoms exist?

(b) What is atomicity?

(c) What are polyatomic ions?

Answer: (a) Atoms of some elements are not able to exist independently. For such elements atoms form molecules and ions. In case of metals and inert gases atoms can exist independently.

Atoms of metals and inert gases: *E.g.*, Na, Mg, Al, He, Ne, Ar
Metals Inert gases

Non-metals: *E.g.*, H_2 , Cl_2 , P_4 , S_8

Exceptional non-metal C

(b) The number of atoms constituting a molecule is known as its atomicity.

E.g., $O_3 \rightarrow$ atomicity is 3

$O_2 \rightarrow$ atomicity is 2

(c) Polyatomic ions: When more than two atoms combine together and act like an atom with a charge on it is called polyatomic ion.

E.g., OH^- , NO_3^- , NH_4^+

Question 2. Calculate

(a) the mass of one atom of oxygen

(b) the mass of one molecule of oxygen

(c) the mass of one mole of oxygen gas

(d) the mass of one ion of oxygen

(e) the number of atoms in 1 mole of oxygen molecule

Answer:

(a) Mass of one atom of oxygen

$$1 \text{ mole of oxygen atom} = 16 \text{ gm} = 6.022 \times 10^{23} \text{ atoms.}$$

$$\therefore \text{Mass of one atom of oxygen} = \frac{16}{6.022 \times 10^{23}} = 2.65 \times 10^{-23}$$

(b) Mass of one molecule of oxygen

$$\begin{aligned} 1 \text{ molecule of oxygen} &= O_2 \\ &= 2 \times 16 \\ &= 32 \text{ u} \end{aligned}$$

(c) Mass of one mole of oxygen gas

$$1 \text{ mole of oxygen gas is } O_2 = 32 \text{ u}$$

(d) Mass of one ion of oxygen

$$\text{One mole of oxygen} = 6.022 \times 10^{23} \text{ atoms} = 16 \text{ g.}$$

$$\begin{aligned} \text{Mass of one ion of oxygen} &= \frac{16}{6.022 \times 10^{23}} \\ &= 2.65 \times 10^{-23} \end{aligned}$$

(e) Number of atoms in one mole of oxygen molecule

1 mole of oxygen molecule *i.e.*,

$$O_2 = 6.022 \times 10^{23} \text{ molecules.}$$

$$1 \text{ molecule of } O_2 = 2 \text{ atoms.}$$

$$\begin{aligned} \therefore \text{Number of atoms in 1 mole of oxygen molecule} &= 6.022 \times 10^{23} \times 2 \text{ atoms} \\ &= 1.2044 \times 10^{24} \text{ atoms} \end{aligned}$$

Question 3. What is meant by atomic mass, gram atomic mass of

- Prepare separately 95% solution of any one pair of substances listed under X and Y in water.
- Take little amount of solution of Y in a conical flask and some solution of X in an ignition tube.
- Hang the ignition tube in the flask carefully; see that the solutions do not get mixed.
- Put a cork on the flask as shown in figure.
- Weigh the flask with its contents carefully.
- Now tilt and swirl the flask, so that the solutions X and Y get mixed.

- Weigh again.
- What happens in the reaction flask?
- Do you think that a chemical reaction has taken place?
- Why should we put a cork on the mouth of the flask?
- Does the mass of the flask and its contents change?

Answer:

- In the reaction flask both the reactants combined to give new products.
- Yes.
- We should put a cork on the mouth of the flask so that no other gases in the air combine or get added into the reaction, neither any gas formed in the reaction should escape.
- No. The mass of the flask before and after reaction do not change.

VI. Value - Based Questions

Question 1. A customer buys a gold jewellery, he is told that the jewellery has 90% gold and the rest copper. He is given a bill which amounts 100% charges of gold. The customer refuses to pay the bill for 100% gold but brings it to 90% gold amount and settles the bill.

- (a) How many atoms of gold are present in 1 gram of gold?
 (b) What is the ratio of gold and copper in the jewellery?
 (c) What value of customer is reflected in the above statement?

Answer:

(a) 1 gram of gold will contain $\frac{90}{100} = 0.9\text{g of gold.}$

$$\begin{aligned} \therefore \text{Number of moles of gold} &= \frac{\text{Mass of gold}}{\text{Atomic mass of gold}} \\ &= \frac{0.9}{197} \\ &= 0.0046 \end{aligned}$$

$$\begin{aligned} \therefore 0.0046 \text{ mole of gold will contain} &= 0.0046 \times 6.022 \times 10^{23} \\ &= 2.77 \times 10^{21} \text{ atoms} \end{aligned}$$

(b) Ratio of gold : copper = 90 : 10

(c) Values of customer are responsible behaviour and self awareness.

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