Answer on Question#38193-Chemistry-Other

Question

The mass ratio of calcium to oxygen in calcium oxide is 5/2. If the reaction of equal masses of calcium and oxygen produces 28 g of calcium oxide, a) what will be the mass of each element, with which the reaction is started? b) which element remains unreacted? how many grams?

Solution

The reaction equation: $2Ca + O_2 \rightarrow 2CaO$

Since the mass ratio of calcium to oxygen in calcium oxide is 5/2, the initial reactants react in the same mass ratio.

Let us assign x – mass of calcium reacted and y – mass of oxygen reacted. Thus, we have the set of two equations:

$$\begin{cases} x + y = 28 \\ x / y = 5 / 2 \end{cases}$$

Solution of the set of equations:

$$x = 2.5\ y$$
$$2.5\ y + y = 28$$
$$3.5\ y = 28$$
$$y = 28 / 3.5 = 8$$
$$x = 28 - y = 28 - 8 = 20$$

So, mass of calcium, with which the reaction is started, is 20 g, and mass of oxygen, with which the reaction is started, is 8 g.

Since the equal masses of the reactants are taken for the reaction, the initial mass of oxygen is the same as the mass of calcium, i.e. it is equal to 20 g. Thus, oxygen remains unreacted. Mass of unreacted oxygen is 20 – 8 = 12 g.

Answer:

a) Mass of **calcium**, with which the reaction is started, is **20 g**, and mass of **oxygen**, with which the reaction is started, is **8 g**.

b) **Oxygen** remains unreacted. Mass of unreacted oxygen is **12 g**.