Answer on Question #64736 - Chemistry - General Chemistry
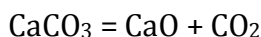
Question:

if 10g of CaCO3 was liberated to produce calcium oxide and carbon(iv) oxide calculate;

1. the volume of CO2 produced of stp

2. the mass of calcium oxide produced

3. moles of calcium oxide produced

Solution:

1)   Write down the balanced equation:

$CaCO_3 = CaO + CO_2$

We can see that one mole of calcium carbonate forms 1 mole of calcium oxide and 1 mole of carbon oxide.

2)   Let's find corresponding masses:

Molar mass of $CaCO_3$ = 40 + 12 + (16*3) = 100 g/mol;

Molar mass of CaO = 40 + 16 = 56 g/mol;

Molar mass of CO_2 = 12 + (16*2) = 44 g/mol;

So from 100 g of calcium carbonate we receive 56 g of calcium oxide and 44 g of carbon oxide.

From simple proportion we find that 10 g of calcium carbonate form 5.6 g of calcium oxide and 4.4 g of carbon oxide.

3)   Find amount of moles of products:

CaO: 5.6 g / 56 g/mol = 0.1 mol;

CO_2: 4.4 g / 44 g/mol = 0.1 mol;

4)   Find volume of CO_2:

1 mole of any gas at stp has volume of 22.4 litres = $2.24*10^{-2}$ cubic meters

So 0.1 mole of CO_2 has volume 0.1 * $2.24*10^{-2}$ m^3 = $2.24*10^{-3}$ m^3.

Answer:

1. the volume of CO_2 produced of stp is $2.24*10^{-3}$ m^3.

2. the mass of calcium oxide produced is 5.6 g.

3. 0.1 moles of calcium oxide are produced.