

## Answer on question#38863 - Chemistry - Other

### Question

How many grams of Cl are in 345 g of  $\text{CaCl}_2$ ?

### Solution:

There are two ways of solution.

1) Molar mass of  $\text{CaCl}_2$  equals:

$$M(\text{CaCl}_2) = M(\text{Ca}) + 2M(\text{Cl}) = 40 + 2 \cdot 35.5 = 40 + 71 = 111 \frac{\text{g}}{\text{mole}}$$

This means that 1 mole of  $\text{CaCl}_2$  weighs 111 g. If we have 1 mole of  $\text{CaCl}_2$  then 111 g of this compound contains 71 g of Cl. Therefore we can make a proportion:

$$111 \text{ g of } \text{CaCl}_2 - 71 \text{ g of Cl}$$

$$345 \text{ g of } \text{CaCl}_2 - x \text{ g of Cl}$$

$$x = \frac{345 \cdot 71}{111} = 220.67 \text{ g}$$

**Answer:**  $m(\text{Cl}) = 220.67 \text{ g}$ .

2) 1 mole of  $\text{CaCl}_2$  contains 2 moles of Cl (because of formula – there are two Cl-atoms in  $\text{CaCl}_2$  molecule). Number of moles of  $\text{CaCl}_2$  equals:

$$n = \frac{m}{M}$$

$m$  – Mass of  $\text{CaCl}_2$ ,  $m = 345 \text{ g}$ .

$M$  – Molar mass of  $\text{CaCl}_2$ ,  $M = 111 \text{ g/mole}$ .

$$n = \frac{345}{111} = 3.108 \text{ moles}$$

Therefore we have:  $n(\text{Cl}) = 2 \cdot 3.108 = 6.216$  moles of  $\text{CaCl}_2$ . Mass of Cl equals:

$$m(\text{Cl}) = n(\text{Cl}) \cdot M(\text{Cl}) = 6.216 \cdot 35.5 = 220.67 \text{ g}$$

**Answer:**  $m(\text{Cl}) = 220.67 \text{ g}$ .