Answer on Question #55596 – Chemistry – General Chemistry

Question:

If you have 1.512 g of bi3+ how do you calculate the mass of BiPO4 obtained from 50 ml of this solution.

Solution:

$m(Bi^{3+})$ = 1.512 g;

V (the solution) = 50 ml;

m(BiPO4) - ?

Ar(Bi) = 209 $g*mol^{-1}$;

M(BiPO4) = 304 $g*mol^{-1}$;

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

n – the amount of substance/mole (mol);

m – the mass (g);

M – the molar mass ($g*mol^{-1}$);

$n(Bi^{3+})$ = 0.007 mol;

One molecule of BiPO4 contains one Bi^{3+} ion.

$n(Bi^{3+})$: n(BiPO4) = 1:1;

$n(BiPO4) = n(Bi^{3+})$ = 0.007 mol;

m=n*M;

m(BiPO4) = 2.128 g;

Answer: 2.128 g;

Notice: According to the objective, we have 1.512 g of Bi^{3+} to produce BiPO4. If all amount of Bi^{3+} were wasted during the reaction, we would receive 2.128 g of BiPO4.

If the objective means that, we have 1.512 g of Bi^{3+} in 1 L of the solution; then we have to calculate the molar concentration of Bi^{3+} in the solution.

$$C = \frac{n}{V};$$

C – the molar concentration (M);

n – the amount of Bi^{3+} ions. (0.007 mol);

V – the volume of the solution (1 L);

C = 0.007 M;

Then we can calculate the number of moles Bi^{3+} that were used during the reaction:

V1 = 0.05 L;

$n(Bi^{3+}) = C*V1$;

$n(Bi^{3+}) = 3.5*10^{-4}$ mol;

Then $n(BiPO4) = 3.5*10^{-4}$ mol;

m(BiPO4) = M(BiPO4)*n(BiPO4);

<u>m(BiPO4) = 0.1064 g;</u>