

Answer on Question #55917 - Chemistry - General chemistry

Question:

a procedure similar to that described in this experiment can be used to precipitate Cl^- as AgCl a sample containing chloride weighing 0.207g was precipitated with Ag^+ and the AgCl produced weighed 0.472g.

calculate the mass percent of Cl^- in the original sample

Solution:

The mass of AgCl is 0.472 g. Let's calculate the number of the moles of AgCl (molar mass of AgCl is 143.32 g/mol):

$$n(\text{AgCl}) = \frac{m(\text{AgCl})}{M(\text{AgCl})} = \frac{0.472 \text{ g}}{143.32 \frac{\text{g}}{\text{mol}}} = 3.29 \cdot 10^{-3} \text{ mol}$$

As one can notice from the formula of AgCl , the number of the moles of Cl^- and AgCl are equal (quantity of AgCl molecules and quantity of Cl^- ions are the same). Then, using the number of the moles of Cl^- , we can calculate the mass of Cl^- :

$$n(\text{AgCl}) = n(\text{Cl})$$

$$m(\text{Cl}) = n(\text{Cl}) \cdot M(\text{Cl}) = 3.29 \cdot 10^{-3} \cdot 35.45 = 0.117 \text{ g}$$

Then, one can calculate the mass percent of the chloride in the sample:

$$\omega(\text{Cl}) = \frac{m(\text{Cl})}{m(\text{sample})} \cdot 100\% = \frac{0.117}{0.207} \cdot 100\% = 57.0\%$$

Answer: 57%