

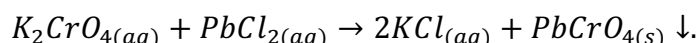
Answer on the question #63487, Chemistry / General Chemistry

Question:

In the reaction $K_2CrO_4(aq) + PbCl_2(aq) \rightarrow 2KCl(aq) + PbCrO_4(s)$, how many grams of $PbCrO_4$ will precipitate out from the reaction between 25.0 millilitres of 3.0 M K_2CrO_4 in an excess of $PbCl_2$?

Solution:

Let's write the reaction equation:



As we see from the stoichiometry of the equation, in condition that there is an excess of lead chloride $PbCl_{2(aq)}$, and thus potassium chromate $K_2CrO_{4(aq)}$ is the limiting reagent, the number of the moles of lead chromate $PbCrO_{4(s)}$ is equal to the number of the moles of potassium chromate :

$$n(PbCrO_{4(s)}) = n(K_2CrO_{4(aq)}).$$

The number of the moles of potassium chromate is the product of the volume and the concentration of its solution:

$$n(K_2CrO_{4(aq)}) = cV = 3.0(M) \cdot 25.0 \cdot 10^{-3}(L) = 7.5 \cdot 10^{-2}mol.$$

$$n(PbCrO_{4(s)}) = 7.5 \cdot 10^{-2}mol$$

The mass of lead chromate is the product of the number of the moles $n(PbCrO_{4(s)})$ and molar mass $M(PbCrO_{4(s)})$:

$$\begin{aligned} m(PbCrO_{4(s)}) &= n(PbCrO_{4(s)}) \cdot M(PbCrO_{4(s)}) = 7.5 \cdot 10^{-2}(mol) \cdot 323.2(g \text{ mol}^{-1}) \\ &= 24.24 g \end{aligned}$$

Answer: 24.24 g