Lower Merion High School Chemistry

Determination of K_{sp} for $PbCl_2$ Lab #30

During this lab you will be finding the K_{sp} of $PbCl_2$ (a somewhat soluble compound).

You will take a measured amount of a saturated solution of $PbCl_2$ and react it with a solution of KI. This will allow the reaction $PbCl_2 + 2\ KI \rightarrow PbI_2 + 2\ KCl$ to occur. Since PbI_2 is extremely insoluble, virtually all of the PbI_2 that could form does…in other words almost every atom of Pb ends up on the bottom of the beaker as PbI_2.

This means that if we measure the amount of PbI_2 produced we can calculate the amount of Pb that was in the original saturated solution of $PbCl_2$. From that information we can calculate K_{sp} of $PbCl_2$.

Materials:

400 mL beaker	filter paper	funnel
balance	saturated PbCl2 solution	KI solution
extra beaker	wash bottle with deionized water	

Procedure:

Obtain a piece of filter paper and label it with your name(s) in PENCIL. Weigh the labeled paper. Obtain a 400-mL beaker. Clean it, dry it, label it and weigh it.

Obtain 100 mL of saturated $PbCl_2$ solution. Record the exact volume. Obtain approximately 100 ml of KI solution. Mix the two solutions together in the beaker.

Allow the mixture to settle for a few minutes and then filter it through your filter paper into another beaker. Discard the filtrate (the liquid that comes through). Do your best to get all of the liquid out of the beaker. Do not worry about getting all of the solid out of the beaker.

Carefully transfer the filter paper from the funnel to the pre-weighed beaker (with the excess stuff in it). Wash out the waste beaker and the funnel (NOT the pre-weighed beaker with extra solid in it!) and put them away.

After allowing the filter paper and beaker to dry in the oven overnight, weigh them. Discard the filter paper and clean out and put away the beaker.

Calculations:

Determine the total mass of PbI_2 produced in the reaction. Convert to moles.

Determine the moles of Pb ions that were in the original solution. Determine the $[Pb^{+2}]$ in the original solution.

Calculate the $[Cl^{-1}]$ in the original solution.

Calculate Ksp.