Experiment 9   Name _____

Pre Laboratory Problems

1. Calculate the molar masses of the following compounds.
    a. strontium chloride, hexahydrate, $SrCl_2 \cdot 6H_2O$,

    b. sodium phosphate dodecahydrate, $Na_3PO_4 \cdot 12H_2O$ and

    c. Strontium phosphate $Sr_3(PO_4)_2$

2. When a hydrated salt dissolves in water, what happens to the water in the salt and what happens to the ionic compound (salt)?

3. What is the overall balanced reaction when an aqueous solution of $SrCl_2$ reacts with an aqueous solution of Na_3PO_4?

4. 2.000 g of $Na_3PO_4 \cdot 12H_2O$ is reacted with 2.000 g of $SrCl_2 \cdot 6H_2O$, calculate the theoretical yield of $Sr_3(PO_4)_2$ precipitate.

    a. Calculate the theoretical moles of $Sr_3(PO_4)_2$ produced from 2.000 g of $Na_3PO_4 \cdot 12H_2O$ if we assume that the strontium chloride salt is in excess.

    b. Calculate the theoretical moles of $Sr_3(PO_4)_2$ produced from 2.000 g of $SrCl_2 \cdot 6H_2O$ again assuming that the sodium phosphate is in excess

    c. A limiting reactant will be completely consumed; thereby, producing the smallest amount of product as calculated above.   Which reactant produces the smallest theoretical yield?

    d. Which compound above is the limiting reactant?

e. What is the theoretical yield (mass) of $Sr_3(PO_4)_2$ produced from the limiting reactant?

5. In the procedure, the filtrate is tested with the two test reagents (1 M $SrCl_2$ and 1 M Na_3PO_4), what does it mean if the test tube treated with 1 M $SrCl_2$ reagent shows a precipitate?

6. A 1.500 g sample of a mixture of solid $Na_3PO_4 \cdot 12H_2O$ mixed with NaCl, was dissolved in water, reacted with aqueous 1 M $SrCl_2$ and 0.520 g $Sr_3(PO_4)_2$ precipitate was collected and dried to a constant mass. If the reagent tests demonstrated that $Na_3PO_4 \cdot 12H_2O$ was the limiting reactant in the precipitation reaction, show how to calculate the mass percent of $Na_3PO_4 \cdot 12H_2O$ in the original sample.

    a. From the given mass, how many moles of $Sr_3(PO_4)_2$ were produced?

    b. From the balanced chemical reaction, what is reacting to produce the $Sr_3(PO_4)_2$ precipitate? Which reactant is the limiting reactant from the information given?

    c. How many moles of Na_3PO_4 were present in the aqueous solution?

    d. If the moles of Na_3PO_4 are equivalent to the moles of $Na_3PO_4 \cdot 12H_2O$, what is the theoretical mass of $Na_3PO_4 \cdot 12H_2O$ in the solid mixture?

    e. What is the mass percent of sodium phosphate dodecahydrate in the solid mixture?

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