

Bottle Bewilderment Application

Problem:

Knowing the names of six colorless solutions, but not their order of distribution, how can one identify the contents of these mysteriously labeled bottles?

Materials:

0.1 M ammonium sulfate, $(\text{NH}_4)_2\text{SO}_4$
0.1 M lead (II) acetate, $\text{Pb}(\text{C}_2\text{H}_3\text{O}_2)_2$
0.1 M potassium iodide, KI
0.1 M silver nitrate, AgNO_3
0.1 M mercury (II) chloride, HgCl_2
0.1 M sodium hydroxide, NaOH
spot plates
30 mL dropper bottles
solubility table
Handbook of Chemistry and Physics

Hazard Warnings:

Wear safety goggles for this entire experiment. Consult your instructor on how to properly dispose of these chemicals.

Procedure:

Imagine you are a chemistry teacher (a frightening thought), and you've just made up six solutions placing them in bottles labeled A - F. Yikes!!!! You forgot to do one thing. You did not write down which solution was placed in each bottle! Panic stricken, you desperately try to remember what you did, but to no avail. Then suddenly you realize that you are a pretty tricky chemistry teacher. Since your class had just finished a unit on equation writing, you decided to shift the burden to them.

Knowing that all of the solutions are colorless and that tasting is out of the question, you will probably need to investigate how these solutions might react with each other. For this, you will need to consult your textbook and the **Handbook of Chemistry and Physics**. Before venturing into the laboratory, determine some organized way of presenting your predicted results so that you can easily compare them with your actual results.

Your written report should include a concise account of your working plan, the procedure followed and the evidence for each identification. Good luck and work carefully.

Summing Up:

1. List the identities of solutions A through F. Completely explain how your answers were decided upon.
2. Write chemical equations for all reactions that occurred.

3. Write net ionic equations for all of the insoluble products.
4. Compare predicted results with your actual results. Comment on differences and similarities.