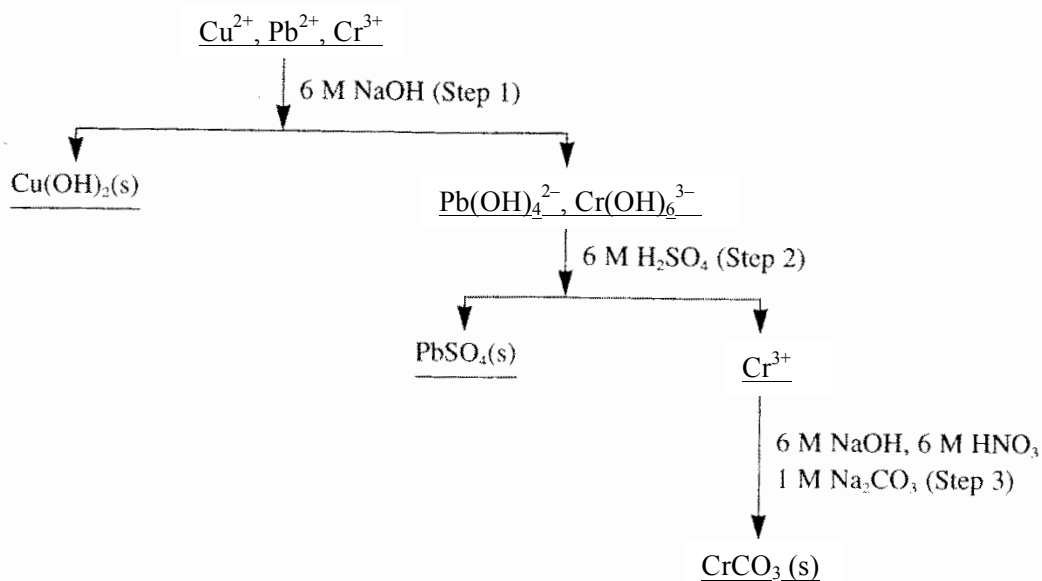


Introduction to Qualitative Analysis

Development of a Scheme for Qualitative Analysis

Qualitative analysis schemes can be summarized by flow diagrams. The flow diagram for a scheme that might be used to analyze a mixture that could contain Cu^{2+} , Pb^{2+} , and Cr^{2+} is shown below:



The meaning of the flow diagram is almost obvious. In the first step, 6 M NaOH is added in excess, $\text{Cu}(\text{OH})_2$ precipitates, and Pb^{2+} and Cr^{3+} remain in solution because of the formation of the hydroxo complex ions. $\text{Cu}(\text{OH})_2$ is removed by centrifuging. In Step 2 the solution is made acidic with H_2SO_4 and PbSO_4 precipitates after the complex is destroyed by the H^+ ion in the acid. PbSO_4 is removed by centrifuging. In Step 3 pH control is used to bring the pH to about 7. Then addition of Na_2CO_3 precipitates CrCO_3 .

Practice

Construct the flow diagram in the space below for the separation scheme containing Ag^+ , Ni^{2+} , and Zn^{2+} . The steps in the procedure are as follows:

- Step 1.** Add 6 M HCl to precipitate Ag^+ as AgCl . Ni^{2+} and Zn^{2+} are not affected. Centrifuge out the AgCl .
- Step 2.** Add 6 M NaOH in excess, precipitating $\text{Ni}(\text{OH})_2(\text{s})$ and converting Zn^{2+} into $\text{Zn}(\text{OH})_4^{2-}$ complex ion. Centrifuge out the $\text{Ni}(\text{OH})_2$.
- Step 3.** Neutralize the solution with 6 M HCl to pH = 7. Add 1 M Na_2CO_3 , precipitating ZnCO_3 .