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A White Ammonia Fountain

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In the preparation of our chemical magic show[1] we wished to produce three simultaneous ammonia fountains; one red, one white, and one blue. The red and blue colors were easy to produce: phenolphthalein and thymolphthalein gave the desired colors in the basic ammonia solution; however, the white color was not so easily produced. We could think of no suitable acid-base indicators that would produce a white color, so we turned our attention to precipitation reactions. We finally decided that aqueous lead[II] nitrate when exposed to gaseous ammonia would produce the desirable white color of lead[II] hydroxide. However, the concentration of the lead[II] nitrate is rather critical. Too dilute a solution produces a faint white color and too concentrated a solution produces an undesirable curdy precipitate. After much experimentation it was found that a 0.02 *M* solution of $Pb[NO_3]_2$, when mixed with the gaseous ammonia in the ammonia fountain, produced a finely divided precipitate of $Pb[OH]_2$ that would not settle out too rapidly. This proved to be quite suitable for our presentation. Extra flair was added to the experiment by using miniature American flags and playing a recording of the "Stars and Stripes Forever." This was done to keep the mood of the presentation light and thus increase student enjoyment.

This concept of precipitation (or perhaps complex ion formation) with the ammonia fountain could be expanded to show the colors of other national flags or perhaps school colors. It could also be the basis of a discussion of the alkaline characteristics of ammonia.

[1] Moore, John T., and Cates, Charles R., "A Traveling Chemistry Magic Show," *Programs for High Schools—A Local Section Activity Book*, American Chemical Society, 21–22, **1980.**

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