

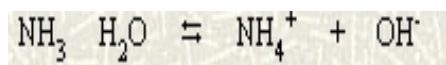
Chemistry 101

Chemistry Experiments for the Home

A Precipitation Reaction

I. Objective: To mix a solution of Epsom salt and ammonia water and observe the resulting chemical change.

II. Discussion: An Epsom salt solution and an ammonia water solution will react to form a precipitate. **Precipitates** are solid products that are not soluble in water. That is why they seem to appear out of nowhere when some chemical reactions occur. The description of a precipitate ranges from faintly cloudy to large clumps of matter. Epsom salt (magnesium sulfate) dissociates into its ions, Mg^{+2} and SO_4^{-2} , when added to water. Ammonia water is mainly ammonia dissolved in water. But the ammonia and water molecules can react with each other to form ammonium ions (NH_4^{+1}) and hydroxide ions (OH^{-1}). This is an equilibrium reaction.



Aqueous solutions of these two ionic compounds, when mixed together result in a **double replacement reaction**, i.e., a reaction in which the two compounds switch ionic partners. One of the new compounds formed is magnesium hydroxide, which is insoluble in water. The equation representing this is:



The particles of magnesium hydroxide are relatively small, and the reaction mixture must be allowed to sit overnight in order for this precipitate to settle out.

III. Materials: Measuring cup, Epsom salt, ammonia water, plastic teaspoon, plastic cup.

IV. Procedure:

Dissolve 1 teaspoon of Epsom salt in about $\frac{1}{2}$ cup of water.

Make sure you have on eye protection. Ammonia water should be used in a well-ventilated area. Add 2 teaspoons of ammonia water to the solution of Epsom salt. Stir the mixture thoroughly. Do you observe any change occurring?

Allow the mixture to stand undisturbed overnight.

Dispose of the liquids in the sink and rinse thoroughly with water. The solid may be placed in a waste container.

V. Questions:

What evidence do you have that Epsom salt and ammonia water underwent a chemical reaction?

What did you observe in the cup after the mixture sat overnight?

Predict the products of the reaction between ammonium carbonate and copper(II) nitrate. Write a balanced equation for this reaction.

What are some criteria that you look for in deciding if a chemical reaction has occurred?