ACTIVITY 2– MORE CHEMICAL CHANGES

Background Information

When you have a chemical reaction, you have a chemical change. Recall that a chemical change is the process that changes materials into new materials.

Chemical reactions that occur in solutions usually involve ions. For example, if you combine silver nitrate and sodium chloride solutions you get a precipitate of silver chloride. But if you combine sodium hydrogen carbonate with hydrochloric acid, you instead get carbon dioxide gas:

$$H_3O^+(aq) + HCO_3^-(aq) \longrightarrow H_2CO_3(aq) + H_2O \longrightarrow CO_2(g) + 2H_2O$$

Generally, solutions of carbonates, bicarbonates, sulfides, sulfites and hydrogen sulfites will yield gas when you mix them with strong acids like hydrochloric acid.

You can predict which solutions will form precipitates if you consult a solubility product table. It is simpler to gain familiarity with the general solubility rules for aqueous solutions:

1. All nitrates, acetates, chlorates, and perchlorates are soluble.
2. All common compounds of alkali metals are soluble.
3. All salts containing ammonium ions are soluble.
4. All chlorides, bromides, and iodide salts are soluble with the exception of those combined with silver, lead or mercurous (Hg_2^{2+}) cations.
5. All sulfates are soluble except those of lead, mercury, barium, strontium, and calcium (note that calcium sulfate is slightly soluble).
6. The normal carbonates, phosphates, silicates, and sulfides are insoluble with the exception of the alkali metals and ammonium ions.
7. All hydroxides and all metal oxides are insoluble with exception of the alkali metals, ammonium, calcium, barium, and strontium ions.

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