



Seeing Is Believing!



Topic: Alkali metal properties, Exothermic reactions, Heterogeneous reactions, Enthalpy

Courses: General Chemistry

Text References:

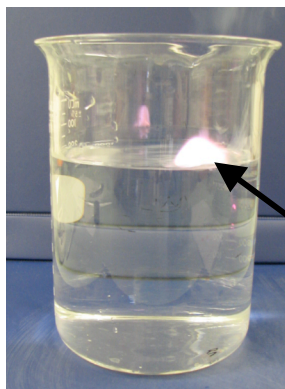
Setup: Preparation time is < 5 minutes.

- Water
- Phenolphthalein
- Two thermometers
- Two beakers
- Sodium (Na) metal
- Potassium (K) metal

Procedure:

1. Add water, 1-2 drops of phenolphthalein, and a thermometer to each beaker.
2. Add a small amount of sodium metal to the second beaker. Observe.
3. Add a small amount of potassium metal to the first beaker. Observe.

Observation: Bubbles form in both solutions. The temperature of each solution increases. Both solutions turn pink. All observations should be more pronounced for the addition of potassium than for the addition of sodium. Potassium metal may even ignite and smoke.



Flame from addition
of potassium metal

Explanation: The chemical reaction responsible for the formation of the bubbles and the pink color is $M(s) + H_2O(l) \rightarrow 2 MOH(aq) + H_2(g)$. (M represents the metal, Na or K.) The bubbles are hydrogen gas, and the pink color indicates the formation of a basic solution (MOH(aq)). The reactions are exothermic, meaning they give off heat. Therefore, the temperature of the solution increases when the metals are added. The periodic trend is for reactivity to increase as you move down the alkali metal group. Potassium is more reactive than sodium. So for each observable, the results are more pronounced in the potassium reaction than in the sodium reaction.