

Safety:

safety glasses



The Soester List recommends using a replacement for potassium whenever possible due to safety and reactivity issues.

DO NOT TOUCH alkali metals bare-handed! Some can react with the water found on your skin. Disposable surgical gloves and tweezers are recommended.

DO NOT USE more than TINY amounts (<2mm diameter pieces) of alkali metals or you are asking for an explosion and possible injury!

Instruments:

- 1 3-chambered Petri dish (3/3) or 3 single Petri dishes (1/1)
- 1 pair of scissors
- disposable surgical gloves
- 1 pair of tweezers
- 1 cutting board
- 1 knife
- cardboard (e.g. box from a package of chalk)
- glue/tape

Chemicals:

- lithium (H: 260-314; EUH: 014; P:223-231+232-280-305+351+338-370+378-422)
- sodium (H: 260-314; EUH: 014; P: 280-301+330+331-305+351+338-309-310-370-378-422)
- potassium (H: 260-314; EUH: 014; P:223-231+232-280-305+351+338-370+378-422)
- water
- phenolphthalein solution (H: 226-360-341; P: 201-210-233-281-308+313)
- dilute soap solution

Preparation:

Cover the insides and separating walls of the Petri dish with circa 2cm high protective cardboard strips and affix firmly. This helps keep the alkali metals from attacking and sticking to the walls. The partitioning walls also serve as splash guards.

Experiment:

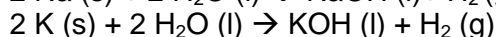
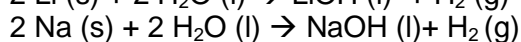
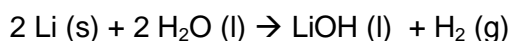
1. Put a little water into all three Petri dish chambers and place the dish under the exhaust hood as a precaution.
2. Drip one drop of phenolphthalein solution and several drops of soap solution into each chamber.
3. Carefully place a very small piece (**maximum** diameter circa **2 mm**) of lithium in the first chamber using the tweezers.
4. Repeat the process in the second and third chambers, substituting sodium and potassium. **Maximum** diameter circa **2mm or you are asking for a possible explosion and injury!**

Observations:

The vigor of the alkali metal's reaction with water follows the order $\text{Li} < \text{Na} < \text{K}$. All three chambers show a color change to reddish-purple and the visible emission of a gaseous product. Potassium reacts violently enough to evidence sparks of light and a quickly-spinning metal particle.

Results:

This reaction produces hydrogen gas and an alkali by-product, which is shown by the color change given by the indicator in solution (by pH 0 - 8,2 phenolphthalein is colorless, at pH > 8,2 it is reddish-purple). The reactive capability (violence of the reaction process) rises as you go down the periodic family from lithium to potassium ($\text{Li} < \text{Na} < \text{K}$).

**Disposal:**

Alkaline waste products can be diluted and disposed of accordingly.