COMMON REACTIONS

A small piece of potassium dropped into water will react explosively, releasing H_2 to form a strongly basic hydroxide solution. The energy of the reaction ignites the hydrogen gas that is produced.

With Water to Form Bases and Hydrogen Gas

Example: $2Na(s) + 2H_2O(l) \longrightarrow 2NaOH(aq) + H_2(g)$

Li, K, Rb, and Cs also follow this pattern.

With Acids to Form Salts and Hydrogen Gas

Example: $2Na(s) + 2HCl(aq) \longrightarrow 2NaCl(aq) + H_2(g)$

Li, K, Rb, and Cs also follow this pattern.

With Halogens to Form Salts

Example: $2Na(s) + F_2(g) \longrightarrow 2NaF(s)$

Li, K, Rb, and Cs also follow this pattern in reacting with F_2, Cl_2, Br_2, and I_2.

With Oxygen to Form Oxides, Peroxides, or Superoxides

Lithium forms an oxide.

$4Li(s) + O_2(g) \longrightarrow 2Li_2O(s)$

Sodium also forms a peroxide.

$2Na(s) + O_2(g) \longrightarrow Na_2O_2(s)$

Alkali metals with higher molecular masses can also form superoxides.

$K(s) + O_2(g) \longrightarrow KO_2(s)$

Rb and Cs also follow this pattern.

Sodium reacts vigorously with chlorine to produce NaCl. Most salts of Group 1 metals are white crystalline compounds.

Alkali-Metal Oxides with Water to Form Bases

Oxides of Na, K, Rb, and Cs can be prepared indirectly. These basic anhydrides form hydroxides in water.

Example: $K_2O(s) + H_2O(l) \longrightarrow 2KOH(aq)$

Li, Na, Rb, and Cs also follow this pattern.

ANALYTICAL TEST

Alkali metals are easily detected by flame tests because each metal imparts a characteristic color to a flame.

When sodium and potassium are both present in a sample, the yellow color of the sodium masks the violet color of the potassium. The violet color can be seen only when the combined sodium-potassium flame is viewed through a cobalt-blue glass. The glass blocks the yellow flame of sodium and makes it possible to see the violet flame of potassium.

Lithium

Sodium

Potassium

Rubidium

Cesium