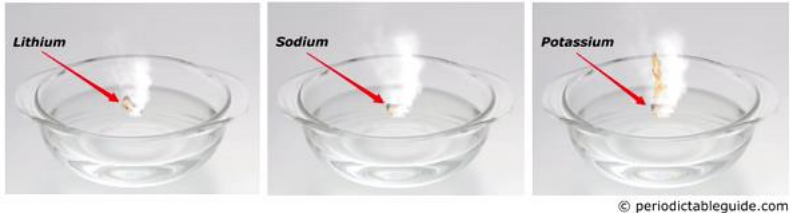


Reactivity of alkali metals ( $Li < Na < K < Rb < Cs < Fr$ )



## Potential Dangers

1. Alkali metals are highly reactive and violently decompose upon contact with water
2. Alkali metal fires cannot be extinguished with normal fire extinguishers
3. Some alkali metals even react with nitrogen gas.



## Lithium Accident

- 500 g of lithium foil was stored in nitrogen filled glovebox
- The foil reacted with the nitrogen atmosphere, generating heat and leading to the metal melting.
- The fire brigade was called and they safely removed the metal from the glovebox.
- The lithium was quenched in 70 gallon barrels being cooled by ice/snow.

## Working with Alkali Metals

- Always store alkali metals in mineral oil to prevent exposure to atmospheric moisture.
  - For use in a reaction cut the metal directly into a flask with hexanes to wash the mineral oil.
- Never use nitrogen as an inert gas when handling lithium. Argon must be used to prevent exothermic reactions with dinitrogen.
- In order to ensure a reactive surface of metal, it can be useful to cut small pieces of metal directly into a reaction vessel. Do this slowly to prevent a large exotherm.
- To quench alkali metals, cool the flask and then slowly add isopropanol, followed by methanol, and finally water. Let the quench stir overnight to ensure all the reactive metal is quenched.
  - Small amounts of lithium metal can be quenched by dropping into ice water.

## Preventing Accidents

- When working with alkali metals ensure there are no flammable materials nearby.
- Let coworkers know that you are working with a reactive metal.
- In the case of a small fire either let it burn out or smother it in sand.
- In the case of a large fire use a LithX fire extinguisher. A water or carbon dioxide based fire extinguisher will react with the alkali metal.

Resources:

<http://chem.sites.mtu.edu/tanasova/wp-content/uploads/2015/12/Alkali-Metal-SOP.pdf>  
<https://mrmes.mcmaster.ca/portal/specific-sops/li-and-na-metal-disposal>  
<https://ehs.stonybrook.edu/Sodium%20Handling%20and%20Disposal.pdf>  
<https://ethz.ch/content/dam/ethz/special-interest/chab/chab-dept/department/services/SU-Management/Safety%20Lecture/Safety%202018%20-%20Causes%20of%20Accidents%20in%20Recent%20Years.pdf>