

# INORGANIC CHEMISTRY

Fabrizia Lorenzini / Finals

## Hydrogen and Alkali metals, Reactions of Alkali Metals, and Anomalous Behavior of Lithium

### Alkali metals & Reactions of Alkali Metals

- Valence Electrons (es) is  $ns^1$ .
- Good conductors of heat and electricity.
- Low melting point, weak metallic bonding.

	Melting point	$\rho/\text{cm}^3$	Ionization E	Color of Flame	Nuclear Radii
Li	180°	0.53	↑    ↓ Increasing	crimson	↓    ↑ Decreasing
Na	98°	0.97		yellow	
K	64°	0.86		Red to blue	
Pb	39°	1.53		violet	
Cs	28°	1.90		blue	

### Hydrogen

- Most abundant element.
- Over 90% of all atoms in the universe are H atoms.
- 75% of all matter.
- Smallest and lightest element  $1e^-$ ,  $1p^+$  in a single atom of H called protium.

### Anomalous Behavior of Lithium, Cesium, and Rubidium

#### LITHIUM

- Abundant as spodumene,  $\text{LiAlSi}_2\text{O}_6$

#### CAESIUM

- Zeolite pollucite,  $\text{Cs}_2\text{Al}_2\text{Si}_4\text{O}_{22} \cdot n\text{H}_2\text{O}$

#### RUBIDIUM

- Can exist as lepidolite,  $\text{Li}_2(\text{F},\text{OH})_2 \text{Al}_2(\text{Si}_4)_4$

#### Rb & Cs

- Rb comes from the reduction of  $\text{RbOH}$  w/  $\text{Mg}$  &  $\text{H}_2$ .
- Cs comes from the reduction of  $\text{CsOH}$  w/  $\text{Mg}$  &  $\text{H}_2$ .
- They are denser than  $\text{H}_2\text{O}$ .
- Ignition is the shattering of  $\text{H}_2\text{O}$ .
- Absorb  $\text{H}_2\text{O}$  from the atmosphere.
- Exothermic rxn.

- White translucent solids.

#### Others



1. Li - gentle reaction
2. Na - vigorous
3. K - vigorous w/ ignition
4. Rb - explosive
5. Fr - highly reactive

#### Uses of Na & K

- Use as coolant of plants because of excellent thermal conductivity.
- Use as a mixture to produce amalgam w/ Hg.

### Group 1

#### Lithium (Li)

- "Lithos" means stone.
- Aircraft (ex. Airplane wings)
- Aerospace
- Batteries (3.3%)
- $\text{LiCaCo}_4$  - can treat bipolar conditions.
- Li stearate ( $\text{C}_{18}\text{H}_{35}\text{Li}_2$ )
- Lubricant in automotive industries.
- $\text{LiNbO}_3$  + Li tantalate - use in mobile communication devices.

#### Nitrogen & Potassium (N&K)

- Essential for physiology as  $\text{NaCl}$  - for flavoring of food.
- For road deicing and to break the ice.

#### Potassium (K)

- As  $\text{KOH}$  used to make soft liquid soap.
- As  $\text{KCl} + \text{K}_2\text{SO}_4$  use as fertilizer.
- As  $\text{KNO}_3 + \text{KClO}_3$  is used for fireworks and explosives.
- $\text{KBr}$  - use as anaphrodisiac to lessen sexual desire.
- $\text{KCN}$  - metal extraction.

#### Rubidium & Cesium (Rb & Cs)

- Use interchangeably.
- Use for glass fiber optics.
- [Cs] - international standard measure of time for definition of seconds and minutes.

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**Scott C. Dulebohn**



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