

Group 1 / IA; Alkali Group

The alkali group formally contains hydrogen (H) even so this element is not counted among the alkali metals and thus not listed below.

Potassium (K) and sodium (Na) are ubiquitous, while rubidium (Rb), lithium (Li) and cesium (Cs) are rarer. Francium (Fr) is radioactive and not found in nature. Altogether the alkali metals provide for about 5 % of the elements in the crust of the earth. They are very reactive and thus are never found in the elemental state

Alkali metals are very soft and have typically low melting points. They are rarely used in the elemental stage (liquid sodium is a coolant in some nuclear reactors) but are absolutely indispensable in compounds. Just consider rock salt (NaCl) or the potassium nitrate (KNO_3) in fertilizers. The lithium ion battery has a bright future, needing millions of tons of lithium for its production.

Table of Basic Data

| Name (German) | Lithium <i>Lithium</i> | Sodium <i>Natrium</i> | Potassium <i>Kalium</i> | Rubidium <i>Rubidium</i> | Cesium <i>Cäsium</i> | Francium <i>Francium</i> |
|------------------------------------|---------------------------|--------------------------|----------------------------|-----------------------------|-------------------------|-----------------------------|
| Atomic number | 3 | 11 | 19 | 37 | 55 | 87 |
| Atomic mass [u] | 6,94 | 22,99 | 39,10 | 85,47 | 132,91 | 223,02 |
| Melting point [K] | 453,69 | 370,95 | 336,8 | 312,2 | 301,55 | 300 |
| Melting point [°C] | 180,69 | 97,95 | 63,8 | 39,2 | 28,55 | 27 |
| Melting point [°F] | 357 | 208 | 147 | 102 | 83,4 | 81 |
| Boiling point [K] | 1590 | 1165 | 1047 | 961 | 963 | 950 |
| Density [g/cm ³] | 0,53 | 0,97 | 0,86 | 1,53 | 1,90 | ? |
| Ionization energy [eV] | 5,39 | 5,14 | 4,34 | 4,18 | 3,89 | 4,0 |
| Electro-negativity | 1,0 | 1,0 | 0,9 | 0,9 | 0,9 | 0,9 |
| Atomic radius [pm] | 155 | 153,7 | 227 | 247,5 | 265,5 | 270 |
| Oxidation numbers | 1 | 1 | 1 | 1 | 1 | 1 |
| Ionic radius [pm] | 78 | 98 | 133 | 149 | 165 | 180 |
| lattice typ Transformation | bcc | bcc | bcc | bcc | bcc | ? |

| | | | | | | |
|---|-------------------------|-------------|------|------|------|---|
| temp. [°C] | ? fcc -195 hcp | -237 fcc | | | | |
| Lattice constant [Å] (a or c) | 3,51 | 4,28 ? | 5,33 | 5,62 | 2,67 | ? |
| Young's - Modulus [GPa] | 11,5 | 8,93 | 3,53 | 2,35 | 1,47 | ? |
| Therm. expansion coefficient α [$10^{-6}K^{-1}$] | 46,6 | 72 | 83 | 90 | ? | ? |

- In case of doubt all numbers are for room temperatures
- fcc = [face centered cubic](#); lattice const. = a
- bcc = [body centered cubic](#)
- sc = [simple cubic](#)
- hp = simple [hexagonal](#)
- hcp = [hexagonal close packed](#); lattice constants a and c.
- op = [simple orthorhombic](#), [monoclinic](#), [triclinic](#)
- tp = [simple tetragonal](#)
- dia = [diamond structure](#)
- r = [trigonal](#) or rhomboedral trigonal