

0009 - Group 1 - The Alkali Metals

Lesson Objectives

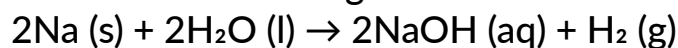
- To identify how the alkali metals behave in various conditions.
- To understand how the properties of the Group 1 elements change as you descend the group.

Course Notes

Alkali metals are found in Group 1 on the periodic table. They are highly reactive especially when reacting with water.



E.g.



Alkali metals will react with the air. This happens very quickly when an alkali metal is cut.

Alkali metals will also react strongly with water forming an alkali solution.

Lithium fizzes when reacting with water. This fizzing is the production of hydrogen gas.

Sodium fizzes and sometimes forms an orange/yellow flame. This is more vigorous than the reaction with Lithium.

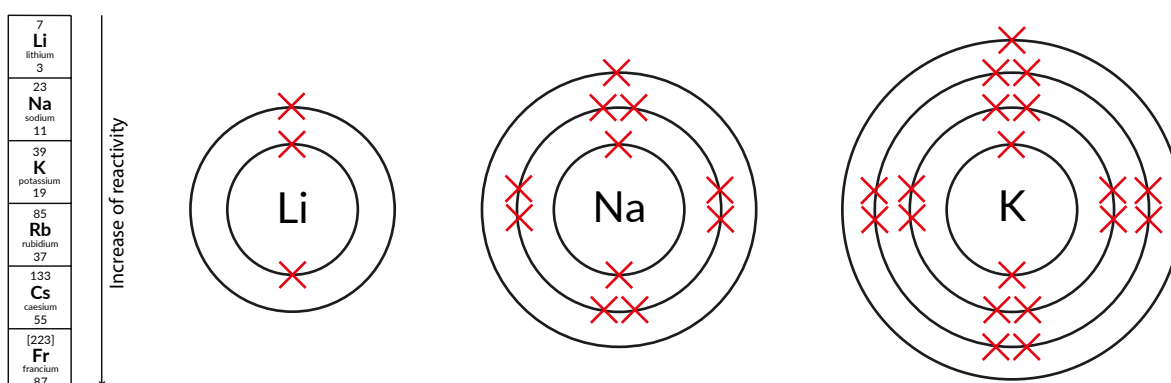
Potassium fizzes and forms a lilac flame. This is the most vigorous reaction of the three.

In each reaction hydrogen gas and an alkali solution are formed.

Patterns of Reactivity in Alkali Metals

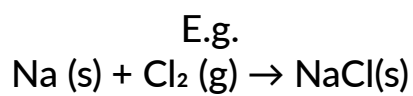
The reactivity of the alkali metals increases with the atomic number. They both increase as they go down the group.

Reactivity is due to having a single electron in their outer energy level or shell.



Alkali metals also react with chlorine gas to form metal chlorides:

Alkali Metal + Chlorine Gas → Metal Chloride





| 1 | 2 | | | | | | | | | | | 3 | 4 | 5 | 6 | 7 | 0 | | | | | | |
|--------------------------------------|------------------------------------|--|--|---------------------------------------|---|---------------------------------------|--------------------------------------|---|---|--|--|--|--|---|--|---|---------------------------------------|--|--|--|--|--|--|
| | | <div style="border: 1px solid black; padding: 5px; display: inline-block;"> 1 H hydrogen 1 </div> | | | | | | | | | | | | <div style="border: 1px solid black; padding: 5px; display: inline-block;"> 4 He helium 2 </div> | | | | | | | | | |
| | | <div style="border: 1px solid black; padding: 5px; display: inline-block;"> Key relative atomic mass Symbol name atomic (proton) number </div> | | | | | | | | | | | | | | | | | | | | | |
| 7 Li lithium 3 | 9 Be beryllium 4 | | | | | | | | | | | 11 B boron 5 | 12 C carbon 6 | 14 N nitrogen 7 | 16 O oxygen 8 | 19 F fluorine 9 | 20 Ne neon 10 | | | | | | |
| 23 Na sodium 11 | 24 Mg magnesium 12 | | | | | | | | | | | 27 Al aluminium 13 | 28 Si silicon 14 | 31 P phosphorus 15 | 32 S sulfur 16 | 35.5 Cl chlorine 17 | 40 Ar argon 18 | | | | | | |
| 39 K potassium 19 | 40 Ca calcium 20 | 45 Sc scandium 21 | 48 Ti titanium 22 | 51 V vanadium 23 | 52 Cr chromium 24 | 55 Mn manganese 25 | 56 Fe iron 26 | 59 Co cobalt 27 | 59 Ni nickel 28 | 63.5 Cu copper 29 | 65 Zn zinc 30 | 70 Ga gallium 31 | 73 Ge germanium 32 | 75 As arsenic 33 | 79 Se selenium 34 | 80 Br bromine 35 | 84 Kr krypton 36 | | | | | | |
| 85 Rb rubidium 37 | 88 Sr strontium 38 | 89 Y yttrium 39 | 91 Zr zirconium 40 | 93 Nb niobium 41 | 96 Mo molybdenum 42 | [98] Tc technetium 43 | 101 Ru ruthenium 44 | 103 Rh rhodium 45 | 106 Pd palladium 46 | 108 Ag silver 47 | 112 Cd cadmium 48 | 115 In indium 49 | 119 Sn tin 50 | 122 Sb antimony 51 | 128 Te tellurium 52 | 127 I iodine 53 | 131 Xe xenon 54 | | | | | | |
| 133 Cs caesium 55 | 137 Ba barium 56 | lanthanoids 57-71 | 178 Hf hafnium 72 | 181 Ta tantalum 73 | 184 W tungsten 74 | 186 Re rhenium 75 | 190 Os osmium 76 | 192 Ir iridium 77 | 195 Pt platinum 78 | 197 Au gold 79 | 201 Hg mercury 80 | 204 Tl thallium 81 | 207 Pb lead 82 | 209 Bi bismuth 83 | [209] Po polonium 84 | [210] At astatine 85 | [222] Rn radon 86 | | | | | | |
| [223] Fr francium 87 | [226] Ra radium 88 | actinoids 89-103 | [261] Rf rutherfordium 104 | [262] Db dubnium 105 | [266] Sg seaborgium 106 | [264] Bh bohrium 107 | [277] Hs hassium 108 | [268] Mt meitnerium 109 | [271] Ds darmstadtium 110 | [272] Rg roentgenium 111 | [285] Cn copernicium 112 | [286] Nh nihonium 113 | [289] Fl flerovium 114 | [289] Mc moscovium 115 | [293] Lv livermorium 116 | [294] Ts tennessine 117 | [294] Og oganeson 118 | | | | | | |
| 139 La lanthanum 57 | 140 Ce cerium 58 | 141 Pr praseodymium 59 | 144 Nd neodymium 60 | 145 Pm promethium 61 | 150 Sm samarium 62 | 152 Eu europium 63 | 157 Gd gadolinium 64 | 159 Tb terbium 65 | 163 Dy dysprosium 66 | 165 Ho holmium 67 | 167 Er erbium 68 | 169 Tm thulium 69 | 173 Yb ytterbium 70 | 175 Lu lutetium 71 | | | | | | | | | |
| [227] Ac actinium 89 | 232 Th thorium 90 | [231] Pa protactinium 91 | 238 U uranium 92 | [237] Np neptunium 93 | [242] Pu plutonium 94 | [243] Am americium 95 | [247] Cm curium 96 | [245] Bk berkelium 97 | [251] Cf californium 98 | [254] Es einsteinium 99 | [253] Fm fermium 100 | [256] Md mendelevium 101 | [254] No nobelium 102 | [257] Lr lawrencium 103 | | | | | | | | | |

