

Combined Science - Chemistry - Key Stage 4

Atomic Structure & the Periodic Table

# Comparing the reactivities of group 1 and 7

Dr Patel



# Periodic Table of Elements

Key:

relative atomic mass →

Atomic symbol ←

Name →

Atomic (proton number) ←

1 <b>H</b> hydrogen 1																	4 <b>He</b> helium 2				
7 <b>Li</b> lithium 3	9 <b>Be</b> beryllium 4															11 <b>B</b> boron 5	12 <b>C</b> carbon 6	14 <b>N</b> nitrogen 7	16 <b>O</b> oxygen 8	19 <b>F</b> fluorine 9	20 <b>Ne</b> neon 10
23 <b>Na</b> sodium 11	24 <b>Mg</b> magnesium 12															27 <b>Al</b> aluminium 13	28 <b>Si</b> silicon 14	31 <b>P</b> phosphorus 15	32 <b>S</b> sulfur 16	35.5 <b>Cl</b> chlorine 17	40 <b>Ar</b> argon 18
39 <b>K</b> potassium 19	40 <b>Ca</b> calcium 20	45 <b>Sc</b> scandium 21	48 <b>Ti</b> titanium 22	51 <b>V</b> vanadium 23	52 <b>Cr</b> chromium 24	55 <b>Mn</b> manganese 25	56 <b>Fe</b> iron 26	59 <b>Co</b> cobalt 27	59 <b>Ni</b> nickel 28	63.5 <b>Cu</b> copper 29	65 <b>Zn</b> zinc 30	70 <b>Ga</b> gallium 31	73 <b>Ge</b> germanium 32	75 <b>As</b> arsenic 33	79 <b>Se</b> selenium 34	80 <b>Br</b> bromine 35	84 <b>Kr</b> krypton 36				
85 <b>Rb</b> rubidium 37	88 <b>Sr</b> strontium 38	89 <b>Y</b> yttrium 39	91 <b>Zr</b> zirconium 40	93 <b>Nb</b> niobium 41	96 <b>Mo</b> molybdenum 42	[97] <b>Tc</b> technetium 43	101 <b>Ru</b> ruthenium 44	103 <b>Rh</b> rhodium 45	106 <b>Pd</b> palladium 46	108 <b>Ag</b> silver 47	112 <b>Cd</b> cadmium 48	115 <b>In</b> indium 49	119 <b>Sn</b> tin 50	122 <b>Sb</b> antimony 51	128 <b>Te</b> tellurium 52	127 <b>I</b> iodine 53	131 <b>Xe</b> xenon 54				
133 <b>Cs</b> caesium 55	137 <b>Ba</b> barium 56	139 <b>La*</b> lanthanum 57	178 <b>Hf</b> hafnium 72	181 <b>Ta</b> tantalum 73	184 <b>W</b> tungsten 74	186 <b>Re</b> rhenium 75	190 <b>Os</b> osmium 76	192 <b>Ir</b> iridium 77	195 <b>Pt</b> platinum 78	197 <b>Au</b> gold 79	201 <b>Hg</b> mercury 80	204 <b>Tl</b> thallium 81	207 <b>Pb</b> lead 82	209 <b>Bi</b> bismuth 83	[209] <b>Po</b> polonium 84	[210] <b>At</b> astatine 85	[222] <b>Rn</b> radon 86				
[223] <b>Fr</b> francium 87	[226] <b>Ra</b> radium 88	[227] <b>Ac*</b> actinium 89	[267] <b>Rf</b> rutherfordium 104	[270] <b>Db</b> dubnium 105	[269] <b>Sg</b> seaborgium 106	[270] <b>Bh</b> bohrium 107	[270] <b>Hs</b> hassium 108	[278] <b>Mt</b> meitnerium 109	[281] <b>Ds</b> darmstadtium 110	[281] <b>Rg</b> roentgenium 87	[285] <b>Cn</b> copernicium 112	[286] <b>Nh</b> nihonium 113	[289] <b>Fl</b> flerovium 114	[289] <b>Mc</b> moscovium 115	[293] <b>Lv</b> livermorium 116	[293] <b>Ts</b> tennessine 117	[294] <b>Og</b> oganesson 118				



## Independent task

A student has written the following answer to **describe and explain** the reactivity of group 1 metals. However, they've made lots of mistakes. Can you correct them?

'As you go down group 1, reactivity decreases because it gets harder to gain an electron to the outer shell.

This is because as you go down group 1, the outer shell gets closer to the positive nucleus, meaning that there is a weaker force of attraction between the nucleus and the positive electrons on the inner shell.

There is also less electron shielding as you go down group 1, because there are more inner shell electrons, which repel the outer shell electron.

All of these reasons mean that as you go down group 1 the outer shell electron is harder to loose'



## Independent task

A student has written the following answer to **describe and explain** the reactivity of group 7 elements. However, they've made lots of mistakes. Can you correct them?

'As you go down group 7, reactivity increases because it gets harder to lose an electron from the outer shell.

This is because as you go down group 7, the outer shell gets closer to the positive nucleus, meaning that there is a stronger force of attraction between the nucleus and the positive electrons on the inner shell.

There is also less electron shielding as you go down group 1, because there are less inner shell electrons, to repel any incoming electrons to the outta shell.

All of these reasons mean that as you go down group 1, it is harder to lose an electron from the outer shell.



Reactivity increases

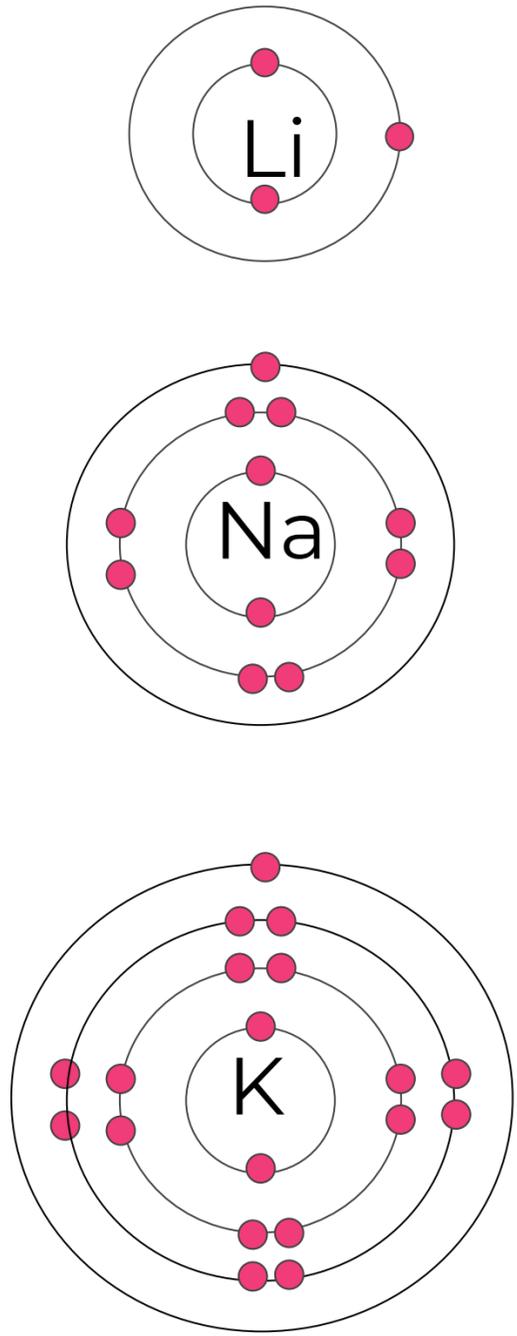


Image source Dr Patel

Group 1 only	Both	Group 7 only

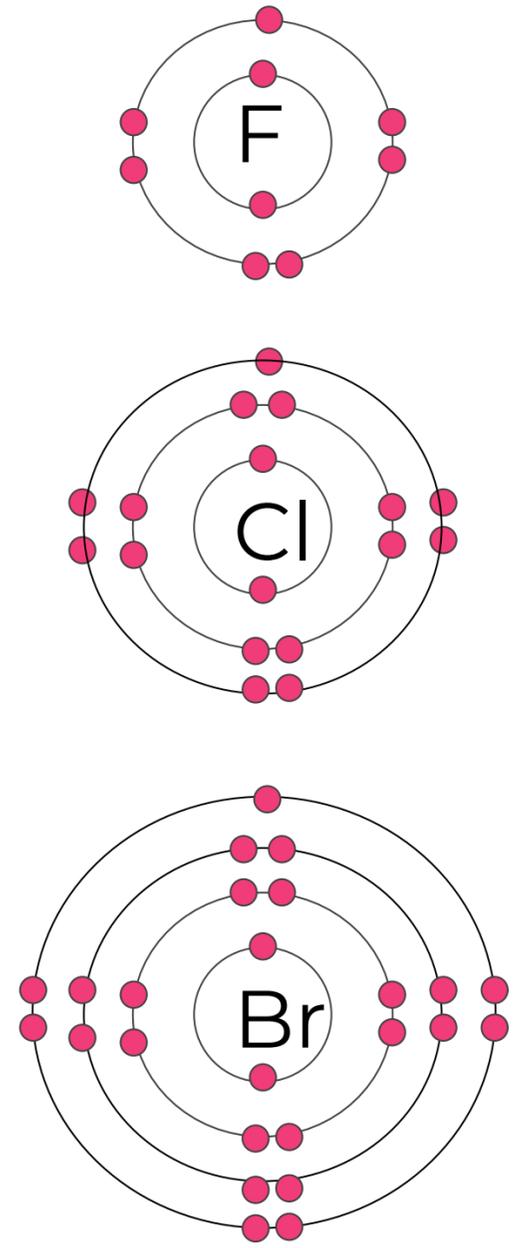
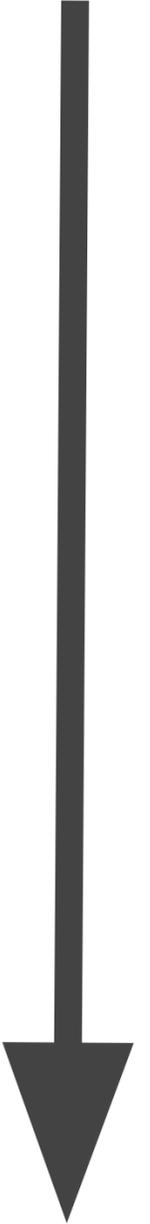


Image source Dr Patel

Reactivity decreases



## Independent practice

**Explain** why group 1 elements increase in reactivity as you go down the group, but group 7 elements decrease.

