

30 - The Periodic Table

The periodic table is an arrangement of elements in order of increasing atomic number.

The word periodic is used as the properties of the elements **repeat**.
e.g. Li, Na and K have similar properties.

The periodic table is made of **families** of elements.

Periodic Table of the Elements

The periodic table is color-coded by groups and families. The groups are labeled at the top: 1 IA, 2 IIA, 3-10 IIB-VIII, 11 IB, 12 IIB, 13 IIIA, 14 IVA, 15 VA, 16 VIA, 17 VIIA, 18 VIIIA. The families are labeled at the bottom: Alkali Metal, Alkaline Earth, Transition Metal, Heavy Metal, Semimetals, Nonmetals, Halogens, Noble Gas, Lanthanides, Actinides.

1 1IA H Hydrogen 1.00794	2 IIA He Helium 4.00260											13 IIIA B Boron 10.811	14 IVA C Carbon 12.011	15 VA N Nitrogen 14.007	16 VIA O Oxygen 15.999	17 VIIA F Fluorine 18.998	18 VIIIA Ne Neon 20.180	
3 Li Lithium 6.941	4 Be Beryllium 9.012											5 B Boron 10.811	6 C Carbon 12.011	7 N Nitrogen 14.007	8 O Oxygen 15.999	9 F Fluorine 18.998	10 Ne Neon 20.180	
11 Na Sodium 22.990	12 Mg Magnesium 24.305	3 IIIB Sc Scandium 44.956	4 IVB Ti Titanium 47.88	5 VB V Vanadium 50.942	6 VIB Cr Chromium 52.004	7 VIIB Mn Manganese 54.938	8 VIII Fe Iron 55.845	9 VIII Co Cobalt 58.933	10 VIII Ni Nickel 58.693	11 IB Cu Copper 63.546	12 IIB Zn Zinc 65.38	13 IIIA Al Aluminum 26.982	14 IVA Si Silicon 28.086	15 VA P Phosphorus 30.974	16 VIA S Sulfur 32.06	17 VIIA Cl Chlorine 35.45	18 VIIIA Ar Argon 39.948	
19 K Potassium 39.098	20 Ca Calcium 40.078	21 Sc Scandium 44.956	22 Ti Titanium 47.88	23 V Vanadium 50.942	24 Cr Chromium 52.004	25 Mn Manganese 54.938	26 Fe Iron 55.845	27 Co Cobalt 58.933	28 Ni Nickel 58.693	29 Cu Copper 63.546	30 Zn Zinc 65.38	31 Ga Gallium 69.723	32 Ge Germanium 72.64	33 As Arsenic 74.922	34 Se Selenium 78.96	35 Br Bromine 79.904	36 Kr Krypton 83.798	
37 Rb Rubidium 85.468	38 Sr Strontium 87.62	39 Y Yttrium 88.906	40 Zr Zirconium 91.224	41 Nb Niobium 92.906	42 Mo Molybdenum 95.94	43 Tc Technetium 98.906	44 Ru Ruthenium 101.07	45 Rh Rhodium 102.905	46 Pd Palladium 106.42	47 Ag Silver 107.868	48 Cd Cadmium 112.411	49 In Indium 114.818	50 Sn Tin 118.710	51 Sb Antimony 121.757	52 Te Tellurium 127.6	53 I Iodine 126.905	54 Xe Xenon 131.29	
55 Cs Cesium 132.905	56 Ba Barium 137.327	57-71 Lanthanide Series La Ce Pr Nd Pm Sm Eu Gd Tb Dy Ho Er Tm Yb Lu	72 Hf Hafnium 178.49	73 Ta Tantalum 180.948	74 W Tungsten 183.84	75 Re Rhenium 186.207	76 Os Osmium 190.23	77 Ir Iridium 192.222	78 Pt Platinum 195.084	79 Au Gold 196.967	80 Hg Mercury 200.59	81 Tl Thallium 204.387	82 Pb Lead 207.2	83 Bi Bismuth 208.980	84 Po Polonium 209	85 At Astatine 210	86 Rn Radon 222.018	
87 Fr Francium 223	88 Ra Radium 226	89-103 Actinide Series Ac Th Pa U Np Pu Am Cm Bk Cf Es Fm Md No Lr	104 Rf Rutherfordium 261	105 Db Dubnium 262	106 Sg Seaborgium 263	107 Bh Bohrium 264	108 Hs Hassium 265	109 Mt Meitnerium 266	110 Ds Darmstadtium 267	111 Rg Roentgenium 268	112 Cn Copernicium 269	113 Nh Nihonium 270	114 Uu Ununquadium 271	115 Uuq Ununpentium 272	116 Uup Ununhexium 273	117 Uuh Ununseptium 274	118 Uus Ununoctium 275	119 Uuo Ununennium 276

Families of Elements

Groups

- There are 8 main groups (across the top) in Roman numerals.
- All elements in each group have similar chemical properties.
- All elements in each **group** have the same number of **electrons** in their outer shell/orbit.

																	1 H HYDROGEN 1		2 He HELIUM 4	0							
n=1 PERIOD	I		II																		III	IV	V	VI	VII		
n=2 PERIOD	3 Li LITHIUM 7	4 Be BERYLLIUM 9																	5 B BORON 11	6 C CARBON 12	7 N NITROGEN 14	8 O OXYGEN 16	9 F FLUORINE 19	10 Ne NEON 20			
n=3 PERIOD	11 Na SODIUM 23	12 Mg MAGNESIUM 24																	13 Al ALUMINUM 27	14 Si SILICON 28	15 P PHOSPHORUS 31	16 S SULFUR 32	17 Cl CHLORINE 35	18 Ar ARGON 40			
n=4 PERIOD	19 K POTASSIUM 39	20 Ca CALCIUM 40	21 Sc SCANDIUM 45	22 Ti TITANIUM 48	23 V VANADIUM 51	24 Cr CHROMIUM 52	25 Mn MANGANESE 55	26 Fe IRON 56	27 Co COBALT 59	28 Ni NICKEL 59	29 Cu COPPER 63	30 Zn ZINC 65	31 Ga GALLIUM 70	32 Ge GERMANIUM 73	33 As ARSENIC 75	34 Se SELENIUM 79	35 Br BROMINE 80	36 Kr KRYPTON 84									
n=5 PERIOD	37 Rb RUBIDIUM 85	38 Sr STRONTIUM 88	39 Y YTIURIUM 89	40 Zr ZIRCONIUM 91	41 Nb NIOBIUM 93	42 Mo MOLYBDENUM 96	43 Tc TECHNETIUM 99	44 Ru RUTHENIUM 102	45 Rh RHODIUM 103	46 Pd PALLADIUM 107	47 Ag SILVER 108	48 Cd CADMIUM 112	49 In INDIUM 115	50 Sn TIN 119	51 Sb ANTIMONY 122	52 Te TELLURIUM 128	53 I IODINE 127	54 Xe XENON 131									
n=6 PERIOD	55 Cs CAESIUM 133	56 Ba BARIUM 137	57 La LANTHANUM 139	72 Hf HAFNIUM 179	73 Ta TANTALUM 181	74 W WOLFRAM 184	75 Re RHENIUM 186	76 Os OSMIUM 190	77 Ir IRIDIUM 193	78 Pt PLATINUM 195	79 Au GOLD 197	80 Hg MERCURY 201	81 Tl THALLIUM 204	82 Pb LEAD 207	83 Bi BISMUTH 209	84 Po POLONIUM 210	85 At ASTATINE 210	86 Rn RADON 222									
n=7 PERIOD	87 Fr FRANCIUM 223	88 Ra RADIUM 226	89 Ac ACTINIUM 227	104 Rf RUFORGIUM 261	105 Db DUBNIUM 262	106 Sg SEABORGIUM 263	107 Bh BOHRNIUM 262	108 Hs HASSIUM 265	109 Mt MEITNERIUM 266																		
		Alkali metals		Alkaline earth metals		Transition metals				Halogens		Noble (inert) gases															

I = Alkali Metals
 II = Alkaline earth metals
 Transition Metals
 VII = Halogens
 VIII or 0 = Nobel gases



More about the elements

Periods

There are **7** periods in the periodic table.

The first period only has Hydrogen and Helium.

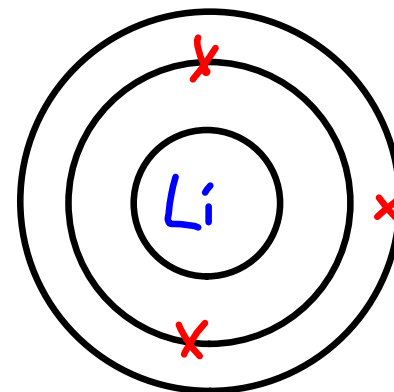
The second period contains Lithium to Neon.

The periods are labelled, **n=1**, n= 2, etc.

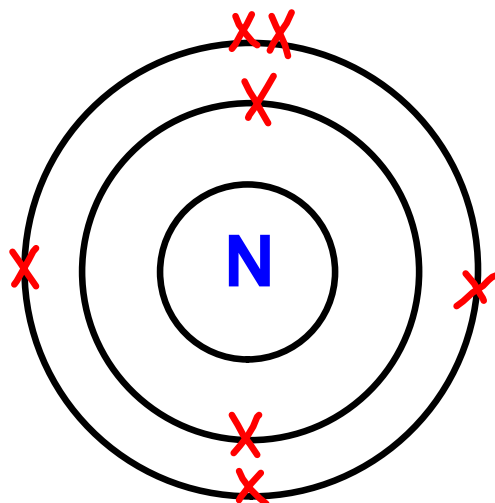
The number of a **period** is the same as the number of **shells**.

	I												III	IV	V	VI	VII	0														
n=1 PERIOD	3 Li LITHIUM 7		4 Be BERYLLIUM 9												5 B BORON 11	6 C CARBON 12	7 N NITROGEN 14	8 O OXYGEN 16	9 F FLUORINE 19	10 Ne NEON 20												
n=2 PERIOD	11 Na SODIUM 23		12 Mg MAGNESIUM 24												13 Al ALUMINIUM 27	14 Si SILICON 28	15 P PHOSPHORUS 31	16 S SULFUR 32	17 Cl CHLORINE 35	18 Ar ARGON 40												
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n=5 PERIOD	55 Cs CAESIUM 133	56 Ba BARIUM 137	57 La LANTHANUM 139	58 Ce CERBIUM 140	59 Pr PRASEODYMIUM 141	60 Nd NEODYMIUM 142	61 Pm PROMETHIUM 145	62 Sm SAMARIUM 150	63 Eu EUROPIUM 152	64 Gd GADOLINIUM 157	65 Tb TERBIUM 159	66 Dy DYSPROSIUM 163	67 Ho HOLMIUM 165	68 Er ERBIUM 167	69 Tm THULIUM 169	70 Yb YTERBIUM 173	71 Lu LUTETIUM 175	72 Hf HAFNIUM 178	73 Ta TANTALUM 181	74 W WOLFRAM 184	75 Re RHENIUM 186	76 Os OSMIUM 190	77 Ir IRIDIUM 193	78 Pt PLATINUM 195	79 Au GOLD 197	80 Hg QUECKSILBER 201	81 Tl THALLIUM 204	82 Pb LEAD 207	83 Bi BISMUTH 209	84 Po POLONIUM 210	85 At ASTATIN 210	86 Rn RADON 222
n=6 PERIOD	87 Fr FRANCIUM 223	88 Ra RADIUM 226	89 Ac ACTINIUM 227	90 Th THORIUM 232	91 Pa PROTAKTINIUM 231	92 U URANIUM 238	93 Np NEPTUNIUM 237	94 Pu PLUTONIUM 244	95 Am AMERICIUM 243	96 Cm CURIUM 247	97 Bk BERKELIUM 247	98 Cf CALIFORNIUM 251	99 Es EINSTEINIUM 252	100 Fm FERMIUM 257	101 Mendelevium 258	102 Nobelium 259	103 Livermorium 260	104 Tennessium 261	105 Oganesson 262	106 Bohrium 263	107 Hassium 264	108 Mt MEITNERIUM 266	109 Darmstadtium 265	110 Roentgenium 266	111 Copernicium 267	112 Nihonium 268	113 Flerovium 269	114 Moscovium 270	115 Livermorium 271	116 Tennessium 272	117 Oganesson 273	118 Oganesson 274

Alkali metals Alkaline earth metals Transition metals Halogens Noble (inert) gases



Bohr Diagrams



These diagrams are used to show the arrangement of electrons around a nucleus of an atom.

They also tell us what **Group** and **Period** the element belongs to.

e.g. **Nitrogen** has **5** electrons in its outer shell so it belongs to **Group 5**.

It also has **2** shells/orbits and so belongs to **Period** number **2** or we say '**n=2**'.

The **electron configuration** of an atom is written as follows,

e.g. N (Nitrogen) = (2, 5)

e.g. Cl (Chlorine) = (2,8,7)

Isotopes

Isotopes are atoms of the same element that have different numbers of neutrons.

Carbon 14 is used for finding out the age of some things.
It's called **Carbon Dating**.

