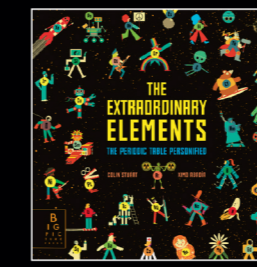


THE PERIODIC TABLE OF ELEMENTS

With well over one hundred elements, scientists organise them into groups based on the way they behave. This is called the periodic table. It is just one of several ways that the elements can be arranged, and makes navigating the building blocks of the Universe simpler. Each tile on this table represents one of the 118 elements that we know of so far, colour-coded into groups that have similar properties. Vertical columns in the table are known as 'groups' (numbered 1-18) with the mass of an atom increasing as you move down a group. Horizontal rows are known as 'periods' (labelled I - VII). Elements get heavier as you move from left to right along each period. A new electron shell is added each time you move down a period.

You may have noticed that the colour of some of the elements at the end of the table don't match any of the colours in the key. This is because they are so unstable they disappear in the blink of an eye after being created! This makes it incredibly difficult to study their properties and accurately identify which group they should belong to.



Discover more in The Extraordinary Elements © Big Picture Press 2020 Written by Colin Stuart, with illustrations by Kimo Abadia

KEY TO GROUPS:

- Alkali Metals
- Alkali-Earth Metals
- Transition Metals
- Post-Transition Metals
- Metalloids
- Reactive Non-metals
- Halogens
- Noble Gases
- Lanthanides
- Actinides

HOW TO USE THE TABLE:

- The average mass of the element's isotopes as found in nature.
- Atomic number, shows the number of protons present in the nucleus.
- Elements have a one or two letter symbol, to save space.
- The full name of the element.
- Description of the properties and uses that make the element's character.

1 1.008 H Hydrogen The element that fuels the majority of stars.	2 4.003 He Helium Lighter than air, this makes zeppelins float.																
3 6.94 Li Lithium Creates the red colour in fireworks.	4 9.012 Be Beryllium Used in weather monitoring satellites.	5 10.81 B Boron Used in armour plating and bulletproof vests.	6 12.011 C Carbon One arrangement creates pencil leads.	7 14.007 N Nitrogen Crucial to fertilisers used in crop growth.	8 15.999 O Oxygen Three minutes without oxygen is fatal.	9 18.998 F Fluorine Used in toothpaste and water sanitation.	10 20.18 Ne Neon Creates the iconic red glow of neon signs.	11 22.99 Na Sodium Used in baking as sodium bicarbonate.	12 24.305 Mg Magnesium A key component of chlorophyll in plants.	13 26.982 Al Aluminium Found in cars, cans and white paints.	14 28.085 Si Silicon A key material used in computer chips.	15 30.974 P Phosphorus Makes the flammable head of matches.	16 32.06 S Sulfur One of the fundamental elements in alchemy.	17 35.45 Cl Chlorine Used to clean pools and water sources.	18 39.95 Ar Argon Found in fluorescent and incandescent lighting.		
19 39.098 K Potassium Found in bananas and vital to human life.	20 40.078 Ca Calcium Medics use calcium sulfate as plaster.	21 44.956 Sc Scandium Used in lightweight sports equipment.	22 47.867 Ti Titanium Super strong and light, used in aircraft.	23 50.942 V Vanadium An alloy of vanadium is found in jet engines.	24 51.996 Cr Chromium Chromium compounds come in a rainbow of colours.	25 54.938 Mn Manganese Manganese pigments were used in cave paintings.	26 55.845 Fe Iron Super strong and found in red blood cells.	27 58.933 Co Cobalt Considered a 'spillover' by miners who often mistook it for silver.	28 58.693 Ni Nickel Found in electric guitar strings, creating a distinctive sound.	29 63.546 Cu Copper A good conductor of electricity, often found in wires.	30 1.008 Zn Zinc Combined with copper, this forms brass.	31 4.003 Ga Gallium Named after Gallia, the Latin name for France.	32 4.003 Ge Germanium Named after Germany and used in optical devices.	33 4.003 As Arsenic Infamously toxic and associated with many famous deaths.	34 4.003 Se Selenium The ingredient that makes skunk spray so potent.	35 4.003 Br Bromine Found in seawater and used in firefighter uniforms.	36 4.003 Kr Krypton A gas that shares a similar name to Superman's kryptonite.
37 85.468 Rb Rubidium An excellent detector of cancerous cells.	38 87.62 Sr Strontium A silvery metal often used in TV sets.	39 88.906 Y Yttrium Known as the 'oxygen thief' for dissolving oxygen.	40 91.224 Zr Zirconium Resistant to corrosion, this is often used in surgeons' tools.	41 92.906 Nb Niobium Named after the Greek goddess Niobe. Often found with tantalum.	42 95.95 Mo Molybdenum It is impossible to digest food without this.	43 98 Tc Technetium The first element to be manufactured by humans.	44 101.07 Ru Ruthenium Sourced in Russia, it is one of the rarest metals.	45 102.906 Rh Rhodium Named after the Greek word for 'rose' due to its pink hue.	46 106.42 Pd Palladium Named after Pallas, one of the largest asteroids.	47 107.868 Ag Silver One of the first precious metals often used in cameras.	48 112.414 Cd Cadmium Gives its name to cadmium pigments used in paint.	49 114.818 In Indium Important for touchscreen technology and LCDs.	50 118.71 Sn Tin In folklore, tin whistles are associated with witches.	51 121.76 Sb Antimony Used as black hole eyeliner in ancient Egypt.	52 127.6 Te Tellurium Named after the Latin word for 'Earth' and highly toxic.	53 126.904 I Iodine Discovered among seaweed, and essential to human diets.	54 131.293 Xe Xenon A common component used in gas that powers spacecraft engines.
55 132.905 Cs Caesium Atomic caesium clocks are the most accurate on Earth.	56 137.327 Ba Barium When swallowed, abnormalities on X-rays appear clearly.	57-71 Lanthanides	72 178.49 Hf Hafnium Useful for space rocket engines due to its high melting point.	73 180.948 Ta Tantalum Named after the unfortunate Greek god Tantalus.	74 183.84 W Tungsten The chemical symbol 'W' comes from the German word for wolf.	75 186.207 Re Rhenium Difficult to find, this is known as the 'invisible element'.	76 190.23 Os Osmium Used in pacemakers and replacement heart valves.	77 192.217 Ir Iridium Geologists use this to evidence mass extinction.	78 195.084 Pt Platinum An expensive metal is used in jewellery and dental fillings.	79 196.967 Au Gold One of the most desirable metals on Earth.	80 200.592 Hg Mercury Liquid at room temperature, suited for use in thermometers.	81 204.38 Tl Thallium Often used in infrared optics, such as night vision goggles.	82 207.2 Pb Lead This toxic element was used as makeup by Queen Elizabeth I.	83 208.98 Bi Bismuth Shimmering, pearl-like powder often found in cosmetics.	84 209 Po Polonium Its radioactive heat is used to power Mars rovers.	85 210 At Astatine Dangerously radioactive, and the rarest natural element.	86 222 Rn Radon Radiation from this element can damage DNA.
87 223 Fr Francium Discovered by French physicist, Marguerite Perey.	88 226 Ra Radium Its radiance was often used for glow-in-the-dark objects.	89-103 Actinides	104 267 Rf Rutherfordium Named after Ernest Rutherford, who studied atomic structure.	105 268 Db Dubnium Named after Russian town Dubna, home to Joint Institute for Nuclear Research.	106 269 Sg Seaborgium Named after Glenn Seaborg, who in part discovered ten transuranic elements.	107 270 Bh Bohrium Named after physicist Niels Bohr who studied atomic structure.	108 269 Hs Hassium Named for the German state of Hesse where the Heavy Ion Research centre is based.	109 278 Mt Meitnerium Named after the Austrian physicist Lise Meitner.	110 281 Ds Darmstadtium Named after Darmstadt, Germany, where the element was first produced.	111 280 Rg Roentgenium Named after German physicist Wilhelm Conrad Röntgen.	112 285 Cn Copernicium Named after the Renaissance scientist Nicolaus Copernicus.	113 286 Nh Nihonium The name refers to the Japanese name for Japan.	114 289 Fl Flerovium Named after Georgiy Flerov who founded the Joint Institute for Nuclear Research.	115 289 Mc Moscovium Its name refers to Moscow, where the Joint Institute of Nuclear Research is based.	116 293 Lv Livermorium Named after the Lawrence Livermore National Laboratory, USA.	117 294 Ts Tennessine The name refers to the US state of Tennessee.	118 294 Og Oganesson Named for Russian nuclear physicist Yuri Oganesson.

There are so many elements in two periods (VI and VII) that a group from each of these periods has been moved to the bottom of the table to stop it becoming too wide. This makes it much easier to fit onto posters just like this one! The groups that are moved to the bottom are called the lanthanides and actinides (named after the first element in each group).

57 138.905 La Lanthanum Extensively used in cinema projectors.	58 140.116 Ce Cerium This sparks when heated and is therefore used in lighters.	59 140.908 Pr Praseodymium A key ingredient in some lamps used by film studios.	60 144.242 Nd Neodymium Neodymium alloy magnets are the strongest in the world.	61 145 Pm Promethium Named after Prometheus, who stole fire in Greek mythology.	62 150.36 Sm Samarium Used to motor the first solar-powered plane.	63 151.964 Eu Europium Used in printing euro bank notes to prevent counterfeiting.	64 157.25 Gd Gadolinium Found in components used in nuclear reactors.	65 158.925 Tb Terbium The control rods in nuclear submarines are made of this.	66 162.5 Dy Dysprosium Commonly used for wind turbine engines.	67 164.93 Ho Holmium Named after Stockholm, it has the highest magnetic strength.	68 167.259 Er Erbium Commonly used in fibre optic cables to amplify broadband.	69 168.934 Tm Thulium Discovered in Uiking heartland, and named by Per Teodor Cleve.	70 173.045 Yb Ytterbium Named after Ytterby, where four elements were found.	71 174.967 Lu Lutetium Named after Lutetia, the Latin word for Paris.
89 227 Ac Actinium This rare element glows blue in the dark.	90 232.038 Th Thorium Named after Thor, Norse god of war and thunder.	91 231.036 Pa Protactinium Useful for various geological processes.	92 238.029 U Uranium Named after the planet Uranus, used in nuclear weapons.	93 237 Np Neptunium Named after the planet Neptune, can spontaneously catch fire.	94 244 Pu Plutonium Named after the planet Pluto and used as fuel for robotic spacecraft.	95 243 Am Americium Named after the Americas, used in smoke detectors.	96 247 Cm Curium Named after Pierre and Marie Curie who researched radioactivity.	97 247 Bk Berkelium Named after Berkeley, the Californian city where it was discovered.	98 251 Cf Californium Also discovered at Berkeley, and used in some cancer treatments.	99 252 Es Einsteinium Named in honour of Albert Einstein and incredibly rare.	100 257 Fm Fermium Named after Enrico Fermi, who designed the first nuclear reactor.	101 258 Md Mendelevium Named after Dmitri Mendeleev, father of the periodic table.	102 259 No Nobelium Named after Alfred Nobel, the creator of the Nobel Prize.	103 262 Lr Lawrencium Named after American physicist Ernest Lawrence.

This group of elements are super heavy (hence the heavy metal reference) they are difficult to produce, dangerous and unstable so they have few practical uses outside of research.

SUPER HEAVY ELEMENTS