

## Metals and Nonmetals

### Order of Elements in the Periodic Table

Scientists arrange the elements in a table called the periodic table. So, what is the periodic table?

The Periodic Table: It consists of squares arranged in horizontal rows called **periods** and vertical columns called **groups**. Each square contains information about an element, including its name, chemical symbol, and the number of protons that distinguishes it from other elements.

1 H Hydrogen 1.008																	2 He Helium 4.002
3 Li Lithium 6.94	4 Be Beryllium 9.012											5 B Boron 10.81	6 C Carbon 12.011	7 N Nitrogen 14.007	8 O Oxygen 15.999	9 F Fluorine 18.998	10 Ne Neon 20.179
11 Na Sodium 22.989	12 Mg Magnesium 24.305											13 Al Aluminum 26.981	14 Si Silicon 28.085	15 P Phosphorus 30.973	16 S Sulfur 32.055	17 Cl Chlorine 35.453	18 Ar Argon 39.948
19 K Potassium 39.098	20 Ca Calcium 40.078	21 Sc Scandium 44.955	22 Ti Titanium 47.867	23 V Vanadium 50.941	24 Cr Chromium 51.996	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 72.63	33 As Arsenic 74.921	34 Se Selenium 78.971	35 Br Bromine 79.904	36 Kr Krypton 83.798
37 Rb Rubidium 85.467	38 Sr Strontium 87.62	39 Y Yttrium 88.905	40 Zr Zirconium 91.224	41 Nb Niobium 92.906	42 Mo Molybdenum 95.94	43 Tc Technetium (98)	44 Ru Ruthenium 101.07	45 Rh Rhodium 102.905	46 Pd Palladium 106.42	47 Ag Silver 107.868	48 Cd Cadmium 112.414	49 In Indium 114.818	50 Sn Tin 118.71	51 Sb Antimony 121.757	52 Te Tellurium 127.6	53 I Iodine 126.904	54 Xe Xenon 131.29
55 Cs Cesium 132.905	56 Ba Barium 137.327	57-71 Lanthanide	72 Hf Hafnium 178.49	73 Ta Tantalum 180.947	74 W Tungsten 183.84	75 Re Rhenium 186.207	76 Os Osmium 190.23	77 Ir Iridium 192.227	78 Pt Platinum 195.084	79 Au Gold 196.966	80 Hg Mercury 200.592	81 Tl Thallium 204.385	82 Pb Lead 207.2	83 Bi Bismuth 208.98	84 Po Polonium (209)	85 At Astatine (210)	86 Rn Radon (222)
87 Fr Francium (223)	88 Ra Radium (226)	89-103 Actinide	104 Rf Rutherfordium (261)	105 Db Dubnium (262)	106 Sg Seaborgium (263)	107 Bh Bohrium (264)	108 Hs Hassium (277)	109 Mt Meitnerium (278)	110 Ds Darmstadtium (281)	111 Rg Roentgenium (282)	112 Cn Copernicium (285)	113 Nh Nihonium (284)	114 Fl Flerovium (289)	115 Mc Moscovium (288)	116 Lv Livermorium (293)	117 Ts Tennessine (294)	118 Og Oganesson (294)
57 La Lanthanum 138.905	58 Ce Cerium 140.116	59 Pr Praseodymium 140.907	60 Nd Neodymium 144.242	61 Pm Promethium (145)	62 Sm Samarium 150.36	63 Eu Europium 151.964	64 Gd Gadolinium 157.25	65 Tb Terbium 158.925	66 Dy Dysprosium 162.5	67 Ho Holmium 164.930	68 Er Erbium 167.259	69 Tm Thulium 168.934	70 Yb Ytterbium 173.054	71 Lu Lutetium 174.967			
89 Ac Actinium (227)	90 Th Thorium 232.037	91 Pa Protactinium 231.036	92 U Uranium 238.028	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 Md Mendelevium (288)	102 No Nobelium (289)	103 Lr Lawrencium (260)			

Elements in the same group have similar physical and chemical properties, and these properties repeat periodically in each period. That's why it's called the periodic table.

### Metals and Their Properties

Metals are located on the left and middle of the periodic table (except for hydrogen).

											H												He
Li	Be												B	C	N	O	F	Ne					
Na	Mg												Al	Si	P	S	Cl	Ar					
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr						
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe						
Cs	Ba	La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn						
Fr	Ra	Ac																					

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### Properties of Metals:

1. Metals are solid at room temperature (except for mercury, which is liquid).
2. Metals are shiny.
3. Metals are malleable and ductile, meaning they can be hammered into sheets or drawn into wires. For example, aluminum foil used for food packaging and copper wires.
4. Metals are good conductors of heat. When you touch a metal spoon, it feels warm after stirring hot food. Metals vary in their ability to conduct heat, with aluminum and iron being good conductors. That's why they are used in cookware.
5. Metals are good conductors of electricity. Metals can pass electric current in a closed electrical circuit. Metals also vary in their ability to conduct electricity, with copper and silver being good conductors. That's why copper is used in electrical wires.

### Nonmetals and Their Properties

Nonmetals are located on the right side of the periodic table.

																						H												He
Li	Be																									B	C	N	O	F	Ne			
Na	Mg																									Al	Si	P	S	Cl	Ar			
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr																	
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe																	
Cs	Ba	La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn																	
Fr	Ra	Ac																																

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### Properties of Nonmetals:

1. Nonmetals can be solid, liquid, or gas at room temperature. For example:
  - Phosphorus ( $P_4$ ) and iodine ( $I_2$ ) are solid.
  - Bromine ( $Br_2$ ) is liquid.
  - Most nonmetals are in the gas state, such as oxygen ( $O_2$ ) and nitrogen ( $N_2$ ).
2. Nonmetals are not shiny.
3. Nonmetals are not malleable or ductile. When nonmetals in solid form are struck, they crumble.
4. Nonmetals are poor conductors of heat and electricity. Despite carbon being a nonmetal, it is a conductor of electricity.

### Uses of Nonmetals:

- Phosphorus is used in the production of fertilizers and matchstick heads. It is also required by the human body in limited quantities and obtained from seafood, chicken, and nuts.
- Chlorine is used in water disinfection tablets and bleach.

### Metalloids and Their Properties

There are elements that separate metals and nonmetals in the periodic table. These elements share common properties with both metals and nonmetals and are called metalloids.

**Metalloids:** They are a group of elements that share some properties with metals and others with nonmetals.

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Metalloids are solid at room temperature. Silicon (Si) and germanium (Ge) are examples of metalloids. They are known for their ability to conduct electricity, so they are used in the production of electronic devices.