

## 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	2																	3	4	5	6	7	8	9	10
H Hydrogen 1.008	He Helium 4.002																	B Boron 10.811	C Carbon 12.011	N Nitrogen 14.007	O Oxygen 15.999	F Fluorine 18.998	Ne Neon 20.179		
3	4																	13	14	15	16	17	18		
Li Lithium 6.941	Be Beryllium 9.012																	Al Aluminum 26.981	Si Silicon 28.085	P Phosphorus 30.973	S Sulfur 32.065	Cl Chlorine 35.453	Ar Argon 39.948		
11	12																	31	32	33	34	35	36		
Na Sodium 22.990	Mg Magnesium 24.305																	Ga Gallium 69.723	Ge Germanium 72.63	As Arsenic 74.921	Se Selenium 78.971	Br Bromine 79.904	Kr Krypton 83.798		
19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36								
K Potassium 39.098	Ca Calcium 40.078	Sc Scandium 44.955	Ti Titanium 47.867	V Vanadium 50.941	Cr Chromium 51.996	Mn Manganese 54.938	Fe Iron 55.845	Co Cobalt 58.933	Ni Nickel 58.693	Cu Copper 63.546	Zn Zinc 65.38	Ga Gallium 69.723	Ge Germanium 72.63	As Arsenic 74.921	Se Selenium 78.971	Br Bromine 79.904	Kr Krypton 83.798								
37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54								
Rb Rubidium 85.467	Sr Strontium 87.62	Y Yttrium 88.906	Zr Zirconium 91.224	Nb Niobium 92.906	Mo Molybdenum 95.94	Tc Technetium (98)	Ru Ruthenium 101.07	Rh Rhodium 102.905	Pd Palladium 106.42	Ag Silver 107.868	Cd Cadmium 112.414	In Indium 114.818	Sn Tin 118.71	Sb Antimony 121.757	Te Tellurium 127.6	I Iodine 126.905	Xe Xenon 131.29								
55	56	57-71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86								
Cs Cesium 132.905	Ba Barium 137.327	Lanthanides	Hf Hafnium 178.49	Ta Tantalum 180.947	W Tungsten 183.84	Re Rhenium 186.207	Os Osmium 190.23	Ir Iridium 192.222	Pt Platinum 195.084	Au Gold 196.966	Hg Mercury 200.592	Tl Thallium 204.38	Pb Lead 207.2	Bi Bismuth 208.98	Po Polonium (209)	At Astatine (210)	Rn Radon (222)								
87	88	89-103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118								
Fr Francium (223)	Ra Radium (226)	Actinides	Rf Rutherfordium (261)	Db Dubnium (262)	Sg Seaborgium (263)	Bh Bohrium (264)	Hs Hassium (265)	Mt Meitnerium (266)	Ds Darmstadtium (267)	Rg Roentgenium (268)	Cn Copernicium (284)	Nh Nihonium (285)	Fl Flerovium (289)	Mc Moscovium (290)	Lv Livermorium (293)	Ts Tennessine (294)	Og Oganesson (294)								
72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89								
La Lanthanum 138.905	Ce Cerium 140.116	Pr Praseodymium 140.907	Nd Neodymium 144.242	Pm Promethium (145)	Sm Samarium 150.36	Eu Europium 151.964	Gd Gadolinium 157.25	Tb Terbium 158.925	Dy Dysprosium 162.5	Ho Holmium 164.930	Er Erbium 167.259	Tm Thulium 168.934	Yb Ytterbium 173.054	Lu Lutetium 174.967	89	90	91								
89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106								
Ac Actinium (227)	Th Thorium 232.037	Pa Protactinium 231.036	U Uranium 238.028	Np Neptunium (237)	Pu Plutonium (244)	Am Americium (243)	Cm Curium (247)	Bk Berkelium (247)	Cf Californium (251)	Es Einsteinium (252)	Fm Fermium (257)	Md Mendelevium (258)	No Nobelium (259)	Lr Lawrencium (260)	92	93	94								

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	<i>minhaji.net</i>																														

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### Properties of Nonmetals:

- 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 ( $N_2$ ).
- Nonmetals are not shiny.
- Nonmetals are not malleable or ductile. When nonmetals in solid form are struck, they crumble.
- 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.

- أشباه الفلزات -

1 H Hydrogen																	2 He Helium																												
3 Li Lithium	4 Be Beryllium																	10 Ne Neon																											
11 Na Sodium	12 Mg Magnesium																	18 Ar Argon																											
19 K Potassium	20 Ca Calcium	21 Sc Scandium	22 Ti Titanium	23 V Vanadium	24 Cr Chromium	25 Mn Manganese	26 Fe Iron	27 Co Cobalt	28 Ni Nickel	29 Cu Copper	30 Zn Zinc	31 Ga Gallium	32 Ge Germanium	33 As Arsenic	34 Se Selenium	35 Br Bromine	36 Kr Krypton																												
37 Rb Rubidium	38 Sr Strontium	39 Y Yttrium	40 Zr Zirconium	41 Nb Niobium	42 Mo Molybdenum	43 Tc Technetium	44 Ru Ruthenium	45 Rh Rhodium	46 Pd Palladium	47 Ag Silver	48 Cd Cadmium	49 In Indium	50 Sn Tin	51 Sb Antimony	52 Te Tellurium	53 I Iodine	54 Xe Xenon																												
55 Cs Cesium	56 Ba Barium	57 La Lanthanum	72 Hf Hafnium	73 Ta Tantalum	74 W Tungsten	75 Re Rhenium	76 Os Osmium	77 Ir Iridium	78 Pt Platinum	79 Au Gold	80 Hg Mercury	81 Tl Thallium	82 Pb Lead	83 Bi Bismuth	84 Po Polonium	85 At Astatine	86 Rn Radon																												
87 Fr Francium	88 Ra Radium	89 Ac Actinium	104 Rf Rutherfordium	105 Db Dubnium	106 Sg Seaborgium	107 Bh Bohrium	108 Hs Hassium	109 Mt Meitnerium	110 Ds Darmstadtium	111 Rg Roentgenium	112 Cn Copernicium	113 Nh Nihonium	114 Fl Flerovium	115 Mc Moscovium	116 Lv Livermorium	117 Ts Tennessine	118 Og Oganesson																												
<table border="1" style="width: 100%; border-collapse: collapse;"> <tbody> <tr> <td>58 Ce Cerium</td> <td>59 Pr Praseodymium</td> <td>60 Nd Neodymium</td> <td>61 Pm Promethium</td> <td>62 Sm Samarium</td> <td>63 Eu Europium</td> <td>64 Gd Gadolinium</td> <td>65 Tb Terbium</td> <td>66 Dy Dysprosium</td> <td>67 Ho Holmium</td> <td>68 Er Erbium</td> <td>69 Tm Thulium</td> <td>70 Yb Ytterbium</td> <td>71 Lu Lutetium</td> </tr> <tr> <td>90 Th Thorium</td> <td>91 Pa Protactinium</td> <td>92 U Uranium</td> <td>93 Np Neptunium</td> <td>94 Pu Plutonium</td> <td>95 Am Americium</td> <td>96 Cm Curium</td> <td>97 Bk Berkelium</td> <td>98 Cf Californium</td> <td>99 Es Einsteinium</td> <td>100 Fm Fermium</td> <td>101 Md Mendelevium</td> <td>102 No Nobelium</td> <td>103 Lr Lawrencium</td> </tr> </tbody> </table>																		58 Ce Cerium	59 Pr Praseodymium	60 Nd Neodymium	61 Pm Promethium	62 Sm Samarium	63 Eu Europium	64 Gd Gadolinium	65 Tb Terbium	66 Dy Dysprosium	67 Ho Holmium	68 Er Erbium	69 Tm Thulium	70 Yb Ytterbium	71 Lu Lutetium	90 Th Thorium	91 Pa Protactinium	92 U Uranium	93 Np Neptunium	94 Pu Plutonium	95 Am Americium	96 Cm Curium	97 Bk Berkelium	98 Cf Californium	99 Es Einsteinium	100 Fm Fermium	101 Md Mendelevium	102 No Nobelium	103 Lr Lawrencium
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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.