

16%
Periodic Table
Session 1

Migma Tshering

Periodic Table of the Elements

1 IA 1 H Hydrogen 1.008 1	2 IIA 3 Li Lithium 6.94 3	4 Be Beryllium 9.0122 4											13 IIIA 5 B Boron 10.81 5	14 IVA 6 C Carbon 12.011 6	15 VA 7 N Nitrogen 14.007 7	16 VIA 8 O Oxygen 15.999 8	17 VIIA 9 F Fluorine 18.998 9	18 VIIIA 10 Ne Neon 20.180 10																	
11 Na Sodium 22.98976928 11	12 Mg Magnesium 24.305 12	13 Al Aluminium 26.982 2-8-3	14 Si Silicon 28.085 2-8-4	15 P Phosphorus 30.974 2-8-5	16 S Sulfur 32.06 2-8-6	17 Cl Chlorine 35.45 2-8-7	18 Ar Argon 39.948 2-8-8											19 K Potassium 39.0983 19	20 Ca Calcium 40.078 2-8-8-2	21 Sc Scandium 44.955908 2-8-9-2	22 Ti Titanium 47.867 2-8-9-2	23 V Vanadium 50.9415 2-8-9-2	24 Cr Chromium 51.9961 2-8-9-3	25 Mn Manganese 54.938044 2-8-9-5	26 Fe Iron 55.845 2-8-9-6	27 Co Cobalt 58.933 2-8-9-7	28 Ni Nickel 58.693 2-8-9-8	29 Cu Copper 63.546 2-8-9-10	30 Zn Zinc 65.38 2-8-9-10	31 Ga Gallium 69.723 2-8-9-11	32 Ge Germanium 72.630 2-8-9-12	33 As Arsenic 74.922 2-8-9-13	34 Se Selenium 78.971 2-8-9-14	35 Br Bromine 79.904 2-8-9-17	36 Kr Krypton 83.798 2-8-9-18
37 Rb Rubidium 85.4678 2-8-18-8-1	38 Sr Strontium 87.62 2-8-18-8-2	39 Y Yttrium 88.90584 2-8-18-9-2	40 Zr Zirconium 91.224 2-8-18-10-2	41 Nb Niobium 92.90637 2-8-18-10-1	42 Mo Molybdenum 95.95 2-8-18-10-1	43 Tc Technetium (98) 2-8-18-10-2	44 Ru Ruthenium 101.07 2-8-18-10-1	45 Rh Rhodium 102.91 2-8-18-10-1	46 Pd Palladium 106.42 2-8-18-10	47 Ag Silver 107.87 2-8-18-10-1	48 Cd Cadmium 112.41 2-8-18-10-2	49 In Indium 114.82 2-8-18-10-3	50 Sn Tin 118.71 2-8-18-10-4	51 Sb Antimony 121.76 2-8-18-10-5	52 Te Tellurium 127.60 2-8-18-10-4	53 I Iodine 126.90 2-8-18-10-5	54 Xe Xenon 131.29 2-8-18-10-6																		
55 Cs Caesium 132.90545196 2-8-18-10-6-1	56 Ba Barium 137.327 2-8-18-10-6-2	57-71 Lanthanides	72 Hf Hafnium 178.49 2-8-18-10-10-2	73 Ta Tantalum 180.94788 2-8-18-10-11-2	74 W Tungsten 183.84 2-8-18-10-10-2	75 Re Rhenium 186.21 2-8-18-10-10-2	76 Os Osmium 190.23 2-8-18-10-10-2	77 Ir Iridium 192.22 2-8-18-10-10-2	78 Pt Platinum 195.08 2-8-18-10-10-1	79 Au Gold 196.97 2-8-18-10-10-1	80 Hg Mercury 200.59 2-8-18-10-10-2	81 Tl Thallium 204.38 2-8-18-10-10-3	82 Pb Lead 207.2 2-8-18-10-10-4	83 Bi Bismuth 208.98 2-8-18-10-10-5	84 Po Polonium (209) 2-8-18-10-10-6	85 At Astatine (210) 2-8-18-10-10-7	86 Rn Radon (222) 2-8-18-10-10-8																		
87 Fr Francium (223) 2-8-18-10-10-6-1	88 Ra Radium (226) 2-8-18-10-10-6-2	89-103 Actinides	104 Rf Rutherfordium (261) 2-8-18-10-10-10-2	105 Db Dubnium (268) 2-8-18-10-10-10-2	106 Sg Seaborgium (269) 2-8-18-10-10-10-2	107 Bh Bohrium (270) 2-8-18-10-10-10-2	108 Hs Hassium (277) 2-8-18-10-10-10-2	109 Mt Meitnerium (278) 2-8-18-10-10-10-2	110 Ds Darmstadtium (285) 2-8-18-10-10-10-1	111 Rg Roentgenium (282) 2-8-18-10-10-10-2	112 Cn Copernicium (285) 2-8-18-10-10-10-2	113 Nh Nihonium (284) 2-8-18-10-10-10-3	114 Fl Flerovium (289) 2-8-18-10-10-10-4	115 Mc Moscovium (288) 2-8-18-10-10-10-5	116 Lv Livermorium (293) 2-8-18-10-10-10-6	117 Ts Tennessine (294) 2-8-18-10-10-10-7	118 Og Oganesson (294) 2-8-18-10-10-10-8																		
57 La Lanthanum 138.91 2-8-18-10-1-2	58 Ce Cerium 140.12 2-8-18-10-1-2	59 Pr Praseodymium 140.91 2-8-18-10-1-2	60 Nd Neodymium 144.24 2-8-18-10-1-2	61 Pm Promethium (145) 2-8-18-10-1-2	62 Sm Samarium 150.36 2-8-18-10-1-2	63 Eu Europium 151.96 2-8-18-10-1-2	64 Gd Gadolinium 157.25 2-8-18-10-1-2	65 Tb Terbium 158.93 2-8-18-10-1-2	66 Dy Dysprosium 162.50 2-8-18-10-1-2	67 Ho Holmium 164.93 2-8-18-10-1-2	68 Er Erbium 167.26 2-8-18-10-1-2	69 Tm Thulium 168.93 2-8-18-10-1-2	70 Yb Ytterbium 173.05 2-8-18-10-1-2	71 Lu Lutetium 174.97 2-8-18-10-1-2																					
89 Ac Actinium (227) 2-8-18-10-10-1-2	90 Th Thorium 232.04 2-8-18-10-10-1-2	91 Pa Protactinium 231.04 2-8-18-10-10-1-2	92 U Uranium 238.03 2-8-18-10-10-1-2	93 Np Neptunium (237) 2-8-18-10-10-1-2	94 Pu Plutonium (244) 2-8-18-10-10-1-2	95 Am Americium (243) 2-8-18-10-10-1-2	96 Cm Curium (247) 2-8-18-10-10-1-2	97 Bk Berkelium (247) 2-8-18-10-10-1-2	98 Cf Californium (251) 2-8-18-10-10-1-2	99 Es Einsteinium (252) 2-8-18-10-10-1-2	100 Fm Fermium (257) 2-8-18-10-10-1-2	101 Md Mendelevium (258) 2-8-18-10-10-1-2	102 No Nobelium (259) 2-8-18-10-10-1-2	103 Lr Lawrencium (260) 2-8-18-10-10-1-2																					

Atomic Number → 13
 Symbol ← Al
 Name → Aluminium
 Atomic Weight ← 26.982
 Electrons per shell → 2-8-3

State of matter (color of name)
 GAS LIQUID SOLID UNKNOWN

Subcategory in the metal-metalloid-nonmetal trend (color of background)
 ■ Alkali metals ■ Lanthanides ■ Metalloids ■ Unknown chemical properties
 ■ Alkaline earth metals ■ Actinides ■ Reactive nonmetals
 ■ Transition metals ■ Post-transition metals ■ Noble gases

Learning Objectives

Modern Periodic Table

- Arrangement of Elements
- Periods and Groups (*Name of some groups*)

WHY Modern Periodic Table?

- **To Study the elements with ease**
- **To Discover new elements**

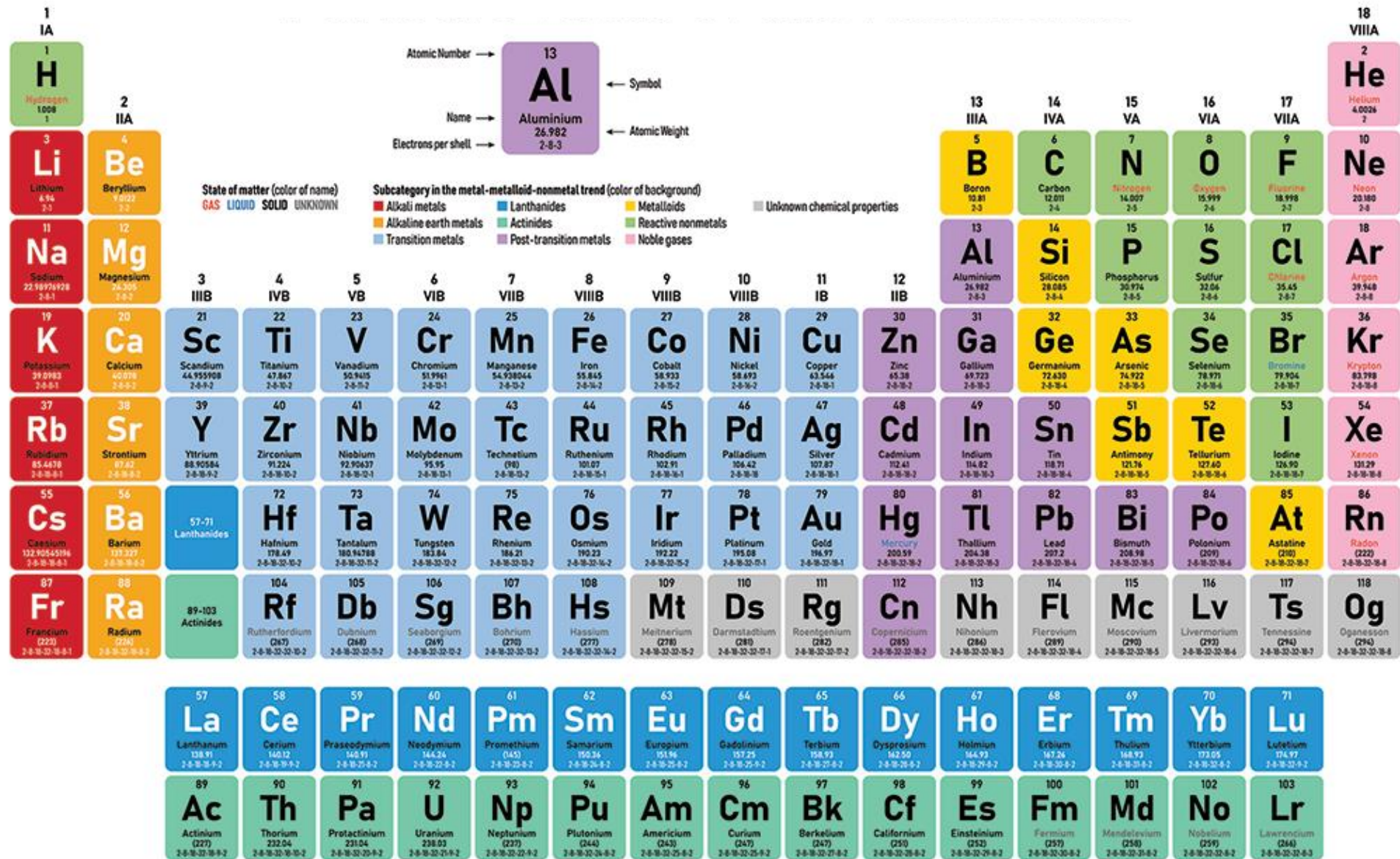
Arrangement of Elements

- **Increasing order of ATOMIC NUMBER**

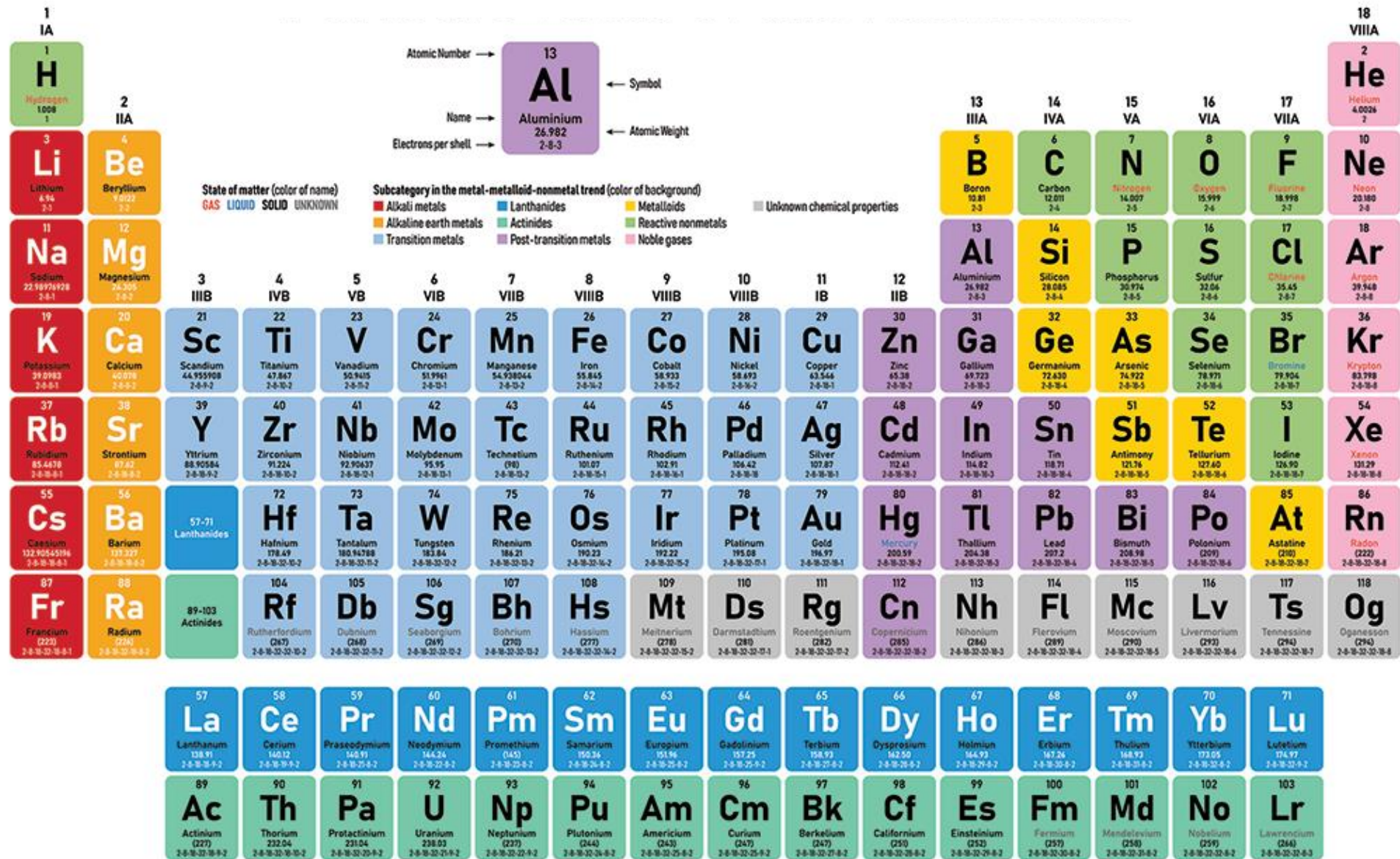
Periods and Groups

- **Period:** The horizontal arrangement of elements
- **Group:** The vertical arrangement of elements

Periods



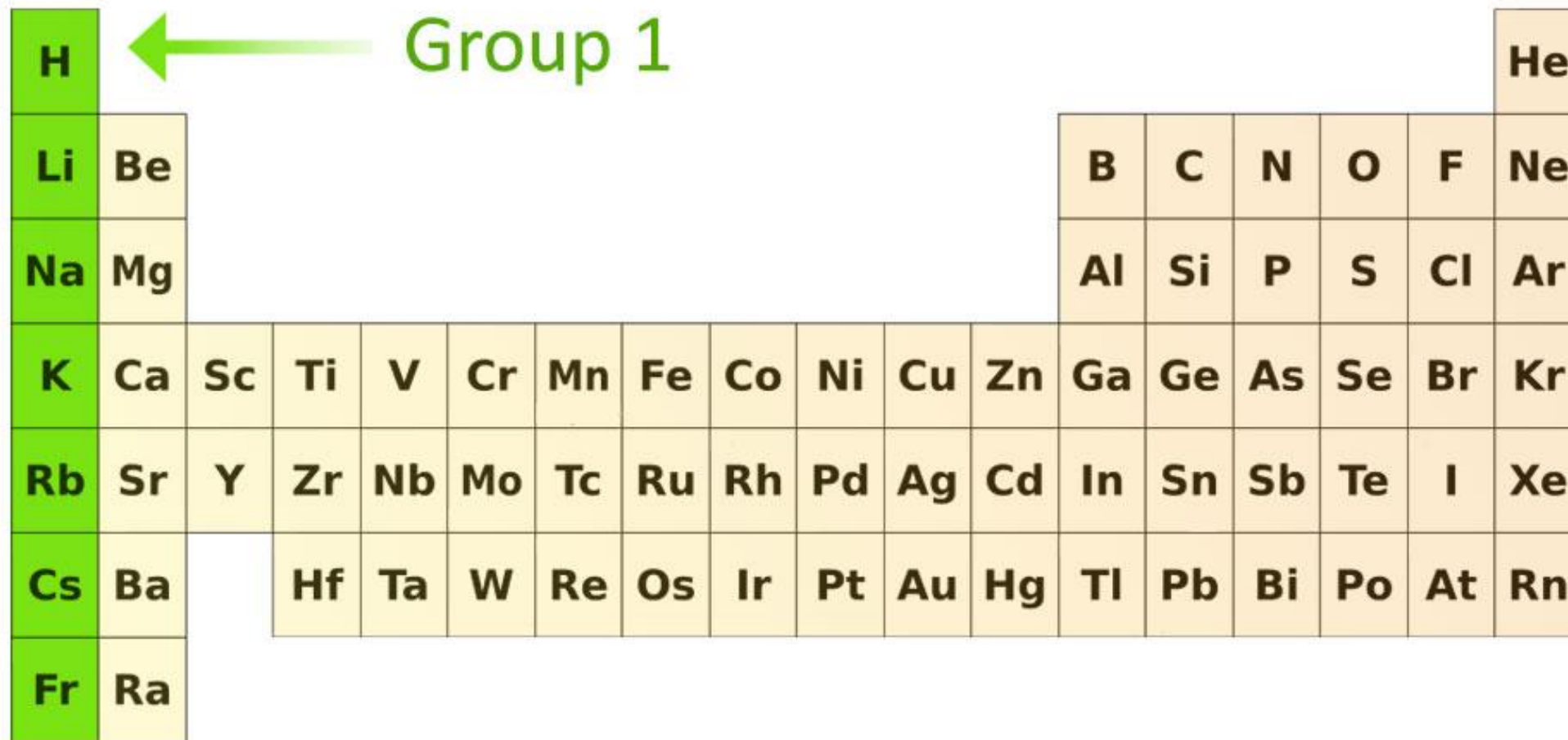
Groups



Name of some groups

- ❖ **Group 1: Alkali Metals**
- ❖ **Group 2: Alkali Earth Metals**
- ❖ **Group 17: Halogens**
- ❖ **Group 18: Noble Gases**

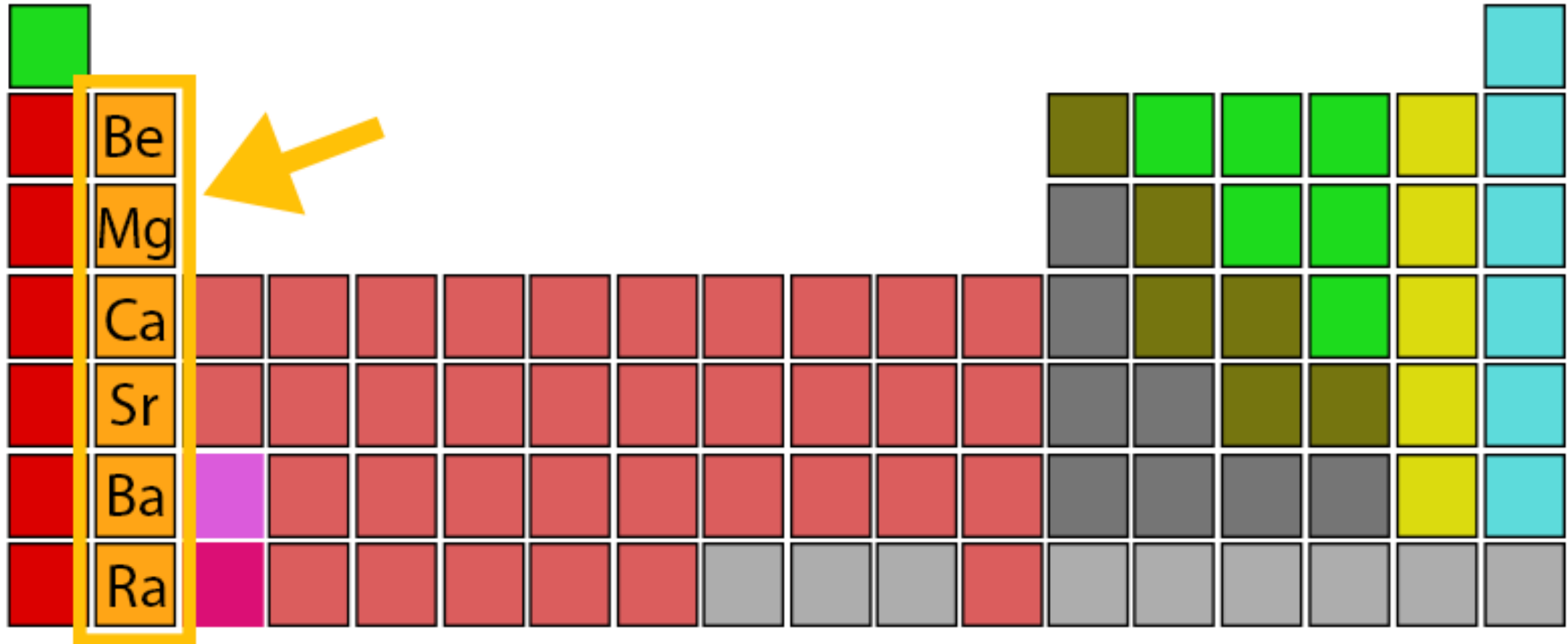
Group 1: Alkali Metals



← Group 1

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		Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
Fr	Ra																

Group 2: Alkali Earth Metals



Group 17: Halogens



Halogens

1 H Hydrogen																	2 He Helium																												
3 Li Lithium	4 Be Beryllium																	5 B Boron	6 C Carbon	7 N Nitrogen	8 O Oxygen	9 F Fluorine	10 Ne Neon																						
11 Na Sodium	12 Mg Magnesium																	13 Al Aluminium	14 Si Silicon	15 P Phosphorus	16 S Sulfur	17 Cl Chlorine	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%; text-align: center;"> <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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Group 18: Noble Gases

1	2	13	14	15	16	17	18										
1 H Hydrogen 1.008							2 He Helium 4.002										
3 Li Lithium 6.94	4 Be Beryllium 9.012						10 Ne Neon 20.180										
11 Na Sodium 22.990	12 Mg Magnesium 24.305						18 Ar Argon 39.95										
19 K Potassium 39.098	20 Ca Calcium 40.078	21 Sc Scandium 44.956	22 Ti Titanium 47.867	23 V Vanadium 50.942	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 72.630	33 As Arsenic 74.922	34 Se Selenium 78.971	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)	44 Ru Ruthenium 101.07	45 Rh Rhodium 102.91	46 Pd Palladium 106.42	47 Ag Silver 107.87	48 Cd Cadmium 112.41	49 In Indium 114.82	50 Sn Tin 118.71	51 Sb Antimony 121.76	52 Te Tellurium 127.60	53 I Iodine 126.90	54 Xe Xenon 131.29
55 Cs Caesium 132.91	56 Ba Barium 137.33	57 La Lanthanum 138.91	72 Hf Hafnium 178.49	73 Ta Tantalum 180.95	74 W Tungsten 183.84	75 Re Rhenium 186.21	76 Os Osmium 190.23	77 Ir Iridium 192.22	78 Pt Platinum 195.08	79 Au Gold 196.97	80 Hg Mercury 200.59	81 Tl Thallium 204.38	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 Ac Actinium (227)	101 Rf Rutherfordium (261)	105 Db Dubnium (268)	106 Sg Seaborgium (269)	107 Bh Bohrium (270)	108 Hs Hassium (277)	109 Mt Meitnerium (278)	110 Ds Darmstadtium (281)	111 Rg Roentgenium (282)	112 Cn Copernicium (285)	113 Nh Nihonium (286)	114 Fl Flerovium (289)	115 Mc Moscovium (290)	116 Lv Livermorium (293)	117 Ts Tennessine (294)	118 Og Oganesson (294)

Lanthanides

Actinides

58 Ce Cerium 140.12	59 Pr Praseodym. 140.91	60 Nd Neodymi. 144.24	61 Pm Promethi. 145.00	62 Sm Samarium 150.36	63 Eu Europium 151.96	64 Gd Gadolinium 157.25	65 Tb Terbium 158.93	66 Dy Dysprosium 162.50	67 Ho Holmium 164.93	68 Er Erbium 167.26	69 Tm Thulium 168.93	70 Yb Ytterbium 173.05	71 Lu Lutetium 174.97
90 Th Thorium 232.04	91 Pa Protactini. 231.04	92 U Uranium 238.03	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 Mendelev. (258)	102 No Nobelium (259)	103 Lr Lawrenc. (266)

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- Arrangement of Elements
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