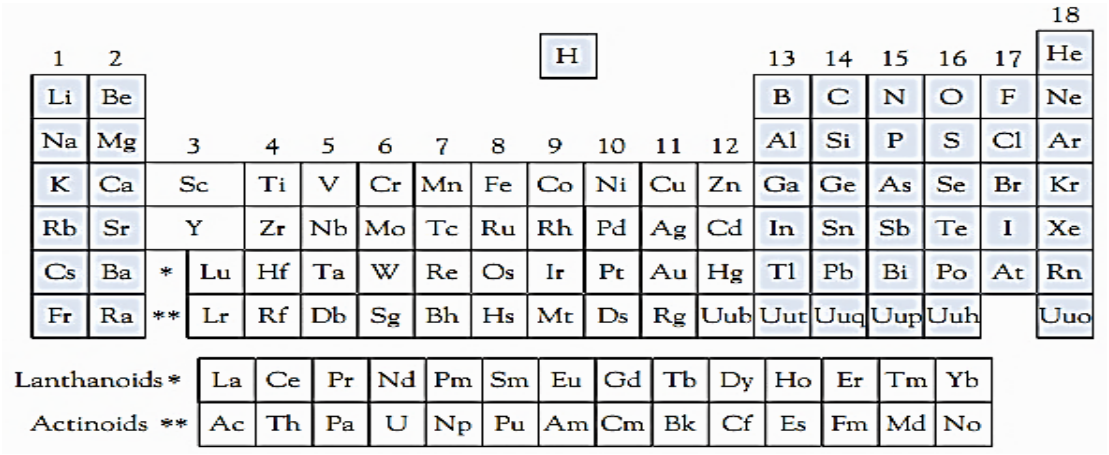
❖ Periodic Table

* The idea of arranging the elements into a periodic table had been considered by many chemists, but either the data to support the idea were insufficient or the classification scheme were incomplete. **Mendeleev** and **Meyer** organized the elements in order of atomic weight and then identified families of elements with similar properties.

* By arranging these families in *rows* or *columns*, and by considering similarities in chemical behavior as well as atomic weight, Mendeleev found vacancies in the table and was not able to predict the properties of several elements (***Gallium, Scandium, Germanium, and Polonium***), that had not yet been discovered.

* The discovery of additional elements not known in **Mendeleev's** time and the synthesis of heavy elements have led to the more complete modern periodic table.

* In the modern periodic table, a ***horizontal row*** of elements is called a ***period***, and a ***vertical column*** is a ***group*** or ***family***.



* ***Groups 1*** and ***2*** and ***13-18*** represent the main group elements, and these groups correspond to the filling of the ***s*** and ***p*** orbitals, (***s-block***) and (***p-block***) elements.

Groups 4 -11, corresponding to the filling of the ***d*** orbitals, are classified as the ***transition metals***, (***d-block***) elements.

* The elements of ***Group 12***, although sometimes included among the transition metals, have a very different chemistry from that series; hence, ***Group 12*** will be considered separately.

* Several of the main groups have been given specific names:

For Example: ***alkali metals*** (**Group 1**),

Alkaline earth metals (**Group 2**),

pnictogens (a lesser used term for **Group 15**),

chalcogens (a lesser used term for ***Group 16***),

Halogens (**Group 17**),

Coinage metals (**Group 11**),

and noble gases (**Group 18**),

*The elements corresponding to the filling of the **4f** orbitals are called the ***lanthanoids*** and those corresponding to the filling of the **5f** orbitals are called the ***actinoids***. A collective name for the **Group 3** and **lanthanoid elements** is the ***rare earth elements***.

The Periodic Table of the Elements

1																	2
H Hydrogen 1.00794																	He Helium 4.003
3	4											5	6	7	8	9	10
Li Lithium 6.941	Be Beryllium 9.012182											B Boron 10.811	C Carbon 12.0107	N Nitrogen 14.00674	O Oxygen 15.9994	F Fluorine 18.9984032	Ne Neon 20.1797
11	12											13	14	15	16	17	18
Na Sodium 22.989770	Mg Magnesium 24.3050											Al Aluminum 26.981538	Si Silicon 28.0855	P Phosphorus 30.973761	S Sulfur 32.066	Cl Chlorine 35.4527	Ar Argon 39.948
19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
K Potassium 39.0983	Ca Calcium 40.078	Sc Scandium 44.955910	Ti Titanium 47.867	V Vanadium 50.9415	Cr Chromium 51.9961	Mn Manganese 54.9380049	Fe Iron 55.845	Co Cobalt 58.933200	Ni Nickel 58.6934	Cu Copper 63.546	Zn Zinc 65.39	Ga Gallium 69.723	Ge Germanium 72.61	As Arsenic 74.92160	Se Selenium 78.96	Br Bromine 79.904	Kr Krypton 83.80
37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54
Rb Rubidium 85.4678	Sr Strontium 87.62	Y Yttrium 88.90585	Zr Zirconium 91.224	Nb Niobium 92.90638	Mo Molybdenum 95.94	Tc Technetium (98)	Ru Ruthenium 101.07	Rh Rhodium 102.90550	Pd Palladium 106.42	Ag Silver 107.8682	Cd Cadmium 112.411	In Indium 114.818	Sn Tin 118.710	Sb Antimony 121.760	Te Tellurium 127.60	I Iodine 126.90447	Xe Xenon 131.29
55	56	57	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86
Cs Cesium 132.90545	Ba Barium 137.327	La Lanthanum 138.9055	Hf Hafnium 178.49	Ta Tantalum 180.9479	W Tungsten 183.84	Re Rhenium 186.207	Os Osmium 190.23	Ir Iridium 192.217	Pt Platinum 195.078	Au Gold 196.96655	Hg Mercury 200.59	Tl Thallium 204.3833	Pb Lead 207.2	Bi Bismuth 208.98038	Po Polonium (209)	At Astatine (210)	Rn Radon (222)
87	88	89	104	105	106	107	108	109	110	111	112	113	114				
Fr Francium (223)	Ra Radium (226)	Ac Actinium (227)	Rf Rutherfordium (261)	Db Dubnium (262)	Sg Seaborgium (263)	Bh Bohrium (262)	Hs Hassium (265)	Mt Meitnerium (266)	(269)	(272)	(277)						

58	59	60	61	62	63	64	65	66	67	68	69	70	71
Ce Cerium 140.116	Pr Praseodymium 140.90765	Nd Neodymium 144.24	Pm Promethium (145)	Sm Samarium 150.36	Eu Europium 151.964	Gd Gadolinium 157.25	Tb Terbium 158.92534	Dy Dysprosium 162.50	Ho Holmium 164.93032	Er Erbium 167.26	Tm Thulium 168.93421	Yb Ytterbium 173.04	Lu Lutetium 174.967
90	91	92	93	94	95	96	97	98	99	100	101	102	103
Th Thorium 232.0381	Pa Protactinium 231.03588	U Uranium 238.0289	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 (262)

*The ***first*** period contains only two elements, ***hydrogen*** and ***helium***. The ***second*** and ***third*** periods each contain ***eight*** elements, while the ***fourth*** and **fifth** periods contain ***18 elements*** each. The sixth period contains 32 elements

* ***Classifications of the Elements***

* At 25°C; [(**Br**) and (**Hg**) are ***Liquids***], [(**H, N, O, F, Cl, He, Ne, Ar, Kr, Xe** and **Rn**) are ***gases***], while all others are [***Solids***].

*[(B, Si, Ge, As, Sb and Te) are ***semimetals*** or ***metalloids***], [(H, C, N, P, O, S, Se, F, Cl, Br, I, At, He, Ne, Ar, Kr, Xe and Rn) are ***nonmetals***], while all others are ***[metals***].

*** *Block structure***: The table divides naturally into ***s, p, d*** and **f** blocks according to the outer electron configurations, ***s*** and ***p blocks*** formed the main groups or representative elements (groups ***1, 2, 13-18*** and **H**), the ***d block*** forms the transition elements (groups ***3-12***), and the ***f block*** or **Inner Transition Elements** the ***lanthanides*** and ***actinides***.