

Periodic Table:

Periodic Law: When elements are arranged in order of increasing atomic mass, certain properties recur periodically.

Periodic Table of the Elements

1	IA	1	H	IIA	2	He	0																															
2		3	Li	4	Be	5	B	6	C	7	N	8	O	9	F	10	Ne																					
3		11	Na	12	Mg	13	Al	14	Si	15	P	16	S	17	Cl	18	Ar																					
4		19	K	20	Ca	21	Sc	22	Ti	23	V	24	Cr	25	Mn	26	Fe	27	Co	28	Ni	29	Cu	30	Zn	31	Ga	32	Ge	33	As	34	Se	35	Br	36	Kr	
5		37	Rb	38	Sr	39	Y	40	Zr	41	Nb	42	Mo	43	Tc	44	Ru	45	Rh	46	Pd	47	Ag	48	Cd	49	In	50	Sn	51	Sb	52	Te	53	I	54	Xe	
6		55	Cs	56	Ba	57	* La	72	Hf	73	Ta	74	W	75	Re	76	Os	77	Ir	78	Pt	79	Au	80	Hg	81	Tl	82	Pb	83	Bi	84	Po	85	At	86	Rn	
7		87	Fr	88	Ra	89	+ Ac	104	Rf	105	Ha	106	106	107	107	108	108	109	109	110	110																	

• Lanthanide Series	58	59	60	61	62	63	64	65	66	67	68	69	70	71
	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu
+ Actinide Series	90	91	92	93	94	95	96	97	98	99	100	101	102	103
	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr

Periodic Table and Electron Configuration:

Group 8A	He	$1s^2$	Period 1
	Ne	$[\text{He}]2s^22p^6$	Period 2
	Ar	$[\text{Ne}]3s^23p^6$	Period 3
Group 1A	H	$1s^1$	Period 1
	Li	$[\text{He}]2s^1$	Period 2
	Na	$[\text{Ne}]3s^1$	Period 3
Group 7A	F	$[\text{He}]2s^22p^5$	Period 2
	Cl	$[\text{Ne}]3s^23p^5$	Period 3

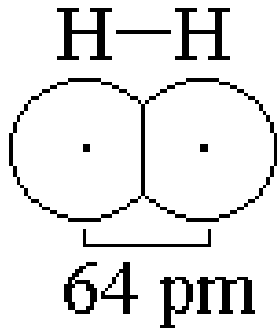
Cations and Anions:

The noble gases(Group 8) have the total number of valence electrons and are very stable. They have an octet(2 valence electrons for He and 8 valence electrons for the others).



Elements in Group 1 tend to lose one electron spontaneously and elements in Group 7 gain one electron spontaneously.

Relative Size of the Atoms:



Atomic Radius of H atom = 32 pm

Atomic Radius: Half the distance between two identical nuclei in a diatomic molecule.

Ionic Radius: Radius of a cation or anion.

<u>Species</u>	<u>Covalent/Ionic Radius</u>
Na	186 pm
Na⁺	95 pm
Cl	99 pm
Cl⁻	181 pm
Mg	160 pm
Mg²⁺	65 pm

Ionization Energy:

The amount of energy required to remove an electron from an isolated atom or ion.



IE expressed in kJ/mole

$$\mathbf{IE_1 < IE_2 < IE_3}$$

Periodic Trends:

Atomic size decreases across a period from left to right and increases down a group.

IE increases across a period from left to right and decreases down a group.

Electron Affinities:

The energy change associated with the addition of an electron to a gaseous atom or ion.



EA expressed in kJ/mole and usually negative.

-EA: energy given off. +EA: energy required.

