

IONIC BONDS

The Formation of Ions and How They Combine to Form Compounds



The Elements & Their Electron Configurations

Family: Noble Gases

Description: Don't play well with others. WHY?

He = $1s^2$ (Energy Level 1 only has an "s" orbital so it is full with just two electrons – so on to the next row.)

Ne = $1s^2 2s^2 2p^6$ (8 valence electrons)

Ar = Ne = $1s^2 2s^2 2p^6 3s^2 3p^6$ (8 valence electrons)

“EIGHT IS GREAT” when we consider the stability of an element's electron configuration! Elements, like the noble gases, are stable (unreactive), when their electron configurations have 8 valence electrons. They do not under normal conditions react with other elements.

ALL OF THE OTHER ELEMENTS.....

Noble Gas Wanna Be's

Every other element on the periodic table will gain, lose or share electrons in order to obtain a noble gas electron configuration – “the GREAT 8”.

Metals & Nonmetals

Remember: The staircase on the periodic table separates the metals from the nonmetals.

Group →	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
↓ Period	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	1 H	← Hydrogen is an exception. It is a nonmetal.																2 He
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		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		104 Rf	105 Db	106 Sg	107 Bh	108 Hs	109 Mt	110 Ds	111 Rg	112 Uub	113 Uut	114 Fl	115 Uup	116 Lv	117 Uus	118 Uuo
Lanthanides			57 La	58 Ce	59 Pr	60 Nd	61 Pm	62 Sm	63 Eu	64 Gd	65 Tb	66 Dy	67 Ho	68 Er	69 Tm	70 Yb	71 Lu	
Actinides			89 Ac	90 Th	91 Pa	92 U	93 Np	94 Pu	95 Am	96 Cm	97 Bk	98 Cf	99 Es	100 Fm	101 Md	102 No	103 Lr	

Ions

Atoms that gain or lose electrons take on a charge.
These charged particles are called ions.

<u>Atom</u>	<u>Ion</u>
Fe	Fe ³⁺
<u>Atom</u>	<u>Ion</u>
At	At ⁻

Cations: Positive Ions

Anions: Negative Ions



“Paw”sitve! 😊

Metals are Losers!!!!!!

(They lose electrons when they form ions.)

Mg Atom 12 p⁺
 12 e⁻
Net Charge: 0

Mg Ion 12 p⁺
 10 e⁻
Net Charge: 2⁺

Ion Symbol: Mg²⁺

K Atom 19 p⁺
 19 e⁻
Net Charge: 0

K Ion 19 p⁺
 18 e⁻
Net Charge: 1⁺

Ion Symbol: K⁺ or K¹⁺

Nonmetals are winners!!!

(They gain electrons when they form ions.)

O Atom 8 p⁺
 8 e⁻
Net Charge: 0

O Ion 8 p⁺
 10 e⁻
Net Charge: 2⁻

Ion Symbol: O²⁻

Cl Atom 17 p⁺
 17 e⁻
Net Charge: 0

Cl Ion 17 p⁺
 18 e⁻
Net Charge: 1⁻

Ion Symbol: Cl⁻ or Cl¹⁻


Elements in the same group or family on the periodic table form ions with the same charge.


Ion typically formed


1+	2+
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3+	4-	3-	2-	1-	0
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1																	18
H	2											13	14	15	16	17	He
Li	Be											B	C	N	O	F	Ne
Na	Mg	3	4	5	6	7	8	9	10	11	12	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	Rf	Db	Sg	Bh	Hs	Mt	Uun	Uuu	Uub						

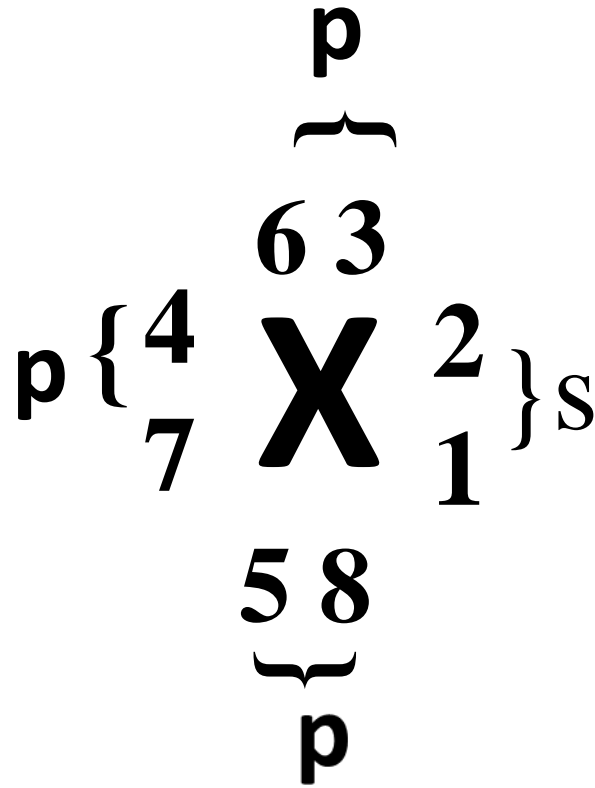
 = Weak nuclear attraction for valence electrons; tendency to form positive ions

 = Strong nuclear attraction for valence electrons; tendency to form negative ions

 = Strong nuclear attraction for valence electrons but valence shell is already filled; no tendency to

Electron Dot Notation

Used to symbolize valence electrons.

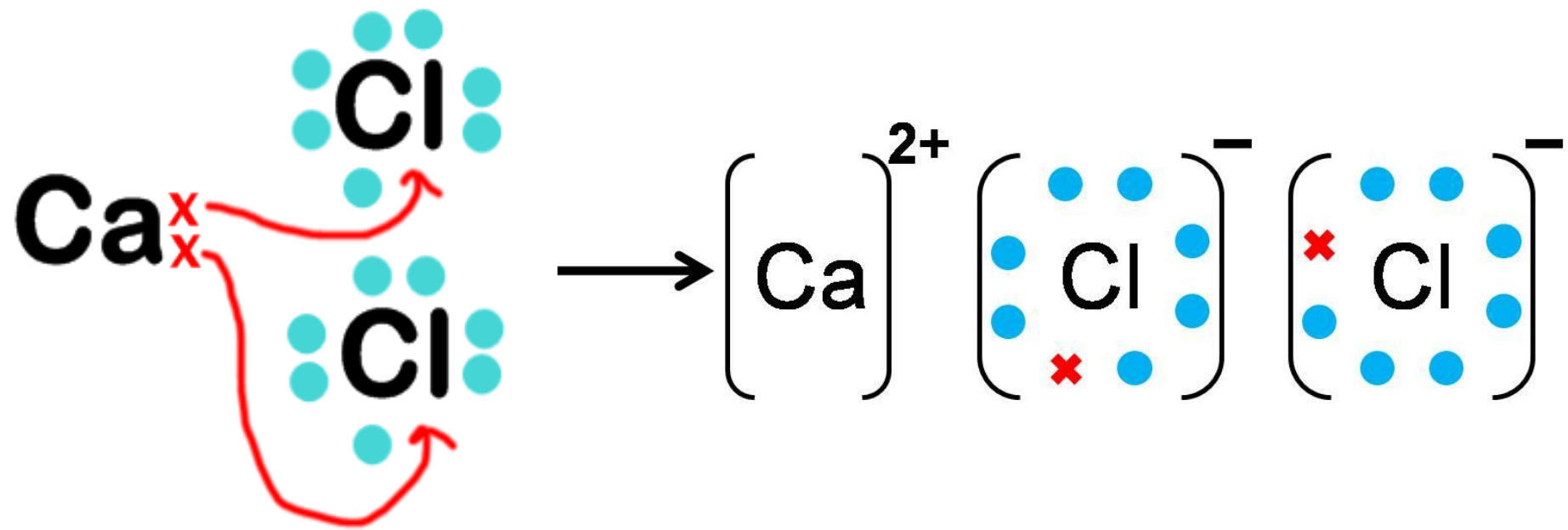


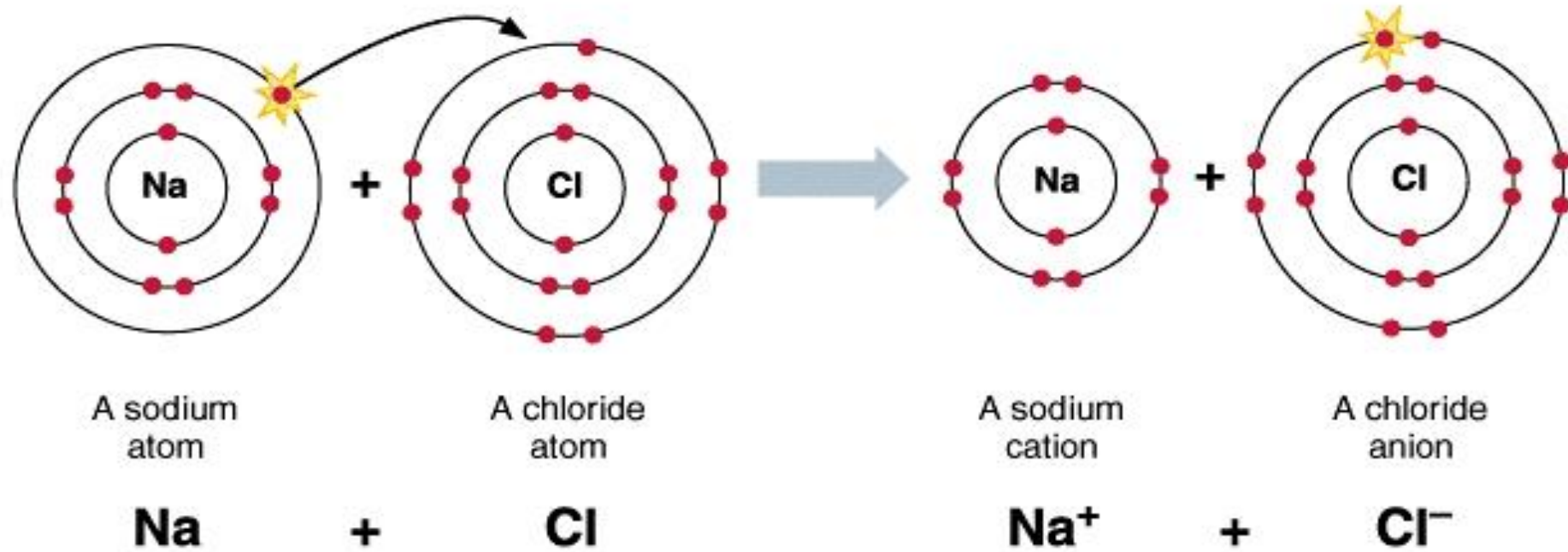
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Ionic Bonds

When atoms form an ionic bond, the electrons from the cation are transferred to the anion. These positive and negative ions are strongly attracted and that attraction holds the ions together in a bond.

Ionic Bonding





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