


Chapter 19

Molecules and

Compounds



Section 19.1

Bonding and

Molecules - Part 1

Most matter is in the form of compounds.

Most atoms are unstable unless combined.

Atoms combine in molecules.

Chemical bonds are formed when atoms combine.

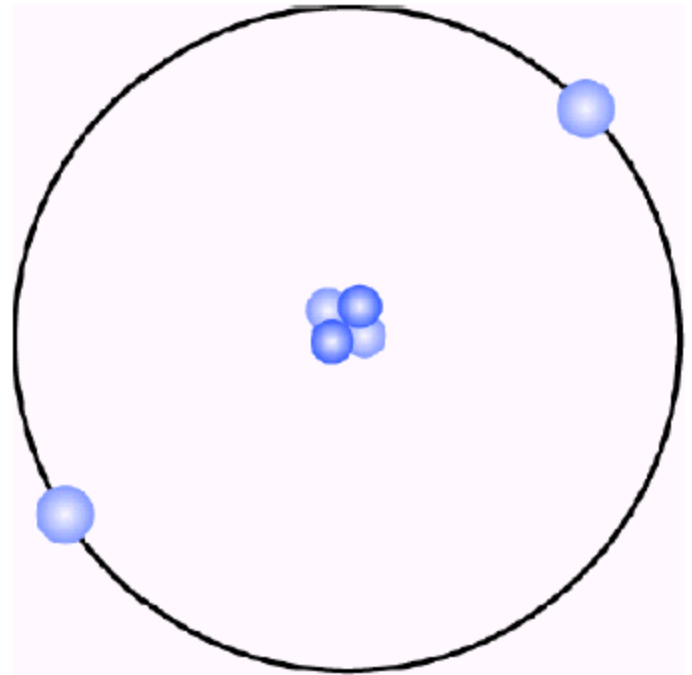
Valence shell electrons (outermost) are involved in bonding.

What are valence shell e^- ?

- # e^- are found in energy levels (E.L.) within electron cloud surrounding nucleus.
- # Highest E.L., highest energy.

Energy Levels

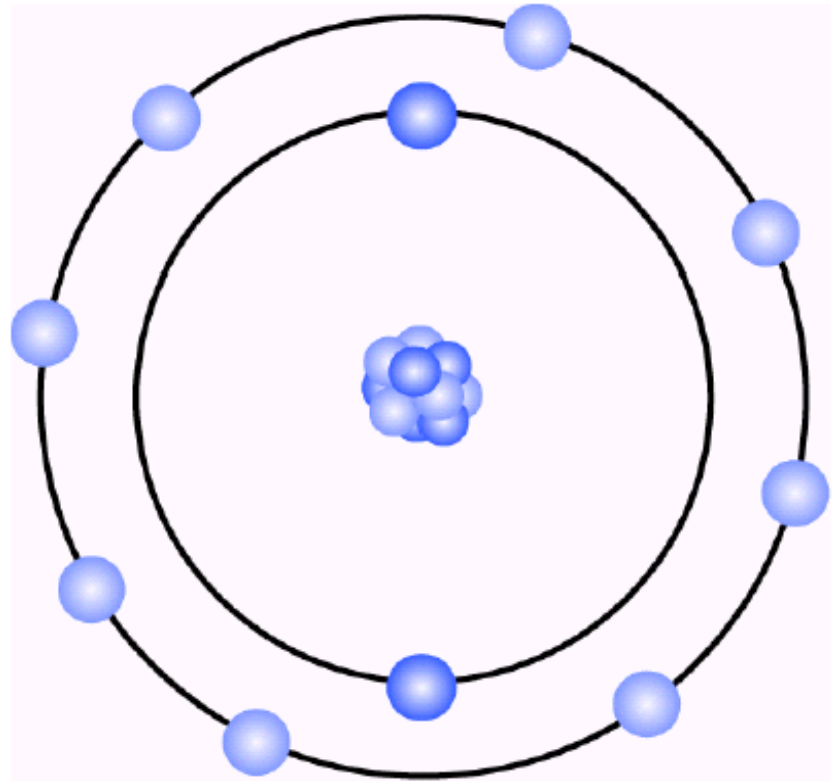
First E.L.
can hold
up to 2
 e^- .



What is this element?

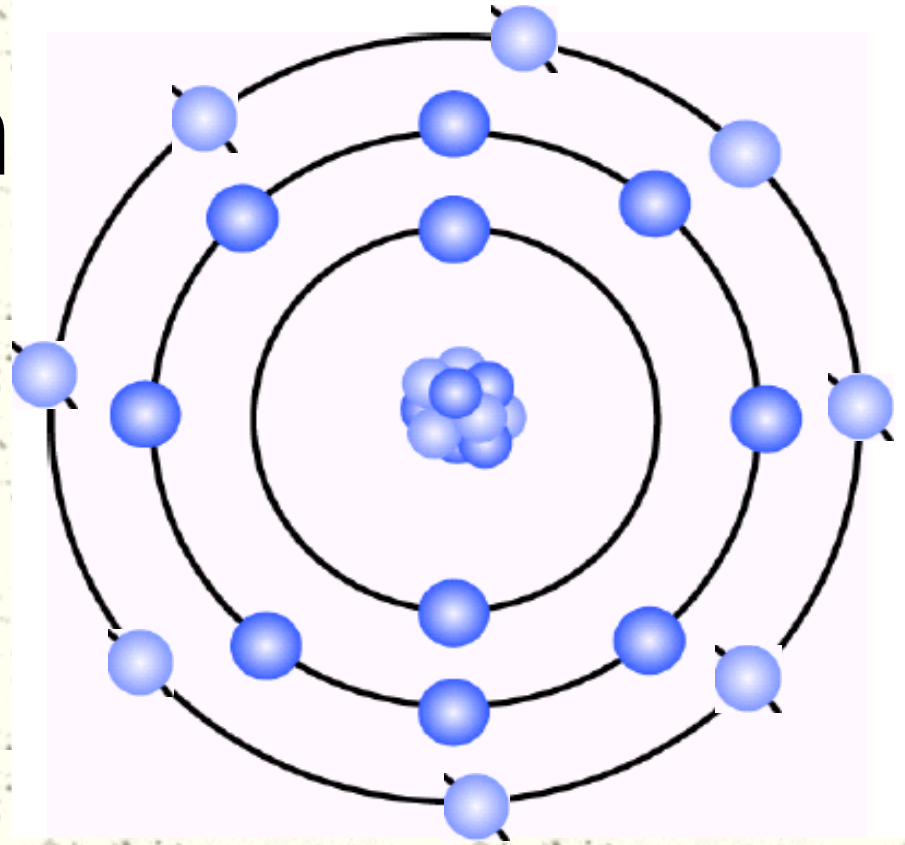
**Second E.L. can hold
up to 8 e^- .**

**What is
this
element?**



**Third E.L. can hold up
to 8 valence shell e^- .**

**How many
more e^- can
this atom
hold in its
valence
shell?**



Octet Rule

- # **Chemically stable atoms have 8 valence electrons (2 for 1st E.L. only).**
- # **Atoms form bonds to complete their octet and become stable.**
- # **Known as octet rule.**

Complete this chart:

element	valence electrons	number needed	element	valence electrons	number needed
H	1	1	Ne	8	0
He	2	0	Na	1	7
Li	1	7	Mg	2	6
Be	2	6	Al	3	5
B	3	5	Si	4	4
C	4	4	P	5	3
N	5	3	S	6	2
O	6	2	Cl	7	1
F	7	1	Ar	8	0

Use the PT to find # of valence e^- .

- # Column (group / family) tells how many valence e^- .**
- # All atoms in a group have same # of valence e^- , with exception of transition metals.**

Partial Periodic Table

(1)

Number of valence electrons in parentheses

(8)

H 1																He 2	
Li 3	Be 4	Transition metals: groups 3-12 (Variable number of valence electrons)										B 5	C 6	N 7	O 8	F 9	Ne 10
Na 11	Mg 12											Al 13	Si 14	P 15	S 16	Cl 17	Ar 18
K 19	Ca 20	Sc 21	Ti 22	V 23	Cr 24	Mn 25	Fe 26	Co 27	Ni 28	Cu 29	Zn 30	Ga 31	Ge 32	As 33	Se 34	Br 35	Kr 36
Rb 37	Sr 38	Y 39	Zr 40	Nb 41	Mo 42	Tc 43	Ru 44	Rh 45	Pd 46	Ag 47	Cd 48	In 49	Sn 50	Sb 51	Te 52	I 53	Xe 54

Dot Diagrams

- # Dot diagrams are used to represent valence e^- .
- Element symbol represents nucleus & all e^- except for valence e^- .

Dot Diagrams, cont.

- Dots around symbol = valence e^- .
- Place one dot for each valence e^- on each side of the symbol before pairing up the e^- .

Examples:

