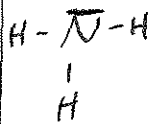
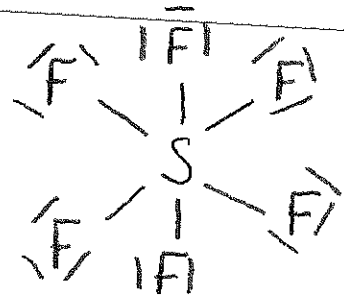
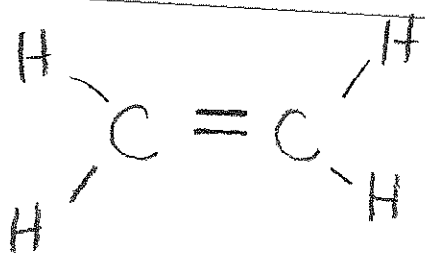


## Final Practice – Electron Dot Structures

Formula	Number of valence electrons	Dot Structure
H <sub>2</sub>	$\begin{array}{r} 2 \\ -2 \\ \hline 0 \end{array}$	H - H
HBr	$\begin{array}{r} 1 + 7 = 8 \\ -2 \\ \hline 6 \\ -6 \\ \hline 0 \end{array}$	H - <u>Br</u>
CH <sub>4</sub>	$\begin{array}{r} 4 + 4 = 8 \\ -8 \\ \hline 0 \end{array}$	$\begin{array}{c} \text{H} \\   \\ \text{H} - \text{C} - \text{H} \\   \\ \text{H} \end{array}$
NH <sub>3</sub>	$\begin{array}{r} 5 + 3 = 8 \\ -6 \\ \hline 2 \\ -2 \\ \hline 0 \end{array}$	$\begin{array}{c} \text{H} - \overset{\cdot\cdot}{\text{N}} - \text{H} \\   \\ \text{H} \end{array}$ <p style="text-align: right; margin-right: 50px;">hydrogen bonding</p>
H <sub>2</sub> O	$\begin{array}{r} 2 + 6 = 8 \\ -4 \\ \hline 4 \end{array}$	$\text{H} - \overset{\cdot\cdot}{\text{O}} - \text{H}$ <p style="text-align: right; margin-right: 50px;">hydrogen bonding</p>



CO <sub>2</sub>	$4 + 6 + 6 = 16$ $\quad - 4$ $\quad \underline{12}$ $\quad - 12$ $\quad \underline{\emptyset}$	$\underline{\text{O}} = \text{C} = \underline{\text{O}}$
SF <sub>6</sub> (exception)	$6 + 42 = 48$ $\quad - 12$ $\quad \underline{36}$ $\quad - 36$ $\quad \underline{\emptyset}$	
AlCl <sub>3</sub> (exception) Al Cl	$3 + 21 = 24$ $\quad - 6$ $\quad \underline{18}$ $\quad - 18$ $\quad \underline{\emptyset}$	$\underline{\text{Cl}} - \text{Al} - \underline{\text{Cl}}$ $\quad  $ $\quad \underline{\text{Cl}}$
PO <sub>4</sub> <sup>3-</sup>	$5 + 24 + 3 = 32e^-$ $\quad - 8$ $\quad \underline{24}$ $\quad - 24$ $\quad \underline{0}$	$\left[ \begin{array}{c} \underline{\text{O}} \\   \\ \underline{\text{O}} - \text{P} - \underline{\text{O}} \\   \\ \underline{\text{O}} \end{array} \right]^{3-}$ <p style="text-align: right;">★ always use [ ] w/ polyatomic ions</p>
N <sub>2</sub>	$10$ $\quad - 10$ $\quad \underline{\emptyset}$	$\text{N} \equiv \text{N}$
C <sub>2</sub> H <sub>4</sub>	$8 + 4 = 12$ $\quad - 10$ $\quad \underline{2}$ $\quad - 2$ $\quad \underline{\emptyset}$	

CO <sub>2</sub>	$4 + 6 + 6 = 16$ $\frac{-4}{12}$ $\frac{-12}{0}$	$\text{O}=\text{C}=\text{O}$
SF <sub>6</sub> (exception)	$6 + 4 \times 2 = 48$ $\frac{-12}{36}$ $\frac{-36}{0}$	
AlCl <sub>3</sub> (exception) Al Cl	$3 + 2 \times 1 = 24$ $\frac{-6}{18}$ $\frac{-18}{0}$	$\text{Cl} - \text{Al} - \text{Cl}$ $ $ $\text{Cl}$
PO <sub>4</sub> <sup>(3-)</sup>	$5 + 2 \times 4 + 3 = 32e^-$ $\frac{-8}{24}$ $\frac{-24}{0}$	$\left[ \begin{array}{c} \text{O} \\   \\ \text{O} - \text{P} - \text{O} \\   \\ \text{O} \end{array} \right]^{3-}$ <p style="text-align: center;">★ always use valence electrons</p>
N <sub>2</sub>	$10$ $\frac{-10}{0}$	$\text{N} \equiv \text{N}$
C <sub>2</sub> H <sub>4</sub>	$8 + 4 = 12$ $\frac{-10}{2}$ $\frac{-2}{0}$	

# Chemistry - Unit 3 Test Review

Covalent

Do you know your definitions?

- Double bond
- Single bond
- Triple bond
- Electron dot diagram
- Covalent bond
- Lone pair (unshared pair, non-bonding pair)
- Bonding pair
- Cation

- Anion
- Ionic bond
- Octet rule
- Potential energy
- Conductivity
- Valence electrons
- Common charges of elements
- Metallic bonding

- weaker bonds
- liquids/gases at room temp
- do NOT conduct
- share electrons
- NM + NM

Covalent electrons are shared

What are the characteristics of an ionic bond and covalent bond?

**I** - Strong - M + polyatomic ion - solids @ room temp - dissolve in H<sub>2</sub>O → they conduct electricity  
 - M + NM - high M.P., high B.P. - crystalline  
 - transfer electrons - cation + anion

List of diatomic molecules



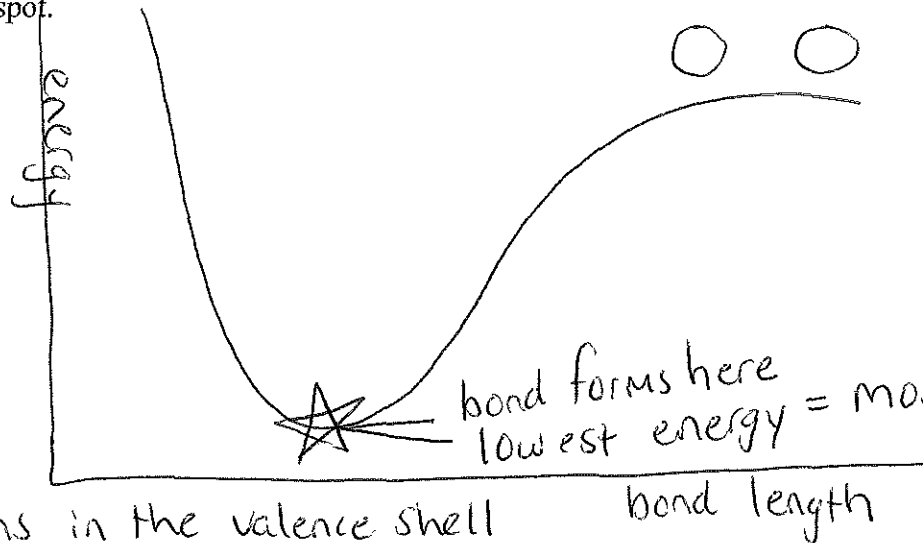
What is the difference between a diatomic, and polyatomic molecules?

↙ many atoms bonded together  
 Any element that does exist as a single atom (2 atoms bonded together)

Explain how an ionic bond is formed. Explain how covalent bonds are formed.

**+** → metal loses electron + becomes positive (cation)  
**I** → NM gains electron + becomes negative (anion)  
 Positive + negative attract "electrostatic force"

Sketch the potential energy diagram that shows bond formation in the space below. Where in the diagram the actual bond forms? Label the spot.



Why do bonds form?  
 become stable  
 achieve an octet

8 electrons in the valence shell

How do you determine how many valence electron an element has?

use the periodic table

Group 1 = 1VE Group 2 = 2VE

Groups 13-18 = # after you drop the "1"

What is conductivity and what type of bond displays conductivity?

So Group 13 = 3 VE

ability to move electrons

Ionic bonds

★ lights up a light bulb (lab)

NM

How are anions and a cations formed and why they are formed?

anions = negative, formed when an atom gains an electron to achieve 8 VE

cations = positive, formed when an atom loses electrons to achieve 8 VE

Why does bond making release energy?

M Atoms release energy to become more stable = happy = low energy

Why does bond breaking require energy?

Need energy to break a bond, because atoms do NOT want to lose their octet (8 VE)

Given two elements, how do you predict if the bond will be ionic or covalent?

I = Metal + Nonmetal      C = NONMetal + Nonmetal

What are the two ways compounds can be exceptions to the octet rule?

- have more than 8 electrons
- less than 8 electrons

How do electrons behave in metallic bonding? How do you describe the location of the electrons in a metallic bond?

↓  
can move freely between metal nuclei.  
" sea of electrons "

- malleable
- ductile
- lustrous

What are the IMF's? What are the three type of IMF's?

Intermolecular Forces

↳ forces that act between molecules

What kinds of molecules have dispersion forces?

- dispersion force
- dipole-dipole force
- hydrogen bonding force

ALL molecules have dispersion force → larger the mass of the molecule = the stronger the force

Which of the IMF's is the strongest?

hydrogen bond force      H-N  
   H-O  
   H-F

What kinds of forces with a high boiling point have?

high boiling pt = strong IMF = hydrogen bond force

What is an octet? Why is it important? → very stable

↓

8 electrons in the valence shell  
↓  
outermost shell

$F_2$  → gases  
 $Cl_2$  → weak force  
 $Br_2$  - liquid  
 $I_2$  - solid  
 ↓  
 Stronger disper force  
 ↓  
 More Mass

NM

How are anions and a cations formed and why they are formed?

anions = negative, formed when an atom gains an electron to achieve 8e  
cations = positive, formed when an atom loses electrons to achieve 8VE

Why does bond making release energy?  
Atoms release energy to become more stable = happy = low energy

Why does bond breaking require energy?

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I<sub>2</sub> - solid  
↓  
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