

Name: _____

Green

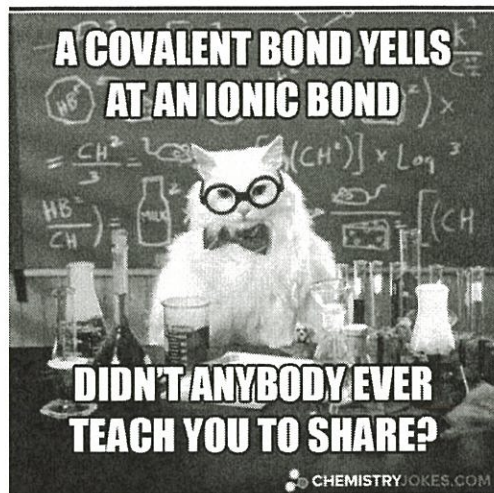
UNIT

4

Chemical Bonding

How do atoms form molecules?

Ongoing questions | How do the properties of invisible particles lead to visible changes?
 | What are particles and how can we model their physical behavior?



Atoms that are unstable will chemically combine with other atoms to produce stable compounds.

November 7 - 20, 2018

Quiz: _____

Fri _____ **Fri 11/16**

NOVEMBER CALENDAR

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SAT.
4	5 Tech Roll Out Day	6 Unit 3 Quiz Corrections	7 4.1 Intro to Chemical Bonding	8 4.1 cont'd 4.2 Electronegativity and Polarity	9 4.2 4.3 Hydrogen Bonding	10
11	12 No School!	13 4.2 4.4 Properties of Ionic and Covalent cont'd	14 4.4 cont'd 4.3	15 Quiz Review 4.4	16 Unit 4 Quiz Quiz Review	17
18	19 Unit 4 Quiz Corrections	20 Thanksgiving Chemistry / Corrections	21	22 Happy Thanksgiving!	23	24

Key Topics and Vocabulary

- Chemical Bonding
 - Ionic
 - Covalent
 - Stability
 - Valence electrons
- Properties
 - Conductivity
 - Melting point
 - Boiling point
 - Solubility
- Polarity
 - Electronegativity
 - Hydrogen bonding

Key Scientific Skills

- Modeling using diagrams and formulas
- Planning and carrying out investigations
- Supporting claims with evidence

Cross-Cutting Concepts

- Patterns
- System models
- Structure and function

Vocabulary Glossary	
ionic bond	metal & nonmetal, electrons are transferred
covalent bond	2 nonmetals, electrons are shared
electronegativity	tendency of an atom to attract electrons in a bond
nonpolar bond	electrons are shared equally $\Delta EN = 0$
polar bond	electrons are shared unequally
hydrogen bonding	strong intermolecular force
(IMF) intermolecular force	force that holds molecules together
conductivity	the result of mobile ions (or electrons) that can provide electricity w/ a moving path through which to flow
electrolyte	substance that conducts electricity when dissolved in water

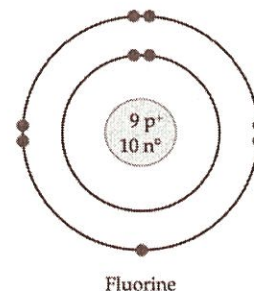
Introduction to Chemical Bonding

How are electrons involved in bonding?

Refresher:

Over the course of this year, we've seen that:

- Matter is everything that has mass and takes up space
 - It is made up of tiny particles called atoms which contain three subatomic particles:
 - protons
 - neutrons
 - electrons
 - Two types of substances
 - Elements: made up of 1 type of atom
 - **Compounds: made up of more than 1 type of atom**
- The Periodic Table is a way of organizing the elements according to their characteristics and chemical behavior
 - Atomic number: number of protons (this identifies an element)
 - Valence electrons: electrons in the last shell
 - Determine the chemical properties of an element
 - Organized into three sections: metals, nonmetals, and metalloids



Mini Lesson:

Unreactive elements: do not form compounds because they are already stable (full valence shells, 8 val. electrons)

When chemicals react - Bonding:

IONIC (example - NaCl)		COVALENT/MOLECULAR (example - HCl)
metal and a nonmetal	WHO What types of elements are involved?	2 nonmetals
transfer	HOW are the electrons involved?	shared
$\text{Na} \cdot \text{Cl} \cdot \rightarrow [\text{Na}]^+ [\cdot\cdot\text{Cl}\cdot\cdot]^-$	WHAT does it look like?	$\text{H} \cdot \text{Cl} \cdot \rightarrow \text{H} - \text{Cl} \cdot\cdot$

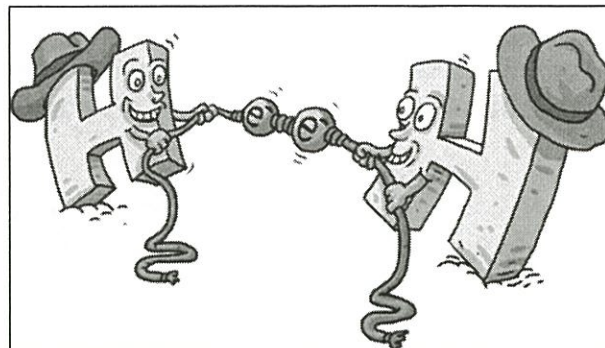
Electronegativity & Polarity

Do covalent compound share electrons equally?

I. Nonpolar Covalent Bonds

- Electrons are equally shared between atoms
- $\Delta EN = 0$
- Examples:
 - Diatomic molecules
 - CS

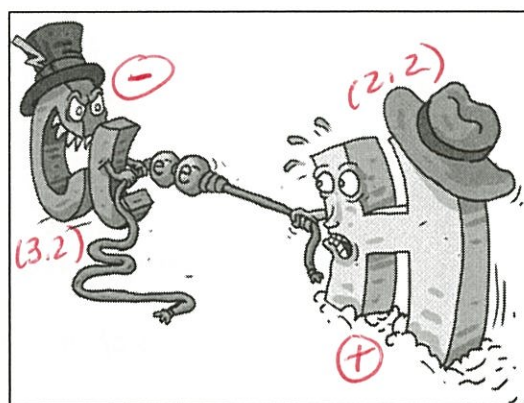
$\Delta =$
difference



II. Polar Covalent Bonds

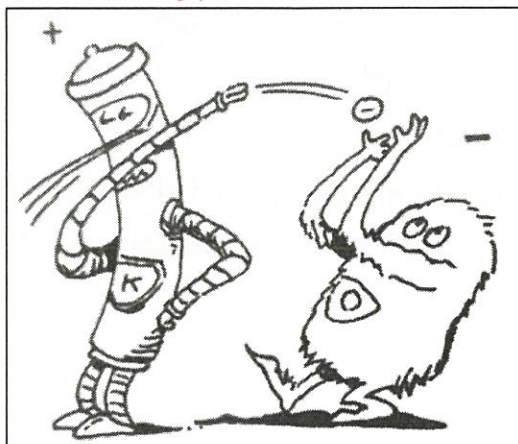
- Electrons are unequally shared between atoms
 - The atom with the greater EN pulls the electrons closer and becomes partially negative
 - The atom with the lower EN becomes partially positive

- $\Delta EN > 0$
- Examples:
 - N and H
 - H and F



III. Ionic Bonds

- Ionic bonds are considered **completely polarized**
- $\Delta EN > 2.0$
- The nonmetal "pulls" so much harder on the electrons that they are completely transferred from the metal atom

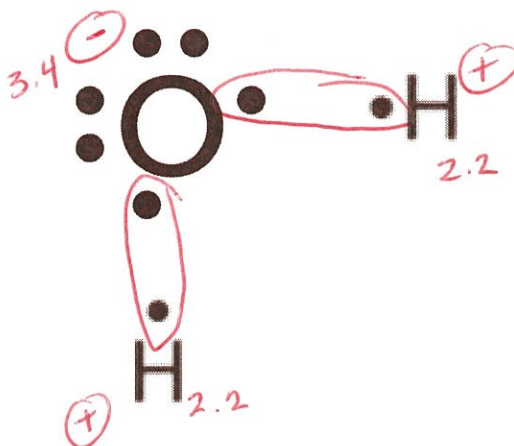


UNIT
4.3

Hydrogen Bonding

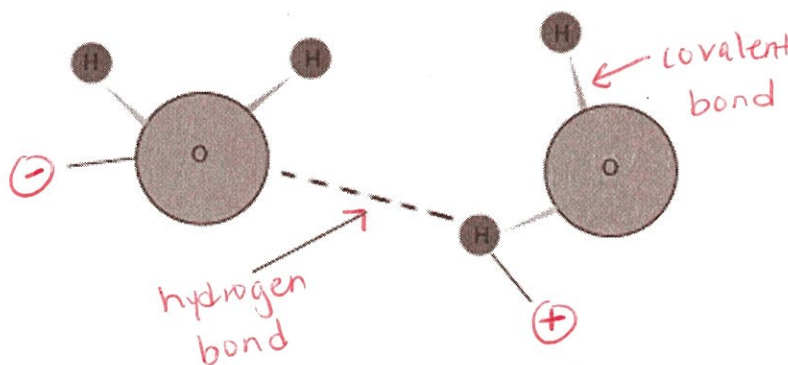
Why is water so special?

Given the Lewis Structures of the atoms that make up water, H_2O , use circles to show how electrons would be shared. Recall that sharing electrons results in a **covalent bond**.



In the article you read yesterday, **electronegativity** was defined as:
the tendency of an atom to attract electrons in a bond

Hydrogen Bonding



Hydrogen bonding: a type of intermolecular force
(something that holds molecules together)

UNIT
4.4

Properties of Ionic and Covalent Compounds

How can we tell the difference between ionic and covalent substances?

We've stuck together atoms in many different ways this unit. How does that bonding process affect the properties of the macro-sized samples of elements or compounds that we create? The key idea to tie everything together is that

Chemical structure determines physical properties.

What type of bonds hold a sample of atoms together is a huge component of the sample's chemical structure; therefore, bond type is a key indicator of the physical properties a sample will have.

Bond Type	Covalent Molecules		Ionic Compounds	Metals
	Nonpolar	Polar		
Type/Strength of IMF	weak	strong	VERY strong	VERY strong
Melting/boiling point	low	moderate	high	high
Phase of matter at STP	s, l, g	s, l, g	solid	solid
Conductivity as a solid*	poor	poor	poor	good
Conductivity as a liquid or aqueous solution*	poor	poor	Good	good
Likelihood to dissolve in water	low	high	high	low

*Conductivity is a result of MOBILE ions (or electrons) that can provide electricity with a moving path through which to flow.

