Vocabulary

1. **Chemical Formula** – an expression that shows the number and types of atoms joined in a compound (ex: CO_2=Carbon dioxide)
2. **Subscript** – a number written to the right and below of the chemical symbol. (ex: CO_2)
3. **Ionic Bond** – the force of attraction between positive and negative ions.
4. **Covalent Bond** – pair of shared electrons between two atoms.
5. **Molecule** – a group of atoms held together by a covalent bond.
6. **Polar Covalent Bond** – a covalent bond where electrons are shared unequally.

Lesson 4

Name:_____
Date:_____
Period:_____

Modeling Compounds and Molecules

Engage/Explore:

Directions: In groups, you must construct models for the compounds and molecules listed below. (Note: you should use relative sizes for different atoms, if materials are available.) First, using the subscript, count the number of atoms of each element present in the compound or molecule. Then, make a model using appropriate materials, and finally make a diagram of your model, including labels to identify the different elements.

Water: H_2O	Calcium Chloride: $CaCl_2$
Sodium Bicarbonate: $NaHCO_3$	Magnesium Sulfate: $MgSO_4$
Acetic Acid: $C_2H_4O_2$	Ammonia Chloride: NH_4Cl
Citric Acid: $C_6H_8O_8$	Sulfuric Acid: H_2SO_4

Name:_____
Date:_____
Period:_____

Building Molecular Models

DIRECTIONS: Write the molecular formula for each of the following compounds, then count how many atoms are in each compound, next build and draw the molecular compounds.

1) Methane:	**6) Formic acid:**
2) Butane:	**7) Isobutane:**
3) Acetic acid:	**8) Methanol:**
4) Ethanol:	**9) Propane:**
5) Ethyne:	**10) Ethene:**

Name:_____
Date:_____
Period:_____

Building Molecular Compounds

Directions: 1) List the name of each element and how many atoms are present
2) Label each as a molecule, compound, or bot

H_2O: Water	**O_2: Oxygen**	**NH_3 :Ammonia**
HNO_3 : Nitric Acid	**CH_4: Methane**	**NO_2 :Nitrogen Dioxide**
CO_2: Carbon dioxide	**H_2CO_3: Carbonic Acid**	**H_2SO_4: Sulfuric Acid**
C_3H_8: Propane	**C_8H_{18}: Octane**	**$C_6H_8O_7$: Citric Acid**

1) How would your model be different if you built: **$2O_2$ or $5O_2$** Draw a picture:
Explain_____

_____

2) What is the difference between a subscript and coefficient?

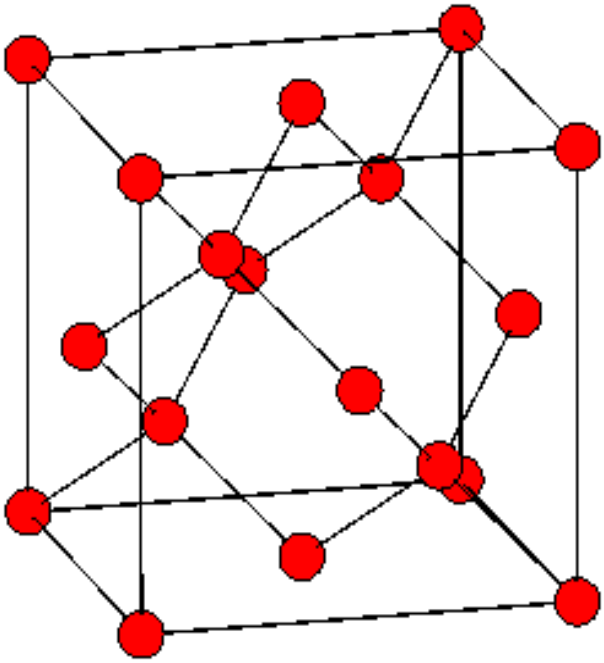
_____

_____

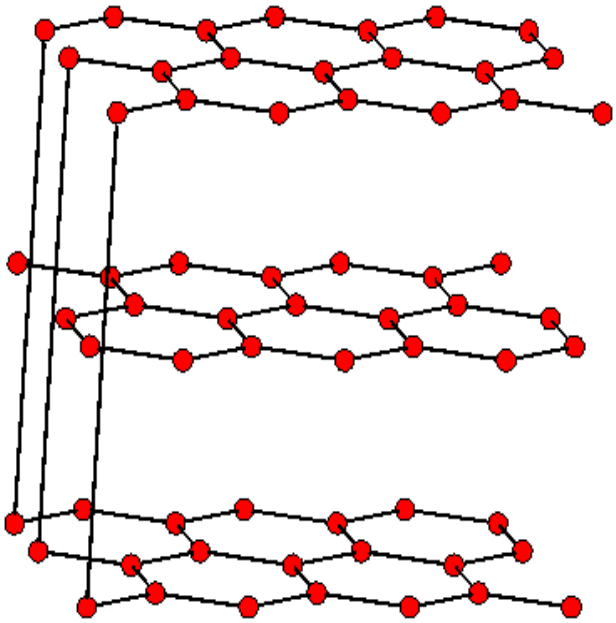
Lesson 4

Molecular Structure images:

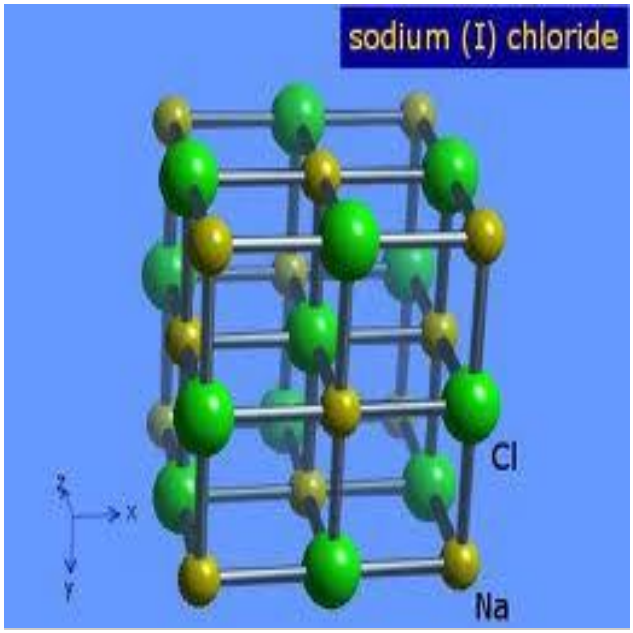
Diamond: cubic structure, C_{18}



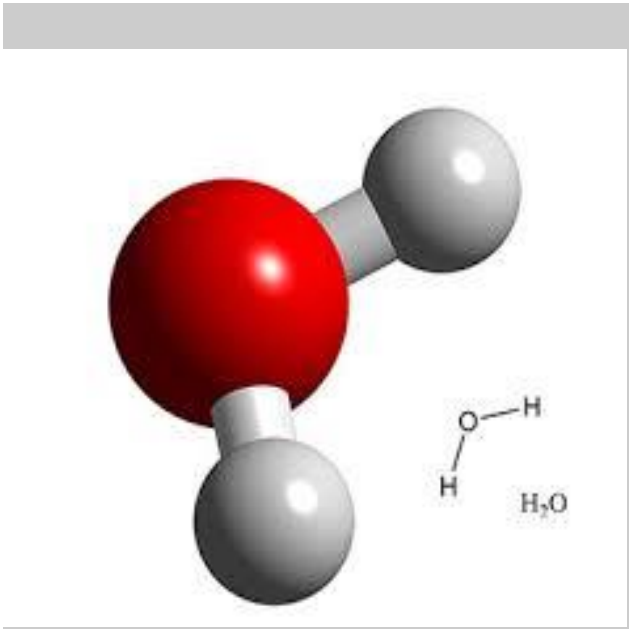
Grapite: hexagonal structure, C_{64}



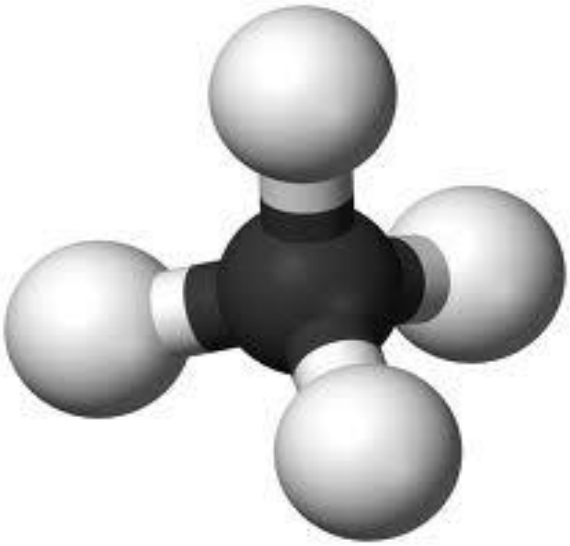
Salt: Many cubic NaCl molecules together



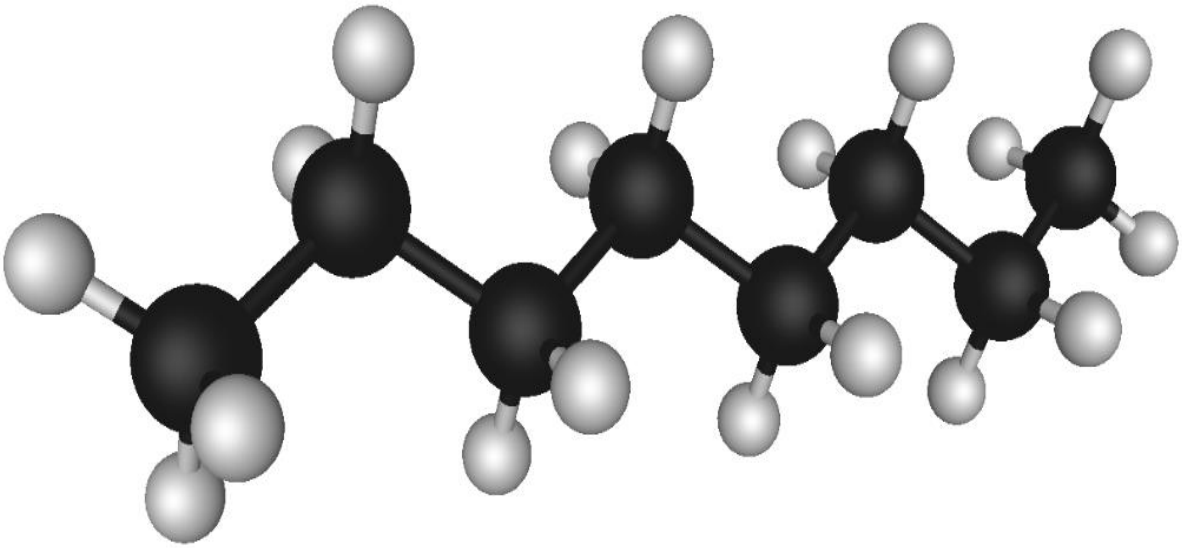
Water: H_2O (one molecule)



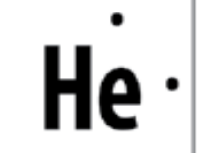
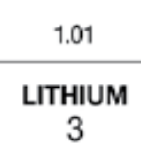
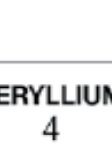
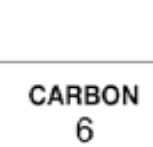
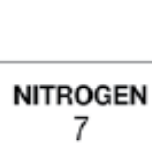
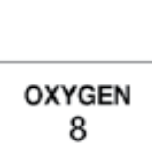
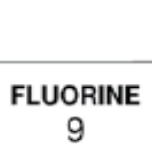
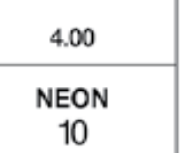
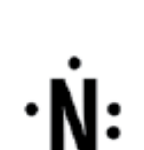
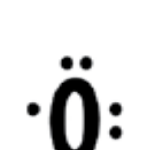
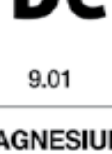
Hydrocarbon: CH_4 Methane



Hydrocarbon: C_8H_{18} Octane



LEWIS DOT DIAGRAMS
ELEMENTS 1–20

HYDROGEN 1  1.01							HELIUM 2  4.00
LITHIUM 3  6.94	BERYLLIUM 4  9.01	BORON 5  10.81	CARBON 6  12.01	NITROGEN 7  14.01	OXYGEN 8  16.00	FLUORINE 9  19.00	NEON 10  20.18
SODIUM 11  22.99	MAGNESIUM 12  24.31	ALUMINUM 13  26.98	SILICON 14  28.09	PHOSPHORUS 15  30.97	SULFUR 16  32.07	CHLORINE 17  35.45	ARGON 18  39.95
POTASSIUM 19  39.10	CALCIUM 20  40.08						

Name: _____ 5___

Build a Molecule Computer Sim

Learning Goals:

1. Describe the difference between a molecule name and chemical formula.
2. Distinguish between the coefficient and subscript in a chemical formula.
3. Use pictorial representations of molecules to generate chemical formulas.

First Tab

1. Make a molecule:
   a. How do you know you made a molecule? _____
   b. Write the molecule **name** of some molecules you made (ex. Water).

_____ _____
_____ _____
_____ _____

2. Molecule Names and Chemical Formulas:
   a. Compare the name and chemical formula for some molecules:

Molecule Name	Drawing	Chemical Formula

Second Tab

3. Make Many
   a. Fill all the collection boxes and then complete the questions for each Goal.

Goal: $4H_2$	
Draw it!	
What does the big '4' in $4H_2$ mean?	
What does the little '$_2$' in $4H_2$ mean?	

Goal: $2CO_2$	
Draw it!	
What does the big '2' in $2CO_2$ mean?	
What does the little '$_2$' in $2CO_2$ mean?	

Goal: $2O_2$	
Draw it!	
What does the big '2' in $2O_2$ mean?	
What does the little '$_2$' in $2O_2$ mean?	

Goal: $2NH_3$	
Draw it!	
What does the big '2' in $2NH_3$ mean?	
What does the little '$_3$' in $2NH_3$ mean?	

Third Tab Challenge

4. What's the biggest molecule you can make?
   a. Molecule Name: _____
   b. Chemical formula: _____

5. Can you make a molecule that can be broken into smaller molecules?
   a. Big molecule **name**: _____
   b. Big molecule **chemical formula**: _____
   c. Smaller molecule **names**: _____
   d. Smaller molecule **chemical formulas**: _____