CST:
Chem of I:E ld

A New Language

Chemcatalyst:

Q: Do you think both bottles contain gold? why or why not?

A:

Q: what do you think the symbols on the bottles mean?

A:

Notes:

- what is an element?
  - unique form of matter that is the building block of more complex matter
  - can exist on its own or in combination w/ other elements
  - can NOT be broken down into different substances
  - ~112 known elements
  - ALL matter is made up of an element or combination of elements
- what is a chemical symbol?
  - stands for an element's name
  - 1 or 2 letters
    - 1st is always capitalized, 2nd is lowercase
  - ex: Cu = Copper O = oxygen Zn = Zinc
- what is a chemical formula?
  - represents compounds = combination of 2 or more different elements
    - Compounds have different properties than the elements that make them
  - ex: H_2O = 2 atoms Hydrogen + 1 atom Oxygen

2 ↓ Subscript tells # of atoms

A New Language

Name:_____

Period: _____Date:_____

Purpose: The goal of this lesson is to give you practice making sense of some of the "language" of chemistry, and translating chemical names and formulas.

Look at each vial and fill in the data in the following table:

	Name	Chemical formula	Description
Vial 1	Sodium nitrate	$NaNO_3(aq)$	clear liquid
Vial 2	copper nitrate	$Cu(NO_3)_2$ (s)	Blue-green crystals
Vial 3	Copper hydroxide	$Cu(OH)_2$ (s)	blue-green crystals
Vial 4	hydrogen	H_2 (g)	Clear
Vial 5	Sodium nitrate	$NaNO_3$ (s)	white powder
Vial 6	Sodium hydroxide	NaOH (s)	white solid chunks
Vial 7	Copper sulfate	$CuSO_4$ (s)	turquoise crystals
Vial 8	Zinc	Zn (s)	silver, metallic powder
Vial 9	nitric acid	HNO_3 (aq)	clear liquid
Vial 10	Copper	Cu (s)	fine, brown powder
Vial 11	Sodium hydroxide	NaOH (aq)	clear liquid
Vial 12	copper oxide	CuO (s)	dark gray, coarse powder
Vial 13	water	H_2O (l)	clear liquid
Vial 14	Sulfuric acid	H_2SO_4 (aq)	clear liquid
Vial 15	zinc sulfate	$ZnSO_4$ (aq)	clear liquid
Vial 16	Copper sulfate	$CuSO_4$ (aq)	turquoise liquid
Vial 17	Copper nitrate	$Cu(NO_3)_2$ (aq)	turquoise liquid
Vial 18	copper sulfate & copper	$CuSO_4$ (aq) & (Cu (s))	turquoise liquid w/ fine brown powder

Answer the following questions:

1. Examine the contents of the vials and their labels. Write down at least six patterns you notice.

   Example: Every substance with the word sodium on it also has the symbol Na.

2. The following symbols represent elements. Identify each element.

   a) Cu b) H c) Zn

3. How would you translate the following words into chemical symbols?

   a) sulfate b) nitrate c) hydroxide

4. **Compounds** are substances that are made up of more than one element. On your data table place a "C" next to the number of each vial that contains a compound.

5. What do you think g, l, and s in parentheses stand for?

6. How would you write the chemical formula for ice?

7. What do all the substances labeled (aq) have in common?

8. Get Vial 18 from your instructor. Substances from two of the vials have been mixed together in Vial 18. Figure out the chemical formulas for the two substances.

Making Sense:
When you turned the penny silver on the first day of class, you used zinc, Zn (s), and sodium hydroxide, NaOH (aq). Do you think the penny was coated with silver, Ag(s)? Explain your reasoning.

If you finish early.....
Imagine you are in charge of organizing a chemistry stock room. It's your job to figure out where to store the substances in Vials 1 through 17. How would you organize them? Which things would you group together?

Making Sense Notes:

- What is the difference btwn a substance & a mixture?
  - substance: matter that has a uniform & unchanging chemical composition
    - ex: H_2O is always made of H & O
    - Salt water is NOT a substance because it is made of differing compositions @ different locations
  - mixture: combination of 2 or more pure substances in which each pure substance retains its individual chemical properties
    - ex: sand & water or salt & water
    - composition is variable
- What kinds of mixtures exist?
  - heterogenous: does not blend smoothly throughout; individual substances stay distinct
    - ex: Sand & water
  - homogenous: has constant composition throughout; mixes completely
    - ex: salt & water
    - aka solution
  - alloy: solid-solid solution of metals or a metal mixed with a nonmetal
    - ex: steel = iron & carbon
    - * our pennies were an alloy
      - we made brass = copper & zinc
- What do the letters in ( ) tell you?
  - the state of matter it is in
  - (g) = gas, (s) = solid, (l) = liquid, (aq) = aqueous, dissolved in water

Check In:

Q: Label = Na_2SO_4 (aq) What does it tell you?

A: 2 Sodium, 1 Sulfur, 4 Oxygen; dissolved in water