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| Law of Definite Proportions  CλeMis+ry: http://genest.weebly.com  Only a fool doesn't check their homework answers.  Students who get high grades find time to re-do homework as practice, after answers are given in class. |  | Name\_\_\_\_\_\_\_\_\_\_\_\_\_  Period\_\_\_\_\_\_\_\_\_\_\_\_\_ |

1. Proust’s Law says \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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| 2. With which brilliant realization is each most appropriately credited?  (You may wish to watch Friday’s history video again on our class website) | |
| \_\_\_\_\_\_\_\_ John Dalton  \_\_\_\_\_\_\_\_\_Josef Proust  \_\_\_\_\_\_\_\_\_Guy Lussac  \_\_\_\_\_\_\_\_\_ Lavoisier | 1. *if something is a 'substance' it has a fixed ratio of elements in it that NEVER varies.* 2. *the atoms in matter come in versions. These versions are called elements.* 3. *The mass of a chemical is the same as the ingredients that went into it. Mass cannot disappear magically.* 4. *Some particles of pure elements contain two atoms of that element.* |

Use the following information about the masses of elements in each pair of compounds to help you suggest formulas that account for these ratios.

**3. Compounds of carbon and oxygen**

Compound A: 57.1 g O / 42.9 g C

Compound B: 72.7 g O and 27.3 C

a. Determine the value of the ratio  in each compound. A \_\_\_\_ B \_\_\_\_\_

b. How does the mass ratio for compound B compare to that in compound A?

c. Express these ratios as improper fractions.

d. For each hypothesis, sketch particle diagrams for the compounds of A and B that account for these mass ratios. Write the formula for the compound in each diagram.

**Hypothesis 1 Hypothesis 2**

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| Atoms of C and O have the same mass | Atoms of O are heavier than C atoms by the ratio in compound A. |
| A | A |
| B | B |

**4. Compounds of copper and oxygen**

Compound A: 79.9 g Cu / 20.1 g O

Compound B: 88.8 g Cu / 11.2 g O

a. Determine the value of the ratio  in each compound. A \_\_\_\_ B \_\_\_\_\_

b. How does the mass ratio for compound B compare to that in compound A?

c. Express these ratios as improper fractions.

d. For each hypothesis, sketch particle diagrams for the compounds of A and B that account for these mass ratios. Write the formula for the compound in each diagram.

Hypothesis 1 Hypothesis 2

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| Atoms of Cu and O have the same mass | Cu atoms are heavier than O atoms by the ratio in compound A. |
| A | A |
| B | B |

e. Which hypothesis seems more reasonable to you? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**5. Compounds of copper and chlorine**

Compound A: 35.9 g of Cl / 64.1 g of Cu

Compound B: 52.8 g of Cl / 47.2 g Cu

a. Determine the value of the ratio  in each compound. A \_\_\_\_ B \_\_\_\_

b. How does the mass ratio for compound B compare to that in compound A?

c. What are the simplest formulas for compounds A and B? Explain your reasoning.

6. Table sugar is a compound known as sucrose. Sucrose is composed of the elements carbon, hydrogen, and oxygen. Analysis of a 20.0 g of sucrose from a bag of sugar finds that the sugar is composed of 8.44 g of carbon, 1.30 g of hydrogen, and 10.26 g of oxygen.

* 1. Express, as fractions, the ratio of the mass of each element to the total mass of the sample.
  2. Using these ratios, calculate the percent composition by mass of each element in the compound.

7. A similar chemical analysis is performed on a 500.0 g sample of the sugar isolated from a sample of pure sugar cane. Analysis shows this sample contains 211.0 g of carbon, 32.5 g of hydrogen, and 256.5 g of oxygen.

* 1. Determine the percent composition by mass of each element in the sugar cane sample.
  2. Could the sugar in this sample be sucrose? Justify your conclusion.

8. A similar chemical analysis is performed on a 200.0g sample of the sugar found in corn syrup. This sample contains 80.0g of carbon, 13.3 g of hydrogen and 106.7 g of oxygen.

1. Determine the percent composition by mass of each element in the sugar cane sample.
2. Could the sugar in corn syrup be sucrose? Justify your conclusion.

9. You should memorize which elements exist as **diatomic molecules**. They are: hydrogen, nitrogen, oxygen, fluorine, chlorine, bromine, iodine

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| In this box, draw one molecule of each: |

1. *When fluorine is by itself, with no other elements,* how many atoms of bromine will be in that molecule ? ( 1 / 2 / variable )
2. *When fluorine is in a compound, with one or more other elements,* how many atoms of fluorine will be in that molecule ? ( 1 / 2 / variable )

12. . In the box draw 5 O2 and 3 C2H4 molecules.

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| This box contains \_\_\_\_\_ hydrogen atoms \_\_\_ carbon atoms and \_\_\_ oxygen atoms.  Altogether this box contains \_\_\_\_\_\_\_ molecules (\_\_\_\_\_ C2H4 and \_\_\_\_\_\_\_ O2) |