**Formula Mass**

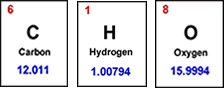
|  |  |  |
| --- | --- | --- |
| **Student Objectives:** | | |
| * Use mass numbers from the periodic table to calculate the formula mass of any compound. * Use a formula mass calculation to determine the percentage composition of a compound. |  |  |

**Formula Mass:**   
**the sum of all the atomic masses in a formula.**

|  |  |
| --- | --- |
|  | **To make these calculations easier, round all atomic mass numbers to the nearest whole number.** |

**Sample Problem: calculate the formula mass of C2H5OH**

Use atomic mass from the Periodic Table.



Set up your calculation this way:



**element = (atomic mass) (# of atoms) =** u

|  |  |  |  |
| --- | --- | --- | --- |
| |  |  |  | | --- | --- | --- | | C = 12 x 2 = 24 H =   1 x 6 =   6 O = 16 x 1 = 16 **46** **u** |  | **Your formula mass calculations should look like this.**  **Units must be included.** | |

The units of formula mass are "atomic mass units" - u



A web-based **formula mass calculator**.



|  |  |
| --- | --- |
| |  | | --- | | **Concept Understanding:**   * Explain this statement: "Every molecular mass is a formula mass, but not every formula mass is a molecular mass". * Work these formula mass **practice problems**. Remember that you must show how chemistry problems are set up and the units of the answer. | |

**Percentage Composition:**   
**the percentage of the formula mass represented by each element.**

**Percentage composition compares the mass of one part of a substance to the mass of the whole.**

**Calculating percentage composition:**

Do a formula mass calculation.   
Divide the total atomic mass for each element by the total formula mass of the compound.



**Example:** Calculate the percentage composition of C2H5OH



|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | | The formula mass step | | | | . | The percentage calculation step | |  | **Your % composition calculations should look like this.** | | C   = | 12 X 2 | = | 24 | . | 24 / 46 | =   52% Carbon | | H   = | 1 X 6 | = | 6 | . | 6 / 46 | =   13% Hydrogen | | O   = | 16 X 1 | = | 16 | . | 16 / 46 | =   35% Oxygen | | . | Total = 46 u | | | | . | . | |

Because of rounding mass numbers to whole numbers, the total % could be between 99 and 101. If it is outside that range, you probably have a mistake.

|  |  |
| --- | --- |
| |  | | --- | | **Concept Understanding:**   * Work these percentage composition **practice problems**. | |

**Research Links:**

* [**Percentage Composition Practice**](http://dbhs.wvusd.k12.ca.us/Stoichiometry/Percent-Composition-Part1.html) **- Diamond Bar High School**