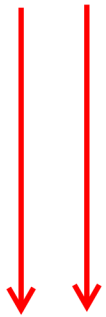
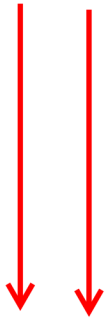
**Empirical Formula Calculation:**

eg 1 determine the empirical formula for a compound that is 39.99 % C, 6.73 % H and 53.28 % O by mass.

The Question!!



Scroll down all seven pages to see a full explanation



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eg 1 determine the empirical formula for a compound that is 39.99 % C, 6.73 % H and 53.28 % O by mass.

In a 100 g sample: (makes the calculation easier)

C:

H:

O:

This is used for convenience. Any mass would work, however, using 100 g makes conversion of percentages to g very simple

One entry per type of atom

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eg 1 determine the empirical formula for a compound that is 39.99 % C, 6.73 % H and 53.28 % O by mass.

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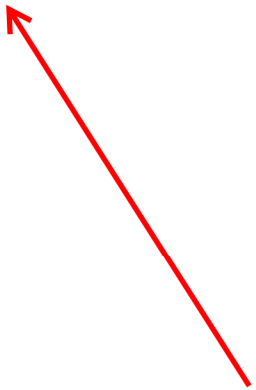
C: 39.99 g

H: 6.73 g

O: 53.28 g



Percentages converted to mass in g

**Empirical Formula Calculation:**

eg 1 determine the empirical formula for a compound that is 39.99 % C, 6.73 % H and 53.28 % O by mass.

Please note inclusion of units!!!

In a 100 g sample: (makes the calculation easier)

C: $39.99\ g \times \frac{1\ mol}{12.01\ g} = 3.330\ mol$

H: $6.73\ g \times \frac{1\ mol}{1.01\ g} = 6.663\ mol$

O: $53.28\ g \times \frac{1\ mol}{16.00\ g} = 3.330\ mol$

Please note the rounding technique used here. Each atomic mass has been rounded to two decimal places to speed up calculations (small error introduced). Note the inclusion of zeros as 15.9994 is rounded to 16.00 - please do this!

This ratio is based on the fact that a moles worth of atoms will have the same mass as the average atomic mass as stated on the periodic table. Each "conversion factor" is such that the numerator and denominator represents the same quantity. The effect of the conversion factor is mass in g in changed to amount in mol (moles)

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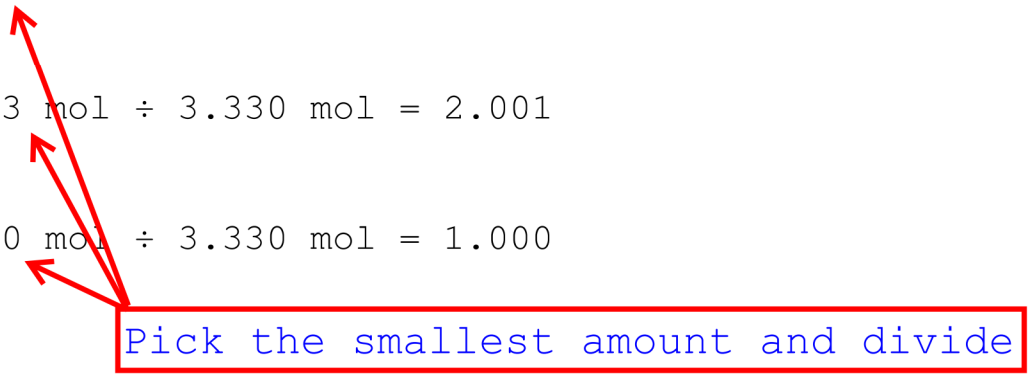
H: $6.73\ g \times \frac{1\ mol}{1.01\ g} = 6.663\ mol \div 3.330\ mol = 2.001$

O: $53.28\ g \times \frac{1\ mol}{16.00\ g} = 3.330\ mol \div 3.330\ mol = 1.000$




* always divide by the smallest amount (in mol)

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O: $53.28\ g \times \frac{1\ mol}{16.00\ g} = 3.330\ mol \div 3.330\ mol = 1.000 \simeq 1$

Approximately equal sign - do not round unless close

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** round as appropriate

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Therefore the empirical formula is $CH_2O$

Conclusion is based on mole ratios

* always divide by the smallest amount (in mol)

** round as appropriate