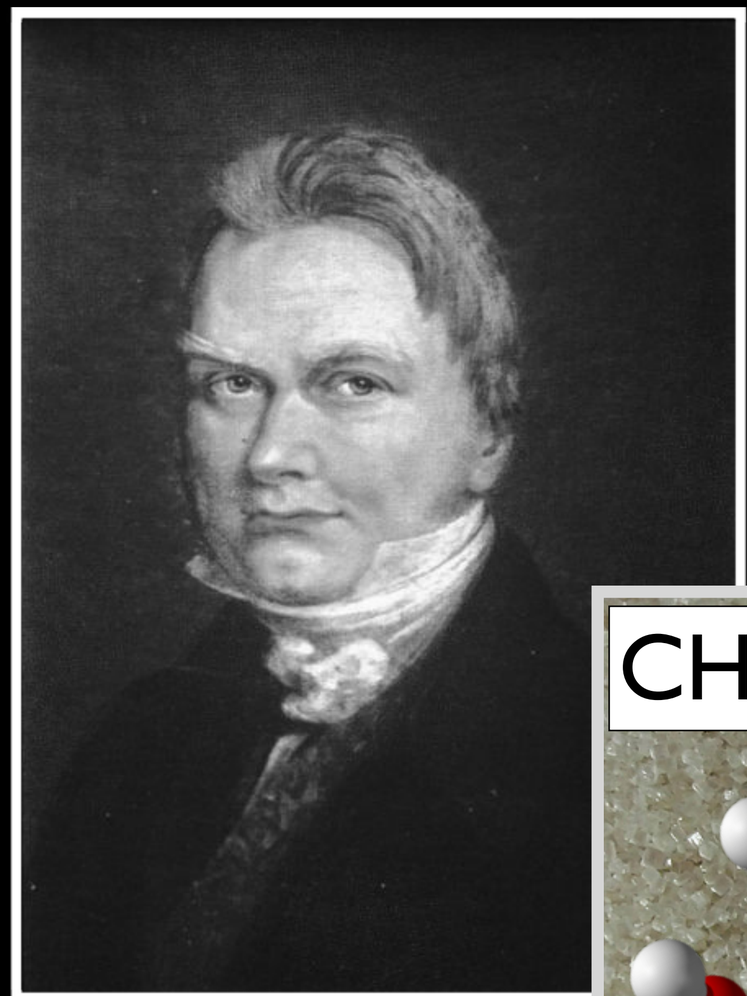
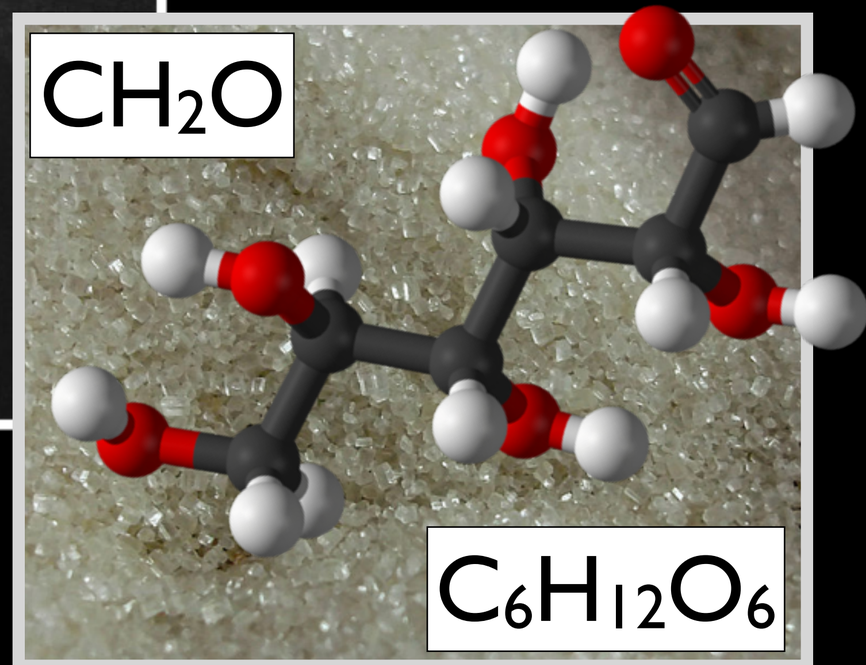
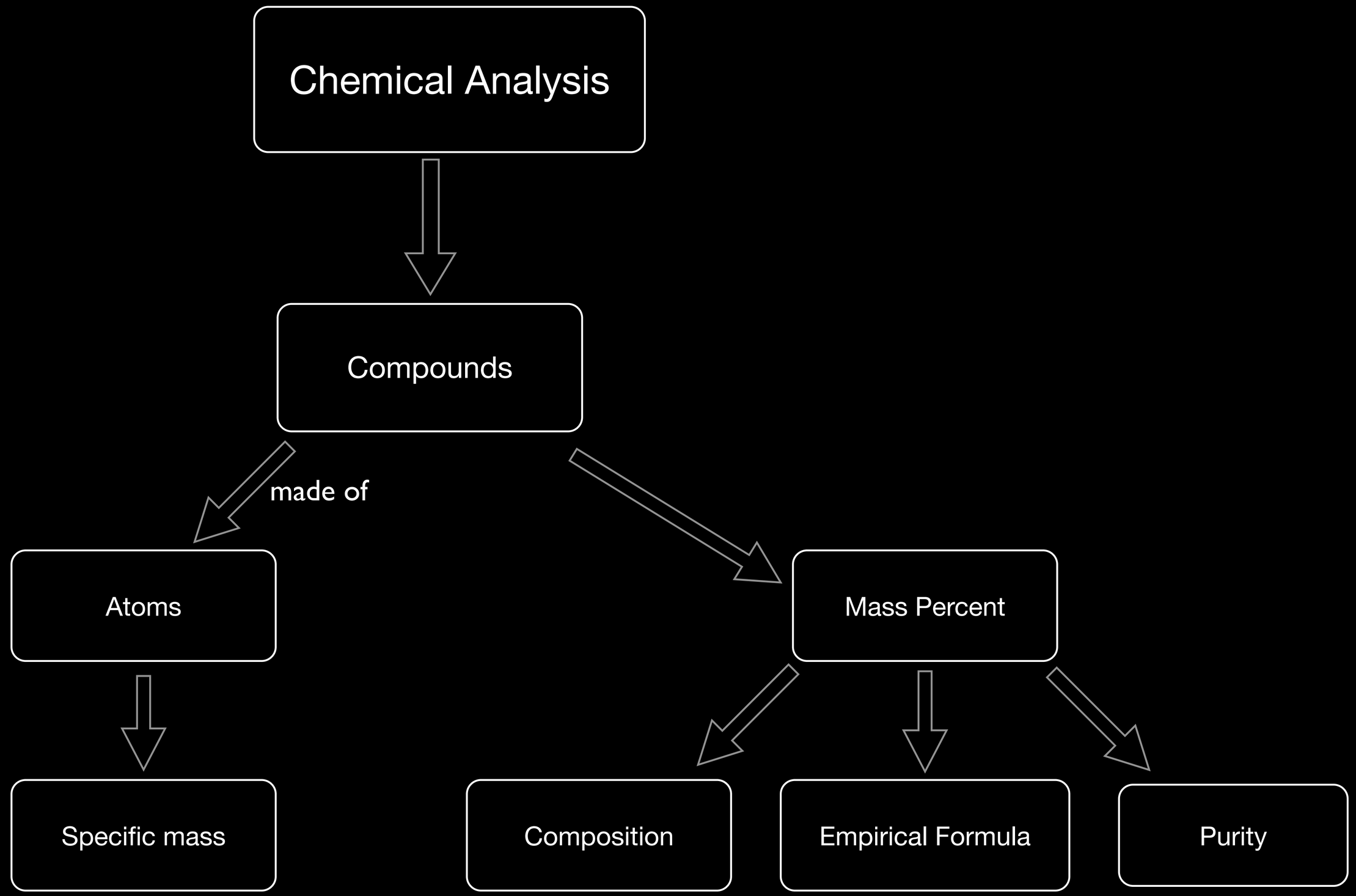
Chemical Analysis



Jöns Jacob Berzelius

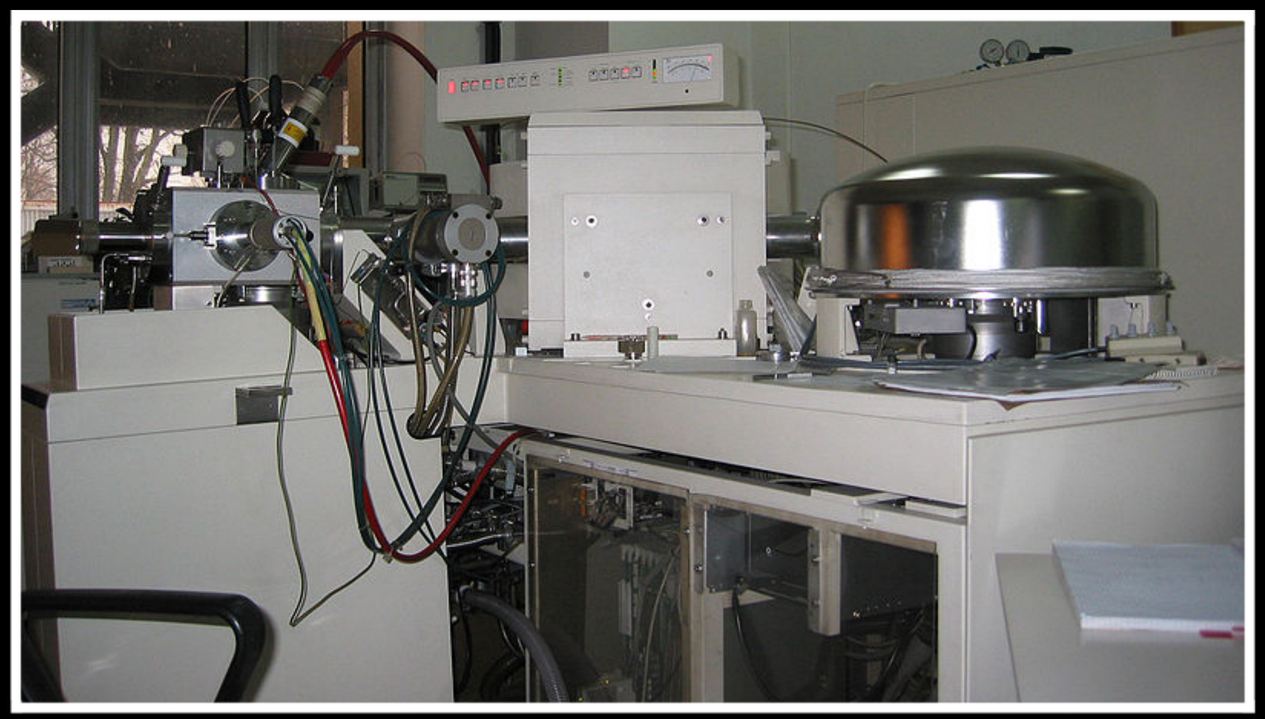


Chemistry Essentials - 002


Chemical Analysis
Compounds
made of
Atoms
Specific mass
Mass Percent
Composition
Empirical Formula
Purity

Determine empirical formula:

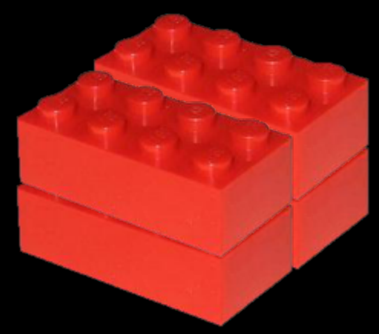
Vitamin C



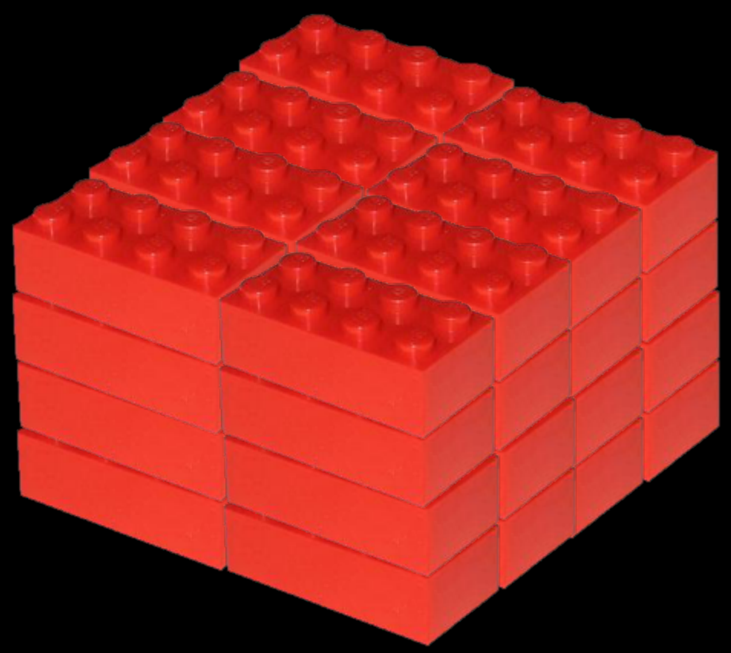
```
> Analysis
>
> 61.38 g CARBON
> 6.87 g HYDROGEN
> 81.75 g OXYGEN
> Done
>
```

Explanation

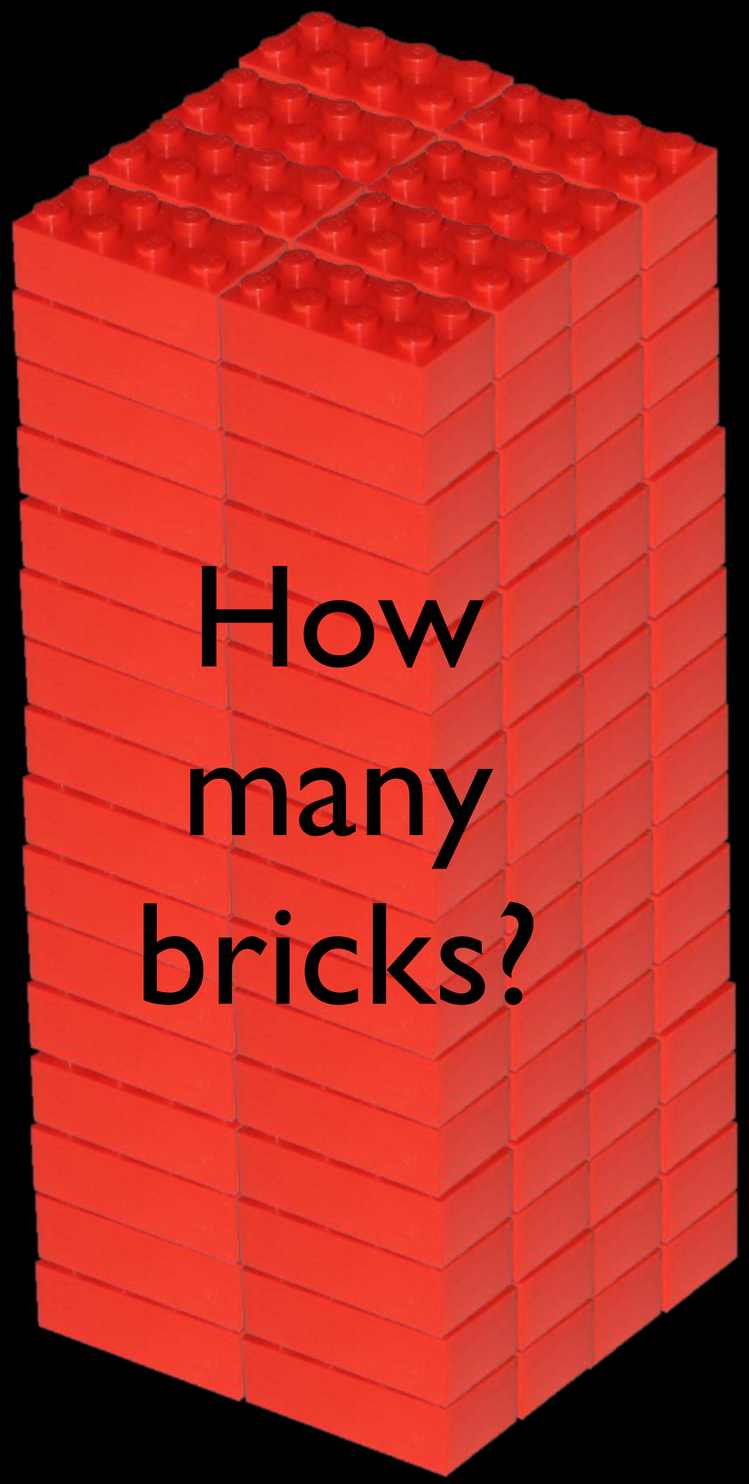
$$\frac{2.5 \text{ grams}}{1 \text{ brick}} \rightarrow 2.5 \text{ g/brick}$$



$$\frac{10 \text{ grams}}{4 \text{ bricks}} \rightarrow 2.5 \text{ g/brick}$$



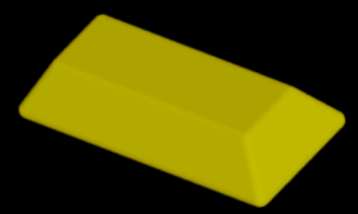
$$\frac{80 \text{ grams}}{32 \text{ bricks}} \rightarrow 2.5 \text{ g/brick}$$



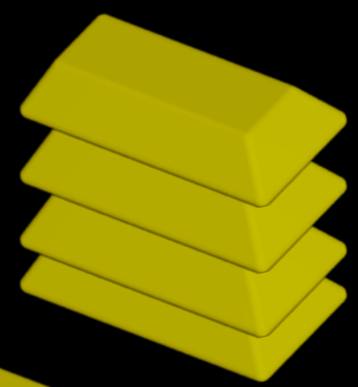
How many bricks?

$$320\ \cancel{\text{grams}} \times \frac{1\ \text{brick}}{2.50\ \cancel{\text{grams}}} = 128\ \text{bricks}$$

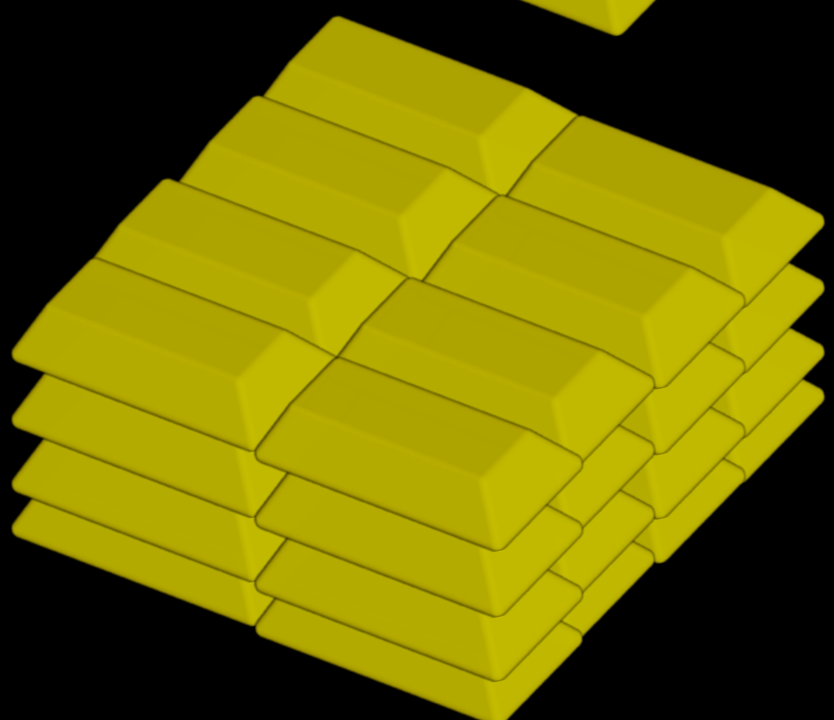
Element



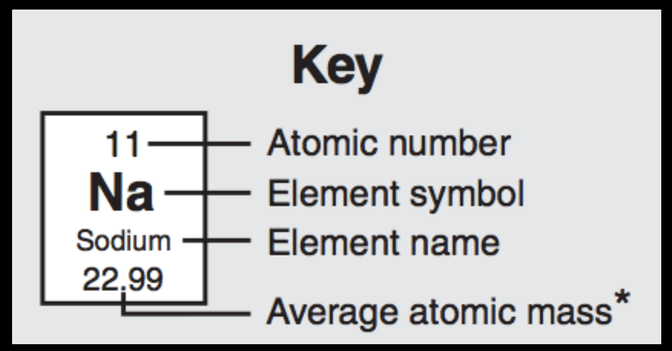
$$\frac{197 \text{ grams}}{1 \text{ mol}} \rightarrow 197 \text{ grams/mol}$$

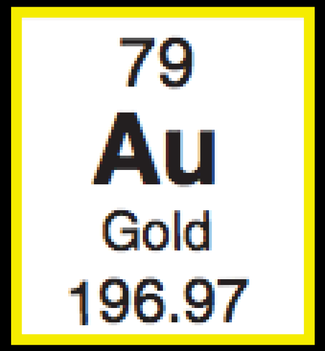


$$\frac{788 \text{ grams}}{4 \text{ mol}} \rightarrow 197 \text{ grams/mol}$$



$$\frac{6304 \text{ grams}}{32 \text{ mol}} \rightarrow 197 \text{ grams/mol}$$





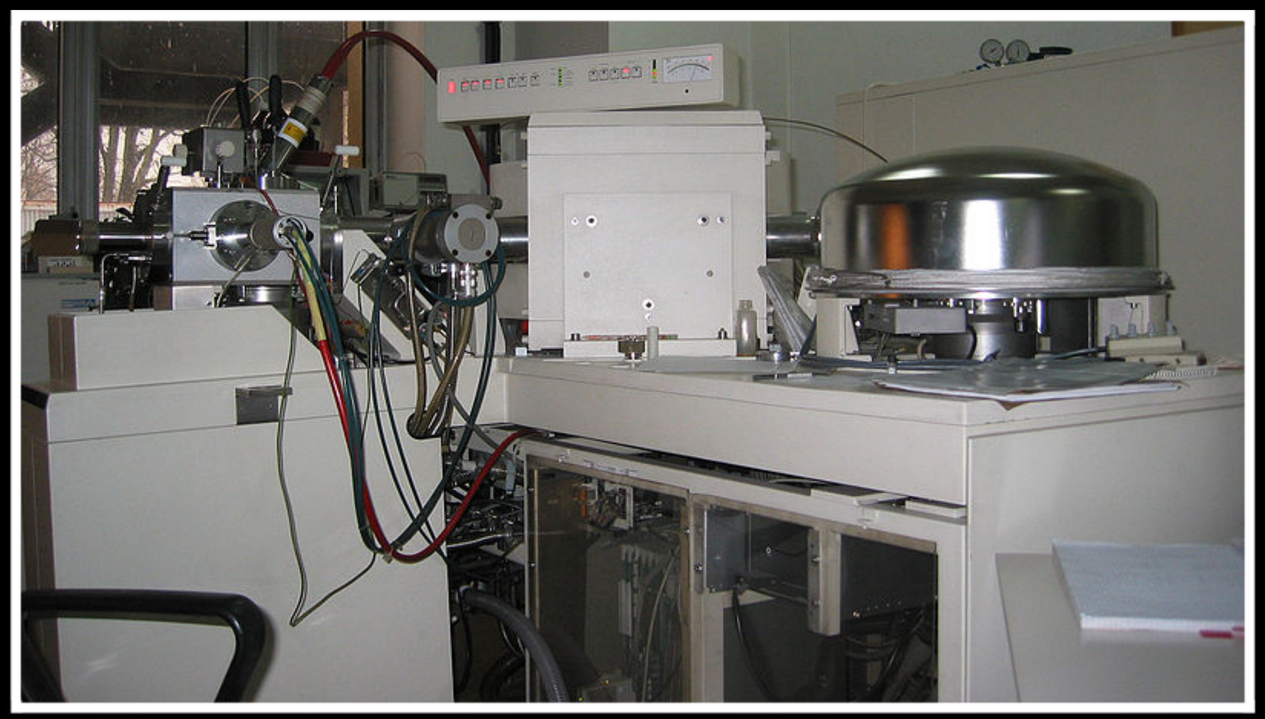
Convert to mole:

79
Au
Gold
196.97

$$56.7\ \cancel{\text{grams}} \times \frac{1\ \text{mol}}{197\ \cancel{\text{grams}}} = .288\ \text{mole}$$

Determine empirical formula:

Vitamin C



```
> Analysis
>
> 61.38 g CARBON
> 6.87 g HYDROGEN
> 81.75 g OXYGEN
> Done
>
```

Determine empirical formula:

$$61.38\ \cancel{g\ C} \times \frac{1\ mol}{12.01\ \cancel{g\ C}} = 5.11\ mol\ C$$

$$6.87\ \cancel{g\ H} \times \frac{1\ mol}{1.01\ \cancel{g\ H}} = 6.80\ mol\ H$$

$$81.75\ \cancel{g\ O} \times \frac{1\ mol}{16.00\ \cancel{g\ O}} = 5.11\ mol\ O$$

6 **C** Carbon 12.01	1 **H** Hydrogen 1.01	8 **O** Oxygen 16.00

Determine empirical formula:

5.11 mol C / 5.11 = 1

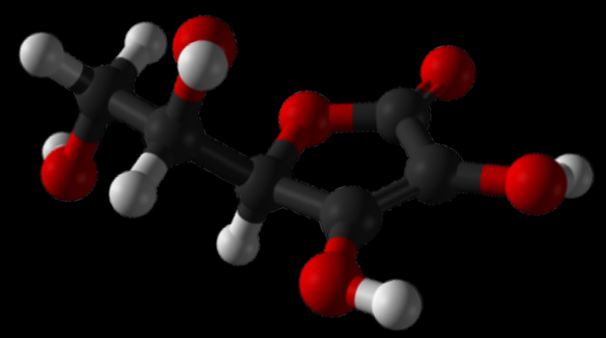
6.80 mol H / 5.11 = 1.33

5.11 mol O / 5.11 = 1

$CH_{1.33}O$

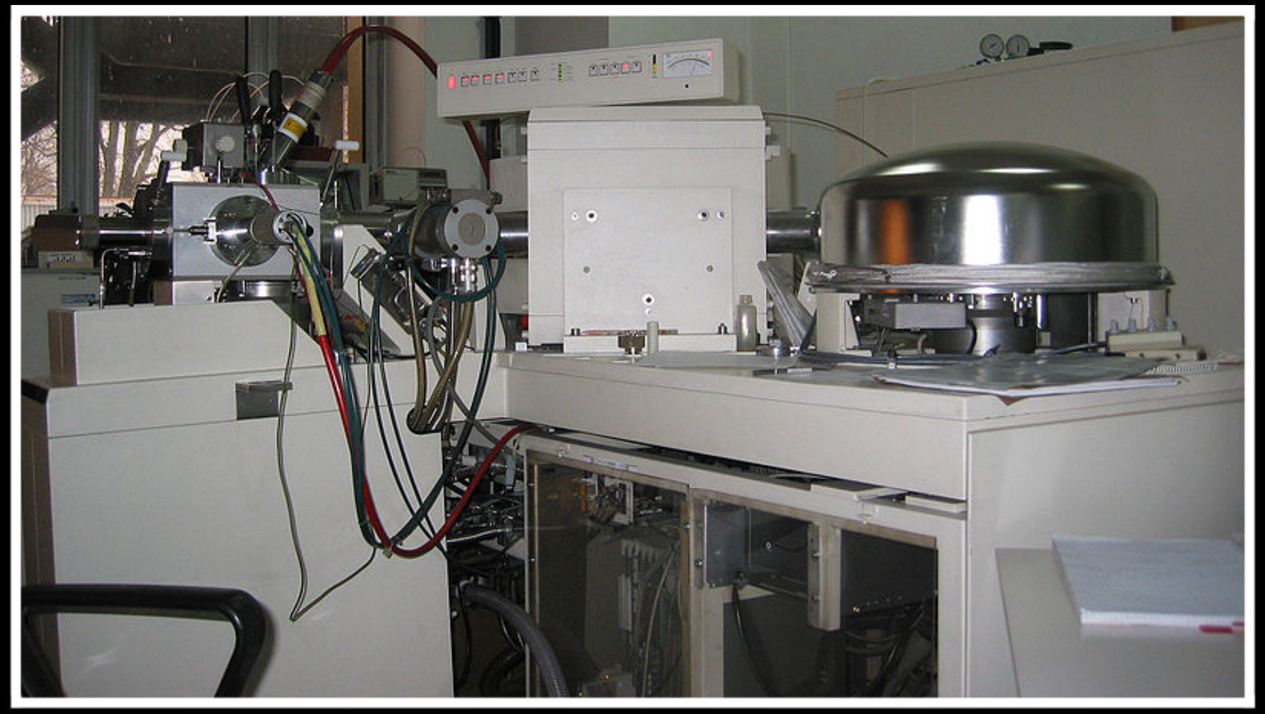
$C_3H_4O_3$

Empirical Formula

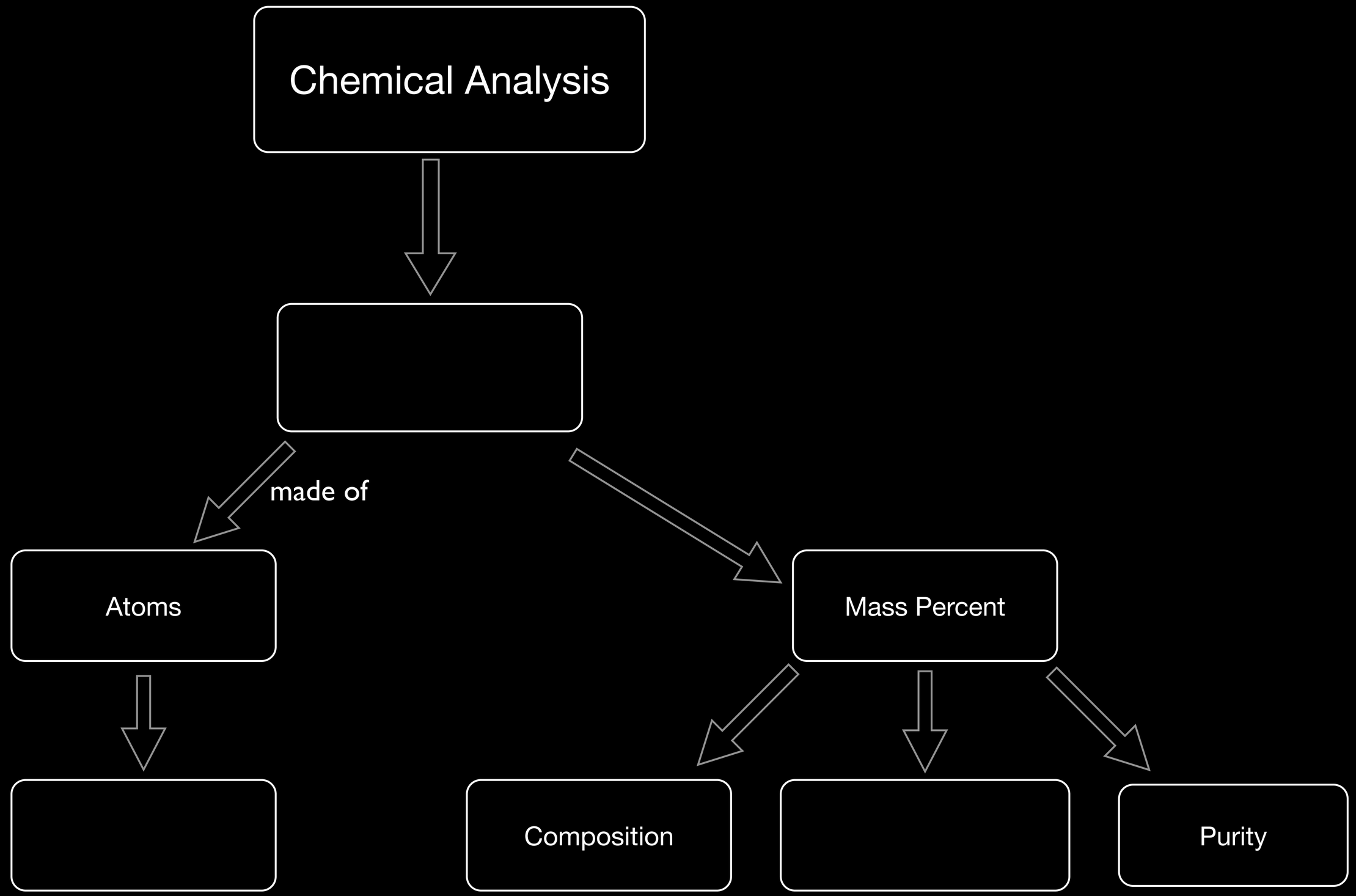


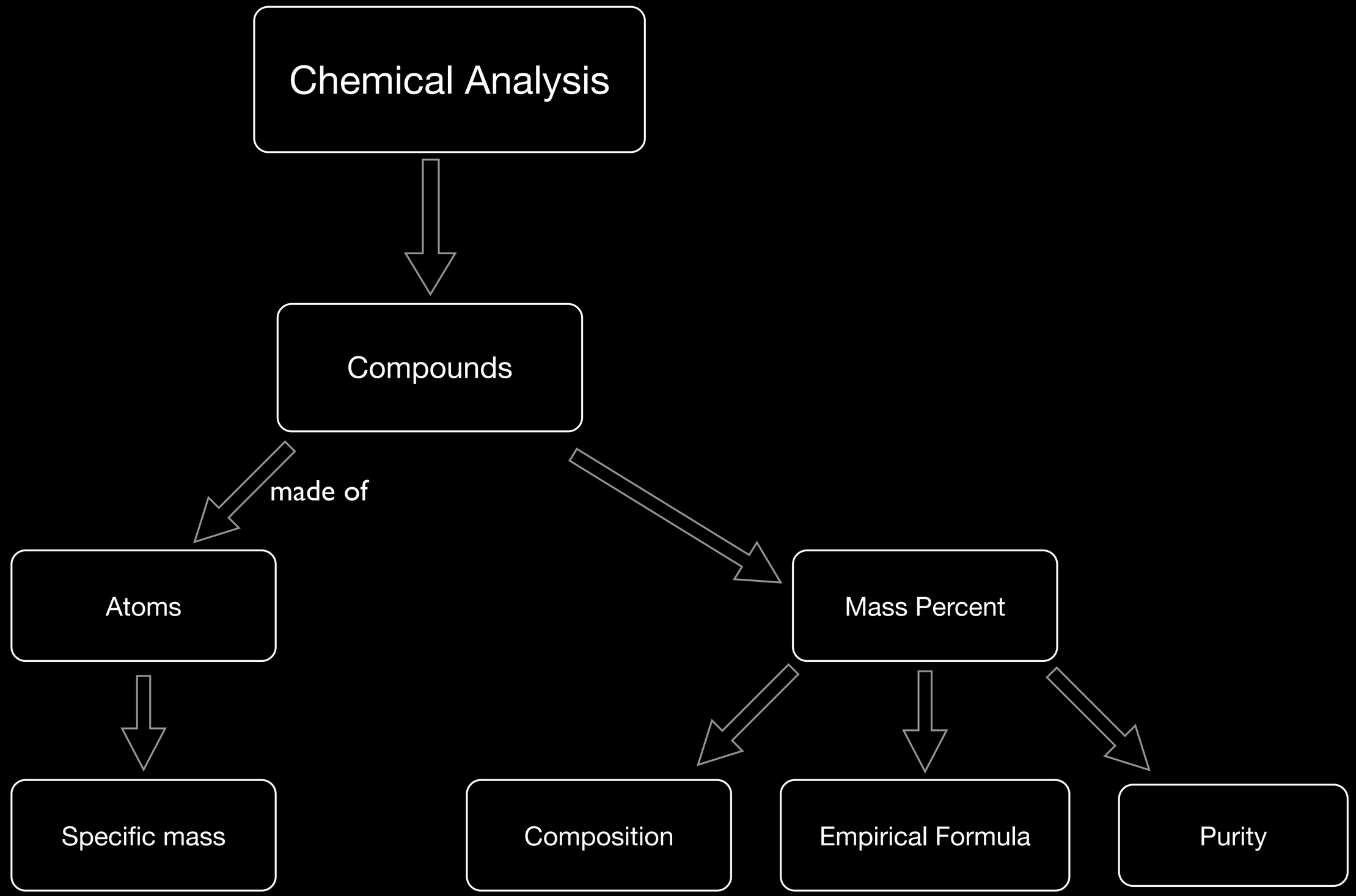
Purity

Vitamin C



```
> Analysis
>
> 61.38 g CARBON
> 6.87 g HYDROGEN
> 81.75 g OXYGEN
> .006 g MERCURY
> .013 g PALLADIUM
> DONE
>
```


Chemical Analysis
made of
Atoms
Mass Percent
Composition
Purity


Chemical Analysis
Compounds
made of
Atoms
Specific mass
Mass Percent
Composition
Empirical Formula
Purity

Did you learn?

Use mass data to identify or infer composition of pure substances and/or mixtures.

Use mass data in order to justify a claim regarding the identity and/or estimated purity of a substance.

Acknowledgements

"File:2oz Gold Engelhard.JPG," March 26, 2013. http://en.wikipedia.org/w/index.php?title=File:2oz_gold_Engelhard.JPG&oldid=502536502.
File:Ascorbic Acid (2).JPG, n.d. http://commons.wikimedia.org/wiki/File:Ascorbic_acid_(2).JPG.
"File:Ascorbic-Acid-from-Xtal-1997-3D-Balls.png," July 29, 2013. http://en.wikipedia.org/wiki/File:Ascorbic-acid-from-xtal-1997-3D-balls.png.
"File:D-Glucose-Chain-3D-Balls.png," July 29, 2013. http://en.wikipedia.org/wiki/File:D-glucose-chain-3D-balls.png.
File:FAB MS.jpg, n.d. http://commons.wikimedia.org/wiki/File:FAB_MS.jpg.
File:Gold Bar.png, n.d. http://commons.wikimedia.org/wiki/File:Gold_bar.png.
"File:Jöns Jacob Berzelius.jpg," July 29, 2013. http://en.wikipedia.org/wiki/File:J%C3%B6ns_Jacob_Berzelius.jpg.

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