

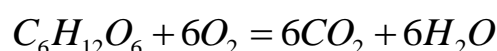
## Answer on Question #85059 – Chemistry – Other

### Task:

In an extremely explosive reaction between Glucose ( $C_6H_{12}O_6$ ) and Oxygen, 294.7 g of water is produced when 500 grams of glucose is combusted. What is the percent yield of this reaction? (remember that the products of a combustion reaction are water and carbon dioxide).

### Solution:

The equation for the combustion of glucose is:



Molar Masses of Glucose and Water:

$$M(C_6H_{12}O_6) = 6 * Ar(C) + 12 * Ar(H) + 6 * Ar(O);$$

$$M(C_6H_{12}O_6) = 6 * 12 + 12 * 1 + 6 * 16 = 180 \text{ g/mol}$$

$$M(H_2O) = 2 * Ar(H) + Ar(O) = 2 * 1 + 16 = 18 \text{ g/mol}$$

According to the chemical reaction equation:

$$n(C_6H_{12}O_6) = \frac{n(H_2O)}{6};$$

$$\frac{m(C_6H_{12}O_6)}{M(C_6H_{12}O_6)} = \frac{m(H_2O)}{6 * M(H_2O)};$$

Then,

$$m_{theor}(H_2O) = \frac{6 * M(H_2O) * m(C_6H_{12}O_6)}{M(C_6H_{12}O_6)};$$

$$m_{theor}(H_2O) = \frac{6 * 18 \text{ g/mol} * 500 \text{ g}}{180 \text{ g/mol}} = 300 \text{ g}$$

The percentage yield is calculated by dividing the amount of the obtained desired product by the theoretical yield:

$$\text{percent yield} = \frac{\text{actual yield}}{\text{theoretical yield}} * 100\%$$

$$m_{\text{theor}}(H_2O) = 300\text{ g}$$

$$m_{\text{actual}}(H_2O) = 294.7\text{ g}$$

Since less than what was calculated was actually produced, it means that the reaction's percent yield must be *smaller* than 100%.

$$\% \text{ yield} = \frac{m_{\text{actual}}(H_2O)}{m_{\text{theor}}(H_2O)} * 100\%$$

$$\% \text{ yield} = \frac{294.7\text{ g}}{300\text{ g}} * 100\% = 98.23\%$$

$$\% \text{ yield} = 98.23\%$$

**Answer:** 98.23% is the percent yield of this reaction.

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