

## % Yield

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

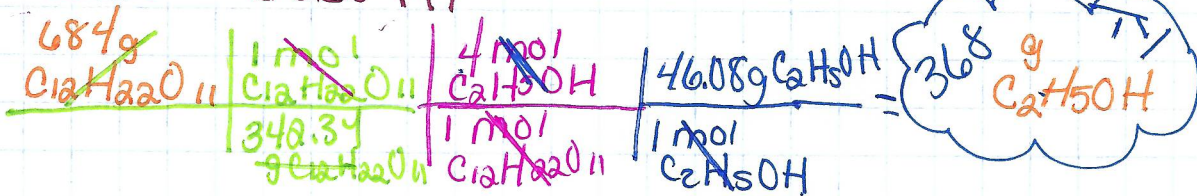
- actual yield - actual amount of product made if you really did the reaction  
AY
- theoretical yield - amount of product you get by doing stoichiometry, what you would get if everything were perfect  
TY

### Examples

1) Ethanol ( $C_2H_5OH$ ) is produced from the fermentation of sugar ( $C_{12}H_{22}O_{11}$ ) in the presence of enzymes.



Determine the theoretical yield of ethanol if 684g of sugar undergoes fermentation. What is the % yield if 349g of ethanol are actually produced?  
 GIVEN TY  
 GIVEN AY



MM

$$\begin{aligned} C & 12 \times 12.01g = 144.12g \\ H & 22 \times 1.01g = 22.22g \\ O & 11 \times 16.00g = 176.00g \\ \hline & 342.34g \end{aligned}$$

MM

$$\begin{aligned} C & 2 \times 12.01g \\ H & 6 \times 1.01g \\ O & 1 \times 16.00g \\ \hline & 46.08g \end{aligned}$$

$$\% \text{ yield} = \frac{AY}{TY} \times 100$$

$$= \frac{349g}{368g} \times 100 = 94.8\%$$

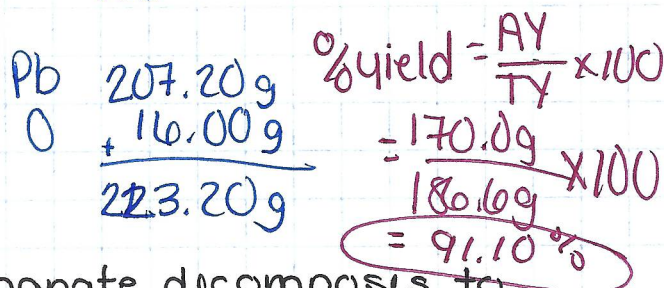
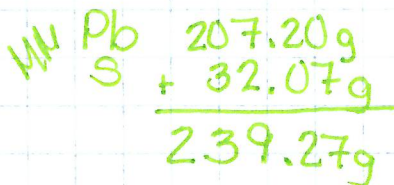
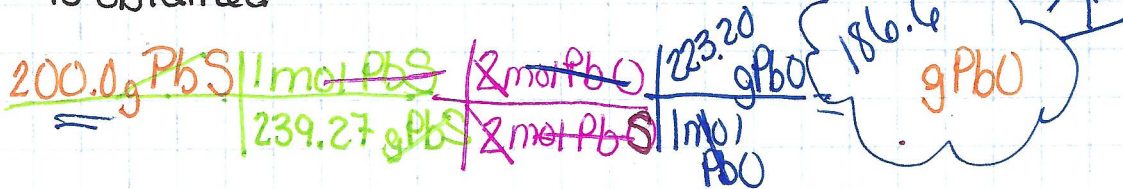
2. Lead (II) oxide is obtained by roasting galena (lead (II) sulfide), in air. The unbalanced equation is:



A. Balance the equation and determine the theoretical yield of lead (II) oxide if 200.0g of lead (II) sulfide is heated.

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B. What is the % yield if 170.0g of lead (II) oxide is obtained?



3. Upon heating, calcium carbonate decomposes to calcium oxide and carbon dioxide.

A. Write the balanced equation and determine the theoretical yield of  $\text{CO}_2$  when 235.0g of calcium carbonate is heated.

B. What is the % yield if 97.5g of carbon dioxide is collected?