

Percent Yield

3/13/2015

Warm Up 3/13/2015



- Methanogens are bacteria that live in the guts of cows helping them digest grass. They generate methane (CH_4) as a byproduct of metabolism using the following equation:

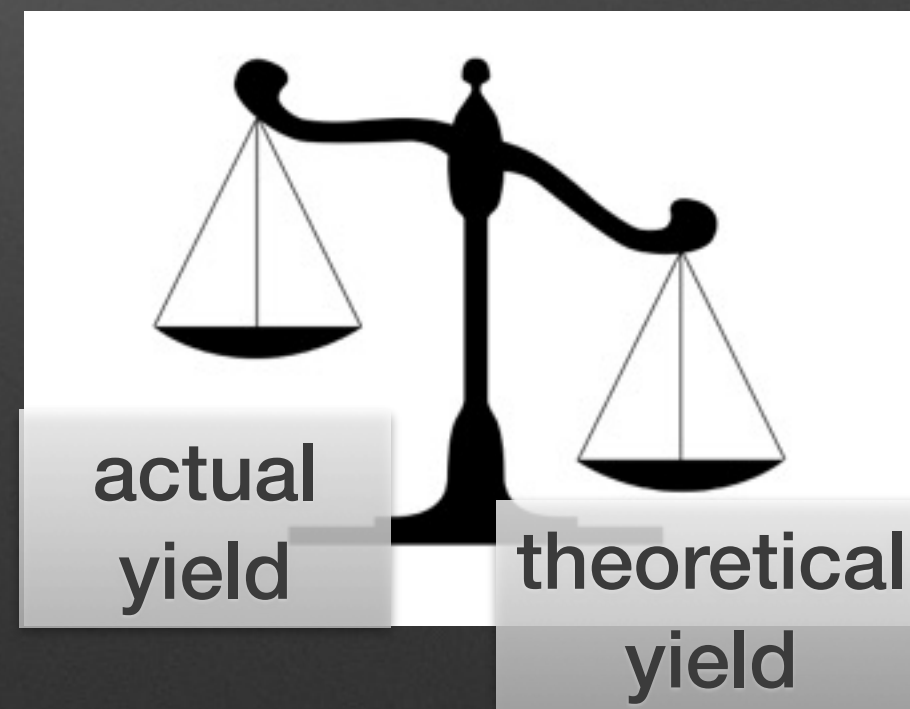


- In a reactor you have 45g of CO_2 and 18g of H_2 . How much methane can bacteria generate?
 - Identify the limiting reagent
 - Identify the excess reagent
 - How much excess reagent remains unused in the reaction?

Percent Yield

- Amount of product calculated from balanced equation is the **theoretical yield**.
- In life nothing is perfect, so not all the theoretical yield is formed. The amount produced/measured from an experiment is the **actual yield**.

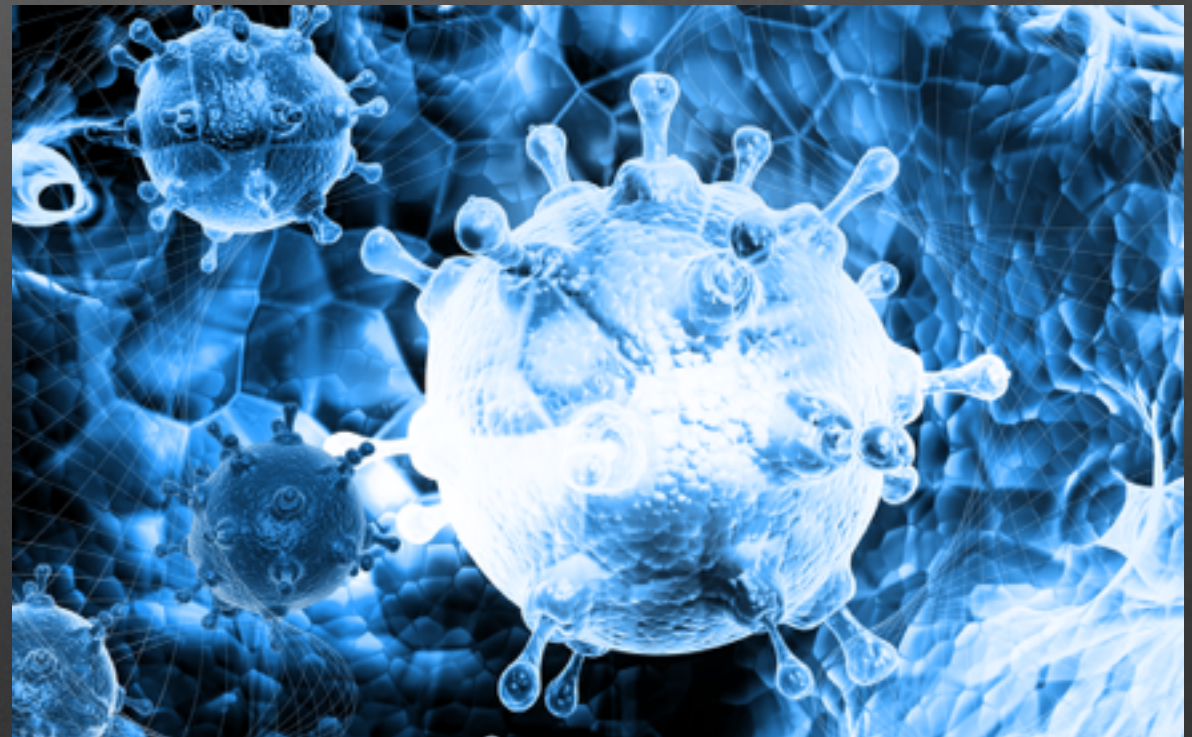
$$\frac{\text{actual yield}}{\text{theoretical yield}} \times 100 = \text{Percent Yield}$$



Life isn't perfect or efficient...

- The methanogens in the previous example only actually produce 13.62 grams of CH₄. What is their percent yield?

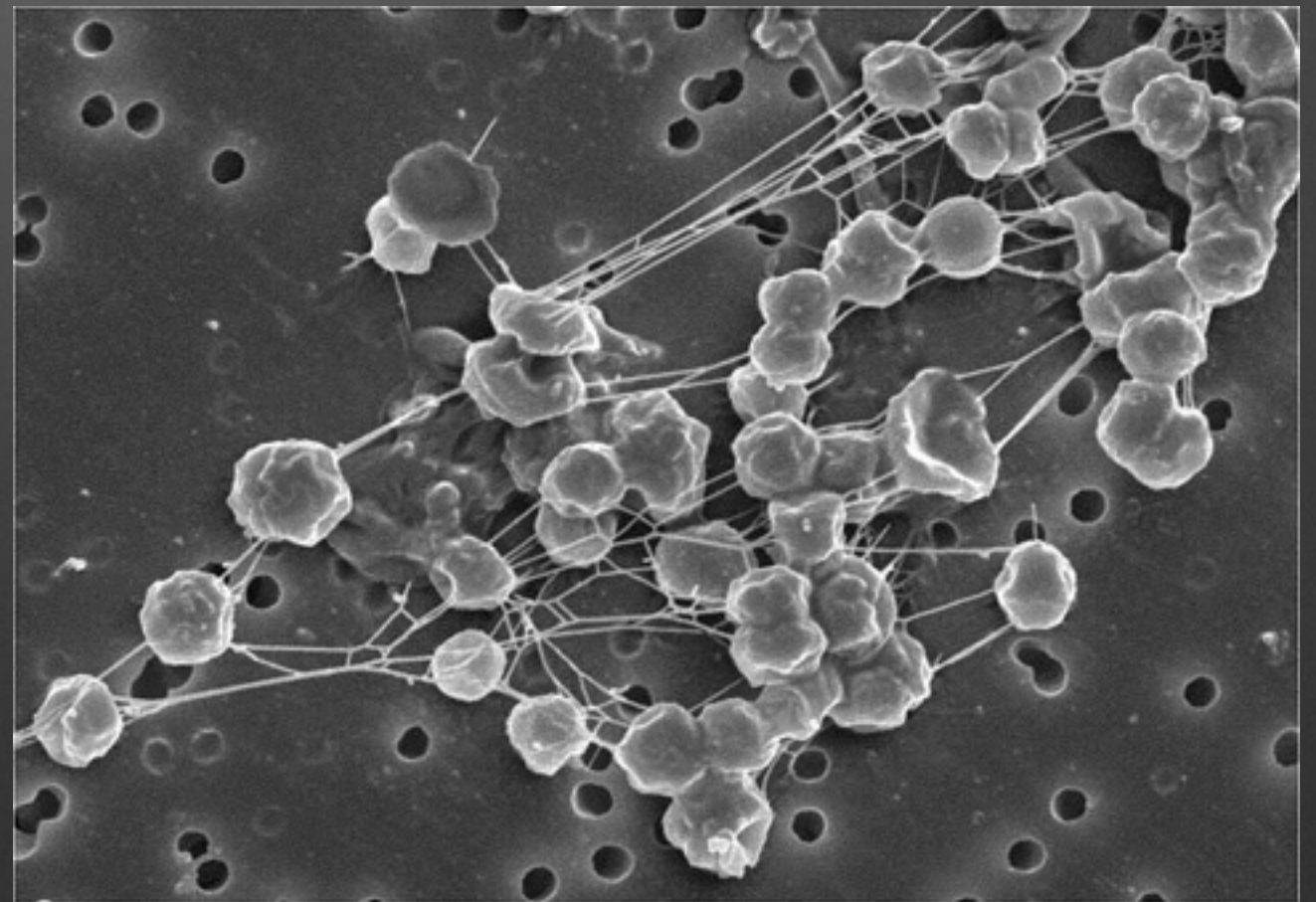
$$\frac{\text{actual yield}}{\text{theoretical yield}} \times 100 = \text{Percent Yield}$$



A new species....

- A new species of methanogens are discovered who have a 76% yield for methane, how much methane can they produce from the previously determined values?

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



Exit Ticket

- Why would you add extra reagent to increase your product?



- think about....



Warm Up - 3/17/2015



If you have 1 kg of gas in your tank, and 2kg of available oxygen, how much CO_2 will you produce? How much excess reagent is left over?

Step 1: Determine limiting reagent.

Step 2: Determine excess reagent used from limiting reagent.

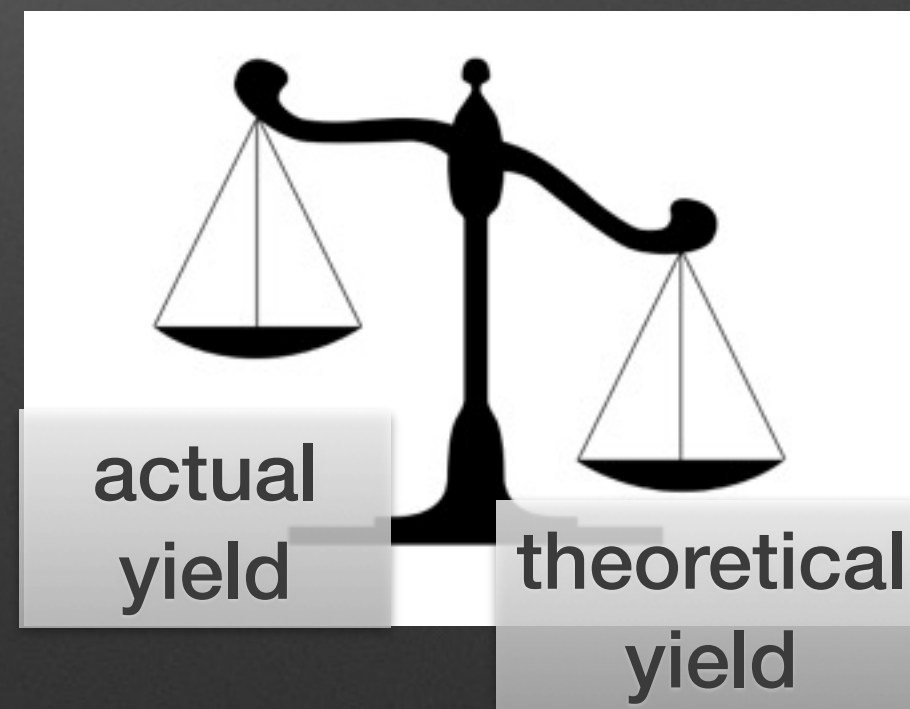
Step 3: Subtract used from total possible value.



Percent Yield

- Amount of product calculated from balanced equation is the **theoretical yield**.
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$$\frac{\text{actual yield}}{\text{theoretical yield}} \times 100 = \text{Percent Yield}$$



Revisit warmup



You found 1,760.4 g CO₂ were produced in the previous example.

The carburetor is responsible for air flow in your car and is faulty. Your car produces 1000g CO₂, what is your percent yield?



Revisit warmup



You calculated 1,760.4 g CO₂ were produced in the previous example.

You fix your carburetor and now have a percent yield of 90%, how much CO₂ will you produce?



Limiting Reagent Worksheet #1

Experiments were performed...

SCIENTIST 1 - MEASURED MASS (ACTUAL YIELD)		SCIENTIST 2 - CALCULATED PERCENT YIELD
YOUR JOB	CALCULATE PERCENT YIELD	CALCULATE ACTUAL YIELD
PROBLEM 1	1.02 g H ₂ O	77%
PROBLEM 2	11.34 g Na ₂ SO ₃	83%
PROBLEM 3	13.84 g Fe ₃ O ₄	65%

Exit Ticket -
Why might scientists
calculate percent yields
when conducting
experiments?

