



Objectives

The objective of this laboratory is to determine which feedstocks yeast prefer for the production of ethanol and why they choose certain types.

Materials

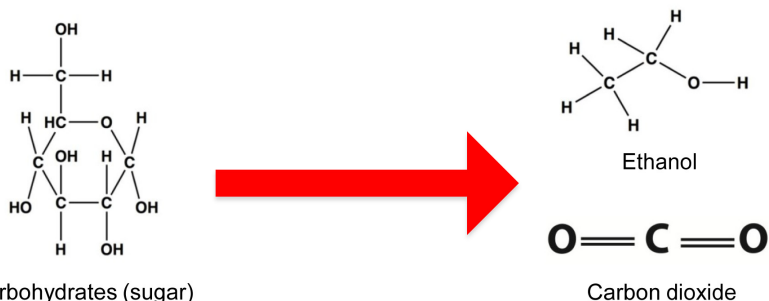
Cereal (variety pack),
 Corn meal
 Yeast
 Plastic bags
 Scoopulas
 Weighing boats
 Balance
 Graduated cylinders
 250 mL Erlenmeyer flasks
 Balloons

Author:

Dr. Jason de Koff
 (adapted from "Fermentation in a Bag"
 by Dr. Ken Newberry)

Do yeast prefer Corn Pops™ or Corn Meal?: Producing ethanol from multiple feedstocks.

Yeast are microorganisms that are used in baking things like bread but they can also be used to produce the biofuel, ethanol. Below is the process that takes place:



Today, we will be determining how much ethanol is produced by different feedstocks by capturing the carbon dioxide produced using a balloon. As an example, about 9 drops of ethanol production will cause a balloon to expand to about three inches in diameter with carbon dioxide.

Procedure

1. Select one of your favorite cereals and place a handful in a plastic bag
2. Close the bag and using your hand or the bottom of your plastic Erlenmeyer flask proceed to crush the cereal into a powder-like substance.
3. Once crushed, use a scoopula to weigh out about 8 grams of your cereal into a tared weighing boat on a balance. Also, you or your partner can weigh out about 8 grams of corn meal into a separate weighing boat and complete each of the next steps for each of your cereal and corn meal samples separately. At the end, you will compare the size of the balloon from the cereal sample with the balloon from the corn meal sample.
4. Select one 7 gram packet of yeast and carefully pour it into your 250 mL Erlenmeyer flask.
6. Using your graduated cylinder, measure 100 mL of warm water and pour it into your Erlenmeyer flask.
7. Quickly place your balloon over the mouth of the flask and gently swirl the material until it all dissolves.
8. After about 15 minutes check on your flask and balloon and identify any changes that you see.

Prelab Questions

1. Why do we crush the cereal before adding it to the flask?
The greater surface area allows for the reaction to take place at a faster rate.
2. According to the reaction equation, what is causing the balloons to inflate?
 What other product is being produced by the reaction?
Production of CO₂ gas Ethanol
3. What are some ways that we could compare which feedstocks produce the most ethanol?
Measure how quickly each balloon inflates, measure the size of each balloon.

Thought Questions

1. In this laboratory exercise, which feedstocks do you think produced the most?
The cereals with the most sugar.
2. What other feedstocks are used to make ethanol?
Wood, grasses, anything with starch, cellulose
3. What is this process called?
Fermentation
4. What is your conclusion, do yeast prefer Corn Pops™ or Corn meal? Why?
Corn Pops™ because they have more readily-available sugars.

AGRONOMY LESSONS
 American Society of Agronomy

