

DISTILLATION; PURIFICATION and SEPARATION OF LIQUID ORGANIC COMPOUNDS

Part 1

REF: "Aldrich", "the CRC", "the Merck", and/or "Lange's"
The Organic Chem Lab Survival Manual, 7th ed., J. Zubrick, Wiley, Hoboken, NJ

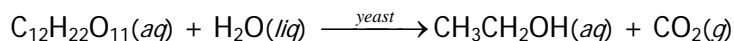
EQUIPMENT: equipment in student lab drawers
 1-L Erlenmeyer flask (*for fermentation*)
 anaerobic fermentation set-up, incl. tubing (*see figure on page 2*)
 enclosed fume hood with incandescent lamp (to maintain ~25°C-35°C)

MATERIALS:

SUBSTANCE.....	AMOUNT / GROUP
sucrose	40. g
baker's yeast, dried	4.0 g
Pasteur's Salts solution.....	40. mL
Ba(OH) ₂ (aq) solution	~100-150 mL
mineral oil	

INTRODUCTION

Yeast ferments sugars to produce ethanol, per the following (*unbalanced*) equation:



Today your task is to get the yeast to start working for you. After the yeast has done its job over the next week, you'll recover the ~~hoteh~~ ethanol product via distillation (ref. Zubrick ch. 20).

The production of alcohol via fermentation is anaerobic; if O₂ is freely available, only CO₂ and H₂O are produced. Therefore, you'll need to set up equipment to allow the CO₂ to escape, but not allow any O₂ to reach the sugar and yeast.

SAFETY & WASTE

Review Zubrick, chapter 1. If you have any questions about lab safety, ask your instructor before proceeding with any experiment.

The barium hydroxide solution should not be discarded in the sink. If you have extra Ba(OH)₂ solution, place it into the waste beaker in the fume hood or share it with another group. As always, wash your hands before you leave the lab.

PROCEDURE, Part I

1. Make a neat, legible list of properties for

- sucrose
- ethanol
- mineral oil
- $\text{Ba}(\text{OH})_2$

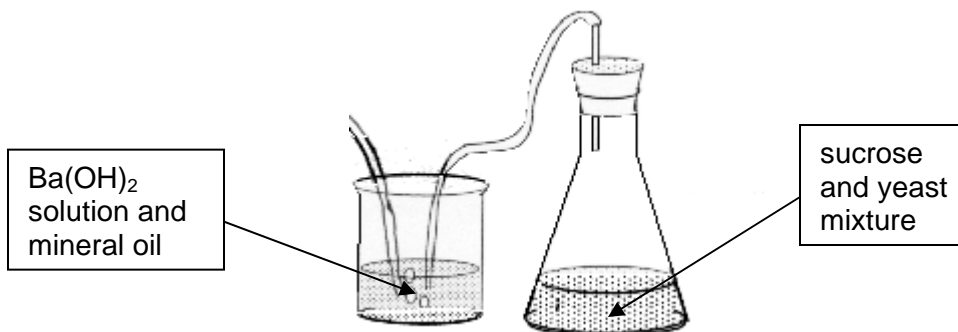
this should include: (ref. Zubrick ch. 3):

- a. systematic (IUPAC) name
- b. molecular & structural formulas
- c. melting & boiling points
- d. solubility information
- e. safety and toxicity information

2. Start the fermentation process:

- a. place 40. g of sucrose into a 1-L Erlenmeyer flask
- b. add 300-500 mL of warm, de-ionized water
- c. add 40. mL of the Pasteur's Salts solution
- d. add 4.0 g of dried baker's yeast that has been rubbed to a thin paste to break up yeast clumps with about 20+ mL of de-ionized water
- e. Stopper the flask and shake the mixture vigorously.
- f. In the second, smaller (~500 mL) beaker or flask:
 - i. add about 100-150 mL of the barium hydroxide solution
 - ii. add enough mineral oil to produce about a 5mm layer (*on top or bottom?*)

g. assemble the fermentation apparatus (per the figure below):



h. place the entire set-up into the fume hood with an incandescent lamp (to maintain a temperature of about 25-35°C)

i. Wait one week. (*Don't simply wait in the lab for the fermentation to occur; continue to go about your regular business for the next 7 days. Start working on the next lab, for instance.*)