

Equipment & Chemical Preparation

Preparation of Banana Oil (Esterification)

In this two-week experiment, students will work in pairs to prepare banana oil (isopentyl acetate) from acetic acid and isopentyl alcohol. Students will prepare banana oil the first week. The product will be purified by distillation and analyzed by IR spectroscopy and TLC. The product will be weighed and a percent yield calculated.

Week 1

In the first step of the reaction, students will generate banana oil from acetic acid and isopentyl alcohol(also called isoamyl alcohol or 3-methyl-1-butanol). Concentrated sulfuric acid is used as a catalyst. The reaction is done by combining the three reagents in a 100ml rb flask with a magnetic stir bar and fitted with a reflux condenser. After refluxing for 1 hour, the crude product is washed in a separatory funnel with DI water and 5% NaHCO₃ and saturated NaCl. The crude product is dried over magnesium sulfate and stored until the second week of the experiment.

Equipment
12 Hot Plate/Stirrers (one in each hood)**
24 Ring Stands with a ring and clamp**(2 in each hood)
12 Magnetic Stir Bars
12 100ml round bottomed flasks**
12 125ml separatory funnels
12 condenser tubes
12 100ml heating mantles
6 packs pH paper

Chemicals
Isopentyl alcohol (~2L)
Acetic acid (~3L)
Conc sulfuric acid (~1 L)
5% NaHCO ₃ (~6L)
Saturated NaCl (~3L)
Magnesium Sulfate (~500g)

Instructions

Set up six bins, one for each bench, containing each of the following

Equipment	Chemicals
2 100ml heating mantles/bathes	100ml isopentyl alcohol
2 magnetic stir bars	~50g magnesium sulfate
2 100ml rb flasks	100ml conc sulfuric acid
2 condenser tubes	100 ml acetic acid
2 125 ml separatory funnels	500 ml 5% NaHCO ₃
1 pack pH paper	500ml saturated NaCl
2 Hot plate/stirrers	

Some of the equipment listed in the table is included in the student's lab drawer or common drawers/hoods. Check the status of this equipment. Please check to that there are enough 100ml rb flasks (50ml flasks are too small.) Also check that there are enough 100ml heating mantles. pH paper is needed not just litmus paper.

2. Check each hood for the following items:

1 Hot Plate/Stirrer
2 Ring Stands
2 Clamps

3. Set out three boxes of disposable pipets with bulbs on benches A, C and E.
4. Check chemical bins throughout the week and refill as needed.

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Week 2

In the second week of the experiment, students will distill the crude product, weigh it and analyze it by IR spectroscopy and TLC.

Equipment	
6 NaCl salt plates	12 Distilling heads
12 rulers; 12 pencils	12 thermometers
6 Jars cut TLC plates (~300 total)	12 vacuum adapters
6-12 packs microcapillary pipets	12 ice bathes
6 iodine chambers	12 50ml rb (collection flasks)
12 400ml beakers	24 keck clamps
12 watch glasses (to fit over beakers)	12 100ml rb distilling flasks
6 UV lamps	

Instructions

1. Set up six TLC bins, one for each bench, containing each of the following items.

TLC Bins	
1 jar TLC plates (~25plates)	1 UV lamp
1 iodine chamber	2 pencils
1 pack microcapillary pipets	2 rulers
~100ml of developing solvent	

2. Set up six distillation bins, one for each bench, containing each of the following items.

TLC Bins	
2 distilling heads	2 vacuum adapters
2 100ml rb flasks	2 50ml rb collection flasks
2 thermometers	4 keck clamps
2 condenser tubes	2 ice bathes

3. Check bins throughout the week and refill as needed.