Pre-lab Lesson Plan:
Esterification: Synthesis of Isopentyl Acetate (Banana Oil)

Goal/Purpose: to introduce students to organic chemistry through the synthesis, isolation, purification and identification of a small organic molecule, isopentyl acetate (banana oil)

Needed Prior Concepts:
* organic functional groups—acids/alcohols/esters
* catalysis—role of conc. sulfuric acid
* refluxing
* aqueous vs organic solvents
* separation using chemical and physical properties
  * extraction
  * gas chromatography
* use of anhydrous salts as drying agents

*Note: Optional relevant concepts for advanced classes
* types of condensation reactions: esterification and amide synthesis
* limiting reagent/stoichiometry
* equilibrium and Le Chatelier's Principle
* saponification
* acid vs base catalysis of esterification
* nomenclature for organic molecules
  acids/alcohols/esters
* reaction mechanism
* natural vs synthetic esters and polyesters
* distillation and fractional distillation
* instrumentation of GC
* prediction of IR spectrum

Lab Skills:
* measurements of mass and volume
* analytical balance
* micropipette
* use of microscale apparatus in organic chemistry
* separation/purification techniques
* extraction with pasteur pipettes
* distillation
* use of drying agents

Prepared by:  Jenny Chiu, Arcadia HS
              Kate Smirnoff, Louisville HS
              John Teeples, Paramount HS
              Donna Owens, South Hills HS
Pre-lab activities/experiences/relevancy:

*Note: the following pre-lab suggestions can be used as post-lab extensions

* introduce topic--discussion
* display of real fruits (orange, banana, peach, apple) and extracts--discuss similarities and differences
* extension of inorganic acids/bases to organic molecules
* possible tie in with caffeine extraction experiment
* process of isolation of a natural compound
* determining structure and geometry
* synthetic procedures
* introduce topic--video
* World of Chemistry: Flavorings
* introduce topic-- demo
* preparation of methyl salicylate/soap/aspirin
* introduce topic-- student participation
* demonstrate importance of smell to sensation of taste--onion vs apple

Safety: * care of microscale apparatus, micropipettes, and GC
* caution in use of concentrated sulfuric acid--possible demo: H₂S₀₄ + sucrose
* condenser set up--appropriate connections
* hot sand bath/ reaction vessel / microscale apparatus

Procedure: Step#1) video of apparatus assembly--silent
  #2) video on micropipetting
  #5) video on use of analytical balance
  #7) video on apparatus assembly with narration
  #8) direction on stopping point and how to take care of product
  #10) video on extraction using pasteur pipette
  #11) importance of venting
  #17) discuss how you know enough MgS₀₄ has been added--clear solution
  at end) video of GC