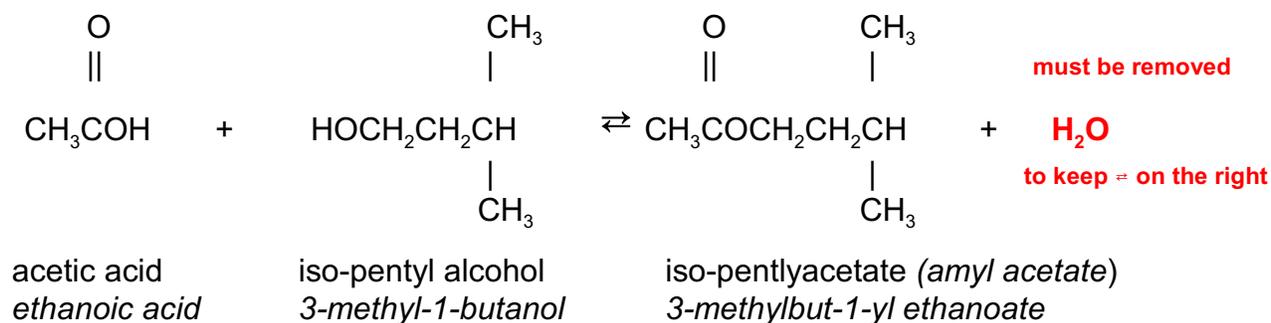


Chem 116

Lab 6: The Preparation and Isolation of Banana Oil (iso-pentyl acetate)

IUPAC Name: 3-methylbut-1-yl ethanoate



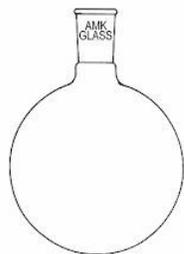
8 mL iso-pentyl alcohol

11 mL glacial acetic acid (anhydrous... called 'glacial' because it freezes at 16 °C

0.5 mL conc H₂SO₄ (98%, 18 mol/L) **NASTY STUFF**. Reacts very exothermically with water,

ADD IT SLOWLY WITH SWIRLING

1 boiling stone. This provides a surface for bubbles to form. Allows the liquid to boil gently



Always Add Acid

The H₂SO₄ reacts with the H₂O made in the reaction, and keeps the equilibrium over on the right hand side.

Set up the reflux apparatus and boil for 45 min. Allow to cool. I'll get ice to speed this up.

What do we have? There is the banana oil of course, whichever reagent was in excess (I'd guess it was the acetic acid, but you will find out when you calculate the % yield), and there will be H₂SO₄, and a bit of water too. The next job is to separate the banana oil from the other stuff. To do this we use a separatory ('separating') funnel.

The sep funnel works on the principle that the banana oil isn't soluble in water, and the impurities are soluble. Banana oil is lighter than water and so it floats on water. The shape of the funnel lets us separate the two layers. If you do more organic chem, you'll use these funnels a lot... they come in all sizes.

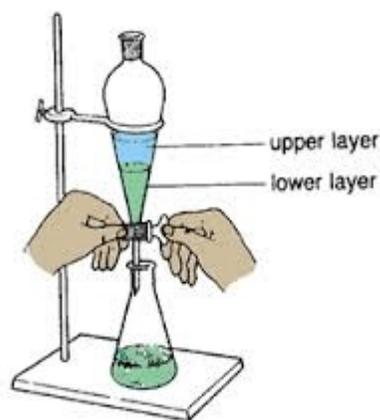
Pour the contents of the reaction flask into the funnel. Add ~20 mL cold water to the funnel. Rinse the flask with an extra 5mL of water to make sure you get all the banana oil. (leave the stone behind).

Shake the flask



Every so often open the tap to release the pressure

Put the funnel in a ring and let the layers settle



the upper layer contains the banana oil

the lower layer contains the impurities

when the layers have formed, run off the lower layer (remove the stopper) into a beaker*

You have now *'washed the banana oil with water'*

The next thing is to get rid of any acid, and to do this you wash the banana oil with 15 mL 0.5 mol/L NaHCO₃. Any acid present reacts with the NaHCO₃ to produce CO₂. You **MUST** vent the funnel the second you turn it upside down, and vent it often. Remove the lower layer and repeat the whole thing with another 15 mL of NaHCO₃.

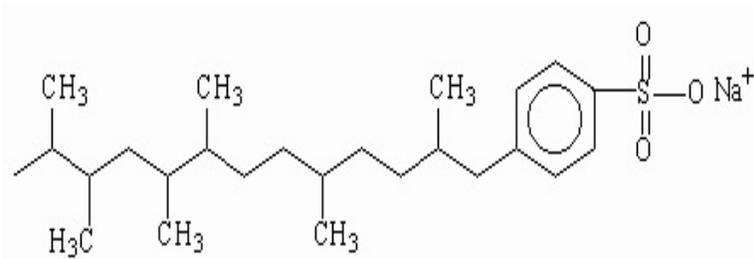
Finally wash the upper layer with 10 mL 4 mol/L NaCl. This makes the layers separate better. Now we have the banana oil, but it is wet. We now dry it. Pour the upper layer into a dry 50 mL erlenmeyer flask.

Add ~5 g anhydrous CaCl₂ and swirl it around for 10 minutes. Carefully decant the now dry banana oil into a dry pre-weighed beaker and weigh it.

* Why did we pour the lower (aqueous) layer into a beaker after each washing? We don't do anything with it, except throw it away.

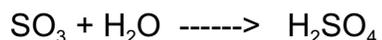
Note

The surfactant in 'Tide' and other detergents is an alkylbenzene sulfonate



I used to work at Lever Brothers in the sulfonation plant. We used a thing called 'oleum' which is a mixture of conc H₂SO₄ and SO₃

The water produced in the reaction is mopped up by the SO₃



Neat eh? You are back to where you started

It was very dangerous if anything went wrong, but it never did while I was there, and I was very well paid.