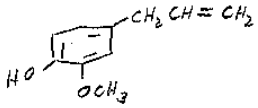
DATE	EXP. NUMBER	EXPERIMENT	
8/28/2012	EAC-11	Isolation of Eugenol from Cloves	
NAME		LAB PARTNER	WITNESS
Eim A. Chemist			

Purpose: To isolate eugenol from cloves by steam distillation

Physical Data and Safety:

Reagent	Structure/Formula	Mol. Wt.	Mp	Bp	Density	Safety
Cloves	---	---	---	---	---	---
Dichloro-methane	CH_2Cl_2	84.93	-97 °C	39 to 40 °C	1.32 g/mL	Irritant, possible cancer hazard, inhalation may cause CNS effects
Sodium sulfate	Na_2SO_4	---	---	---	---	Possible irritant
Eugenol	 $C_{10}H_{12}O_2$	164.20	-12 to -10 °C	254 °C	1.06 g/mL	Irritant, potential allergen

When heating a reaction apparatus, be sure that it is open to the air so that pressure build up and subsequent rupture of the apparatus does not occur.

When heating liquids, make sure the liquid is stirred (or a boiling chip is added) to prevent "bumping".

When performing an extraction, make sure to vent the separatory funnel often to prevent pressure build-up.

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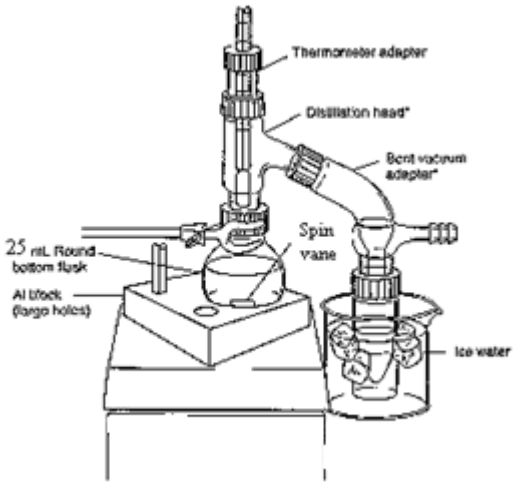
Procedure

1. Place 1 g of ground cloves and 15 mL distilled water into the distillation apparatus (sketched below)



2. Soak the cloves in the water for about 15 min until cloves are thoroughly wetted

3. Heat the mixture to boiling

4. Collect ~~~10 mL~~ ~6 mL of distillate, then discontinue distillation

5. Transfer the distillate to a separatory funnel, extract with 2 mL dichloromethane, then again with (2 x 1 mL) dichloromethane

6. Dry the combined organic extracts over sodium sulfate, transfer dried organic solution to a tared ~~beaker~~ conical vial

7. Evaporate the dichloromethane by heating on a hot plate (UNDER HOOD!)

8. Weigh product

9. Obtain IR spectrum by the thin film method

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Data and Observations

Step	Data/Observations/Calculations
1.	Wt of cloves: 1.032 g, vol DI water = 17 mL
3.	Initial hot plate setting = 3. After 20 min, mixture still not boiling so setting increased to 7. Distillate collected at rate of about 1 drop/2-3 sec
4.	6.5 mL distillate collected
6.	Enough sodium sulfate was added so that free-flowing granules were present, solution allowed to stand over sodium sulfate for about 15 min.
7.	Hot plate setting = 3, slow stream of air was directed over the top of the vial to assist evaporation
8.	Vial tare wt = ~~18.346 g~~ 18.643 g Vial + eugenol = 18.720 g Wt eugenol = 0.077 g (pale yellow oil) % Recovery = (0.077 g/1.032 g) x 100 = 7.46%
9.	FTIR (film, NaCl plates): 3560 (OH), 3080 – 3000 (sp2 CH), 2980 – 2940 (sp3 CH), 1640 (alkene C=C), 1514 (aromatic C=C) cm^{-1} IR corresponds to that of an authentic sample (see Spectral Database for Organic Compounds)

Conclusions

7.46% of eugenol was recovered from the sample of cloves and the identity confirmed by IR