

Extraction of organic compounds from natural sources essay sample

[Science](#), [Chemistry](#)



Introduction

The purpose of this experiment is to illustrate how a solid natural product can be extracted from its natural source through the use of an organic solvent.

Natural products are organic compounds that are synthesized by natural biological processes in plants, animals and microorganisms. These products typically occur in mixtures of many different compounds, so to obtain a particular natural product it is necessary to separate it from all of the other compounds present. We do this through a process called extraction.

In chemistry, extraction is the physical process by which a compound (or mixture of compounds) is transferred from one phase into another. One type of extraction is an organic solvent extraction, in which an organic solvent with a high affinity for the desired compound is used to extract the compound. This is the type of extraction we performed in our experiment.

Nature of the Experiment

Our goal was to extract a triglyceride called trimyristin from solid nutmeg. Nutmeg is a spice from the ground-up seed of the East Indian nutmeg tree. Plant seeds are typically rich in triglycerides, the fatty acid triesters of glycerol. Trimyristin is the major triglyceride found in nutmeg, representing 20-25% of the dried weight of ground nutmeg.

To extract the trimyristin we performed a solid-liquid extraction using the organic solvent Methylene Chloride (CH_2Cl_2). We use methylene chloride

to extract the trimyristin because both are relatively non-polar, and under the principle of 'like dissolves like' this will allow for the proper extraction of trimyristin from the nutmeg.

Table of Pertinent Physical Constants

% of Trimyristin in Dried Weight of Ground Nutmeg

20-25%

Literature Value Melting Point of Trimyristin

56-57°C

Boiling Point of Methylene Chloride

39. 6°C

Summary of Raw Data

Ground Nutmeg Used

5 g

Methylene Chloride Used For Extraction

50 mL

Acetone Used to Wash the Trimyristin Crystals

10 mL

Weight of Trimyristin Extracted

0. 62 g

Experimentally Determined Melting Point of Trimyristin

49-50°C

Theoretical Yield and Percentage Yield

In 5g of dried nutmeg with 20-25% composed of trimyristin the theoretical yield after the extraction should be between 1.00g and 1.25g of trimyristin.

The experimental yield was 0.62g.

The percentage yield is calculated as follows:

At 20%: $(0.62 \div 1.00) \times 100 = 62\%$

At 25%: $(0.62 \div 1.25) \times 100 = 50\%$

The lower experimental yields compared to the theoretical yields can be attributed to a variety of factors: Dried nutmeg could have been lost during the initial transfer from the weighing paper to the round-bottom flask. Not all of the trimyristin could have been extracted during the reflux. Some of the trimyristin could not have been washed from the solid residue in the fluted filter paper. Some of the trimyristin could have been lost in the transfer from the round-bottom flask after being washed with acetone. Some of the trimyristin particles could have been sucked through the filter paper during the vacuum filtration. Some of the dried trimyristin could have remained on the filter paper when it was scraped onto the watch glass to be weighed.

Literature Melting Point and Experimental Melting Point

The literature melting point of trimyristin is 56-57°C, and the experimental melting point of the trimyristin was 49-50°C.

We know that impurities can depress melting point. The low melting point in this case can most likely be attributed to either methylene chloride that was

not distilled from the trimyristin or acetone that did not completely evaporate from the trimyristin.

Conclusion

While I was successfully able to extract the trimyristin from the nutmeg, I lost a sizeable percentage of my yield during the experiment, and also had a product that contained impurities. Because of the non-polar character of both trimyristin and methylene chloride, the proper organic solvent was used for the extraction.

For future experiments I should work to reduce random errors in my measurements and improve my technique to reduce impurities and improve yields.