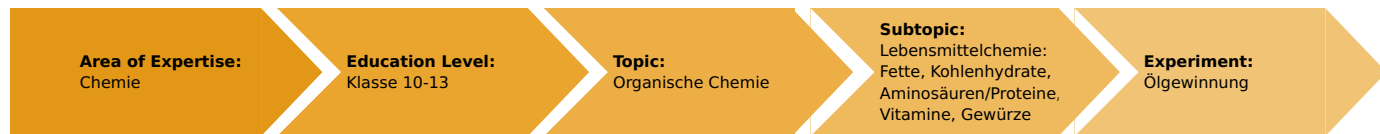


Winning oils (Item No.: P7185400)

Curricular Relevance



Difficulty



Intermediate

Preparation Time



10 Minutes

Execution Time



20 Minutes

Recommended Group Size



2 Students

Additional Requirements:

Experiment Variations:

Keywords:

food chemistry, oil

Task and equipment

Information for teachers

Additional information

Food law requires that the origin of vegetable oils be declared. How is sunflower oil won from sunflowers, or corn oil from corn?

Notes on content and learning objectives

- Vegetable oils can be separated by pressing or extraction.
- Vegetable oils are mainly won from oil seeds and oil fruit such as peanuts, soybean, rape, sunflowers, corn and olives.
- The quality and the price of oils is dependent upon the raw material and the production process.

Notes on the method

This experiment serves as an introduction to the theme "vegetable oils". By using different oil seeds, the large diversity of the plants which supply oil can be well illustrated to the students. The students should inform themselves on the production procedures and their advantages and disadvantages.

Fundamentals and remarks

Vegetable oil is present as storage substance in the seed leaf tissue of plant seeds at a content of up to 70 %. As fat is far more tightly held within plant cells than in animal tissues, extensive preparation is frequently required prior to the winning of the oil. This is shown by the following steps which are customary for the winning of vegetable oil from oil seedlings:

- Cleaning of the oil seedlings
- Podding the oil seedlings
- Crushing then up in several steps
- Conditioning them by adding water and heating
- Pressing procedure
- Extraction procedure

Olive oil, the most used oil from oil fruits, is offered in various qualities, which are in part dependent on the way it is won. Particularly high quality olive oil is pressed out cold and under weak pressure. It is called extra virgin olive oil.

Hints on going deeper

- Information on the connection between oils and a healthy diet.
- Extraction using a Soxhlet apparatus to win a large quantity.
- Distillation with steam for gentle winning of particularly high quality oils, e.g. maize germ oil.

Notes on the set-up and procedure

Preparation:

Other oil seeds such as sunflower seeds, linseeds or soybeans can be used instead of peanuts.

Notes on the students experiment:

The peanuts must be well ground to win a sufficient quantity of fat.

The evaporation of the solvent can be speedened by warming it using a distilling apparatus. Caution: No open flames!



Hazard and Precautionary statements

Petroleum ether:

H225:	Highly flammable liquid and vapour.
H304:	May be fatal if swallowed and enters airways.
H315:	Causes skin irritation.
H361f:	Suspected of damaging fertility or the unborn child.
H336:	May cause drowsiness or dizziness.
H373:	May cause damage to organs through prolonged or repeated exposure.
H411:	Toxic to aquatic life with long lasting effects.
P210:	Keep away from heat/sparks/open flames/hot surfaces – No smoking.
P233:	Keep container tightly closed.
P240:	Ground/bond container and receiving equipment.
P273:	Avoid release to the environment.
P281:	Use personal protective equipment as required.
P301 + P310:	IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.
P302 + P352:	IF ON SKIN: Wash with soap and water.
P304 + P340:	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
P308 + P313:	IF exposed or concerned: Get medical advice/attention.
P331:	Do NOT induce vomiting.
P403 + P235:	Store in a well ventilated place. Keep cool.

Hazards

- Petroleum ether is highly inflammable. Extinguish all open flames before working with petroleum ether!
- Wear protective glasses!
- Carry out the experiment in a fume cupboard, whenever possible!

Waste disposal

Remains can be put into the normal waste bin after allowing residues of petroleum ether to evaporate, or be used in further experiments.

Winning oils (Item No.: P7185400)

Task and equipment

Task

How can vegetable oils be won?

Win vegetable oil from nuts.



Equipment



Position No.	Material	Order No.	Quantity
1	Glass beaker DURAN®, short, 250 ml	36013-00	1
2	Porcelain dish, 75ml, d = 80 mm	32516-00	1
3	Mortar w. pestle, 70ml, porcelain	32603-00	1
4	Pipette with rubber bulb	64701-00	1
5	Spoon, special steel	33398-00	1
6	Protecting glasses, clear glass	39316-00	1
7	Rubber gloves, size S (7)	39325-00	1
	Petroleum ether, 40-60 gr 1000 ml	30184-70	1
	Circular filter,d 125 mm,100 pcs	32977-05	1
Additional material			
	Peanuts, not shelled		

Set-up and procedure

Set-up

Hazards

- Petroleum ether is highly inflammable. Extinguish all open flames before working with petroleum ether!
- Wear protective glasses!
- Carry out the experiment in a fume cupboard, whenever possible!



Setup

Shell the peanuts, removing both the woody wall of the nut and the reddish-brown skin from the seed (Fig. 1).



Fig. 1

Procedure

Put a handful of peanuts in the mortar (Fig. 2). Crush them with the pestle to a brown, finely grained paste (Fig. 3).



Fig. 2



Fig. 3

Transfer half of the paste to a circular filter (Fig. 4). Cover the mass with a second circular filter and press on it several times with

the pestle (Fig. 5).
Look at the filter papers!



Fig. 4



Fig. 5

Add sufficient petroleum ether to the rest of the peanut paste in the mortar to just cover it with the solvent. Carefully grind the mixture with the pestle in the fume cupboard.



Fig. 6

Allow the mixture to stand in the fume cupboard until the peanut paste has settled out. Carefully pour some of the supernatant liquid onto a watch glass. Allow the solvent to evaporate from the watch glass in the fume cupboard.



Fig. 7

Test the smell and the consistency of the residue on the watch glass!

Waste disposal

Remains can be put into the normal waste after allowing residues of petroleum ether to evaporate, or be used in further experiments.

Report: Winning oils

Result - Observations

Note your observations.

- a) Nuts pressed against the filter paper.
- b) Nuts with petroleum ether.

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Evaluation - Question 1

Draw conclusions from your observations.

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Evaluation - Question 2

Name various vegetable oils.

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Evaluation - Question 3

Vegetable oils are mainly won from oil seeds, oil fruits and nuts. Inform yourself further by looking at the texts on labels of oils in food stores.

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Evaluation - Question 4

Complete the following statement.

Vegetable oils are won from oil seeds, oil fruits and nuts by or by with suitable solvents.