Oil fields (Item No.: P7171200)

Curricular Relevance

Area of Expertise: Chemie
Education Level: Klasse 7-10
Topic: Organische Chemie
Subtopic: Kohlenwasserstoffe und Petrochemie
Experiment: Erdöllagerstätten

Difficulty	Preparation Time	Execution Time	Recommended Group Size
Easy	10 Minutes	10 Minutes	2 Students

Additional Requirements:

Experiment Variations:

Keywords:

petrochemistry, oil, oil fields

Task and equipment

Information for teachers

Learning objectives

- Petroleum deposits do not consist of lakes of oil, but of oil-saturated porous rock layers.
- These resulted from the (water) pressure which pressed the oil up against an impenetrable layer (stratum).

Notes on setup and procedure

Preparation:
Diesel can be used instead of petroleum. Oil samples can be obtained from the association of mineral oil companies. The use of a lighter oil is recommended.

Remarks on the students experiments:
Ensure that the gravel is sufficiently wetted with water, otherwise the oil will stick to it. Ensure that the glass tube is not clogged by small pieces of gravel.

Hazard and precautionary statements

Crude oil, synthetic:	
H226:	Flammable liquid and vapour.
H304:	May be fatal if swallowed and enters airways.
H315:	Causes skin irritation.
H336:	May cause drowsiness or dizziness.
H411:	Toxic to aquatic life with long lasting effects.
P102:	Keep out of reach of children.
P210:	Keep away from heat/sparks/open flames/hot surfaces – No smoking.
P280:	Wear protective gloves/protective clothing/eye protection/face protection.
P301 + P310:	IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.
P331:	Do NOT induce vomiting.

Hazards

- Petroleum is highly inflammable. Extinguish all open flames!
- To make glass/rubber connections, wet the glass with glycerol so it can be easily inserted!

Notes

Petroleum collects in highly porous, spongy layers of rocks (e.g. sandstone) which normally contain water. Economically interesting petroleum accumulations are called oil fields. Below impenetrable layers, natural gas is found as the upper component, with petroleum below it and water underlying the petroleum. The search for oil fields concentrates on areas where the porous layers have their highest point (trap). The most frequent form of such a trap is a dome (anticline).

Remarks on the method

Discuss the formation of oil fields, there build-up and how they are exploited. In the discussion you should also cover the topic of energy supply and energy problems.

Waste disposal

Put oil-wetted gravel in the container for solid organic waste or put it to the used oil collection.

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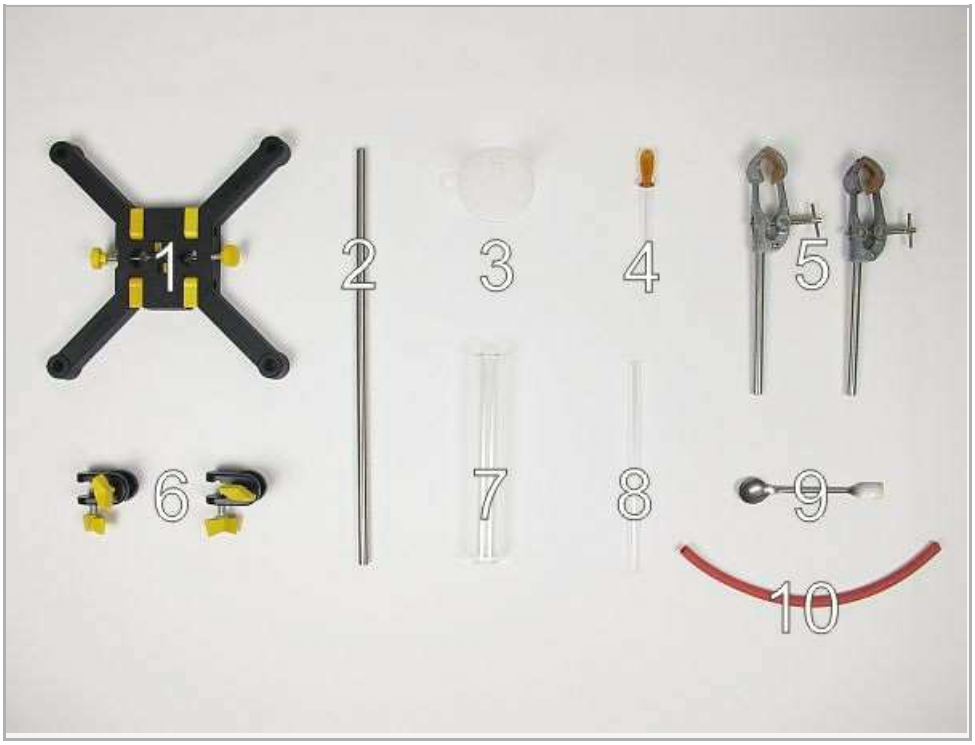
Task and equipment

Task

How are oil fields built up?

Make a model of an oil field.

Equipment



Position No.	Material	Order No.	Quantity
1	Support base, variable	02001-00	1
2	Support rod, stainless steel, l=370 mm, d=10 mm	02059-00	1
3	Funnel, plastic, dia.50mm	36890-00	1
4	Pipette with rubber bulb	64701-00	1
5	Universal clamp	37715-00	2
6	Boss head	02043-00	2
7	Test tube,200x30 mm	37660-01	1
8	Glass tube 200 mm ext. d=8 mm	64807-00	1
9	Spoon, special steel	33398-00	1
10	Rubber tubing, i.d. 6 mm	39282-00	1
	Glycerol, 250 ml	30084-25	1
	Crude oil (petroleum),synthetic, 500 ml	31808-50	1
Additional material			
	Water		

Set-up and procedure

Set-up

Hazards

- Crude oil is highly inflammable. Extinguish all open flames!
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Setup

Set up the stand as shown in Fig. 1 to 4 with two boss heads and two universal clamps. Fix the test tube at the stand with the lower clamp.

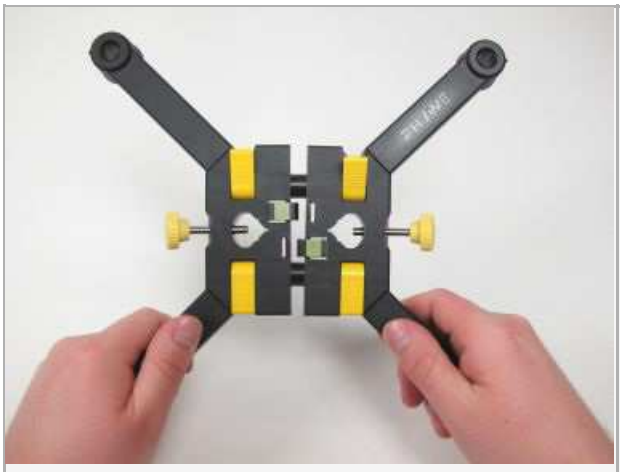
Fig. 1


Fig. 2


Fig. 3


Fig. 4

Connect the glass tube to the outlet of the funnel with a piece of rubber tubing. Put the funnel in the upper clamp and adjust the height of the clamp so that the end of the glass tube reaches down to the bottom of the test tube (Fig. 5+6).

Fig. 5

Fig. 6

Procedure

Fill the test tube about half full with coarse gravel and wet this well with water, there should be no water standing above the gravel (Fig. 7). Pour crude oil onto the gravel to a height of about 0.5 cm (Fig. 8).

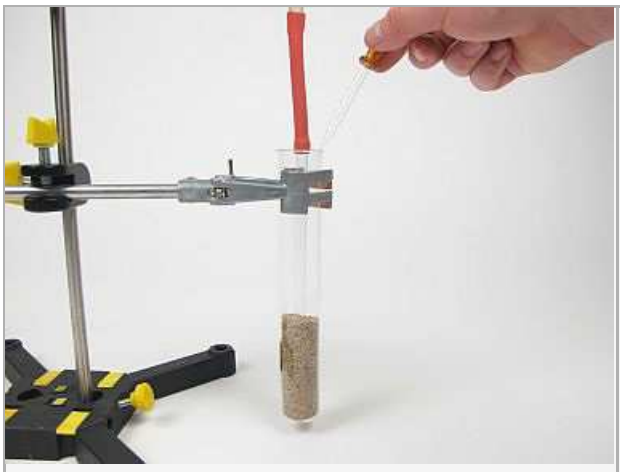

Fig. 7

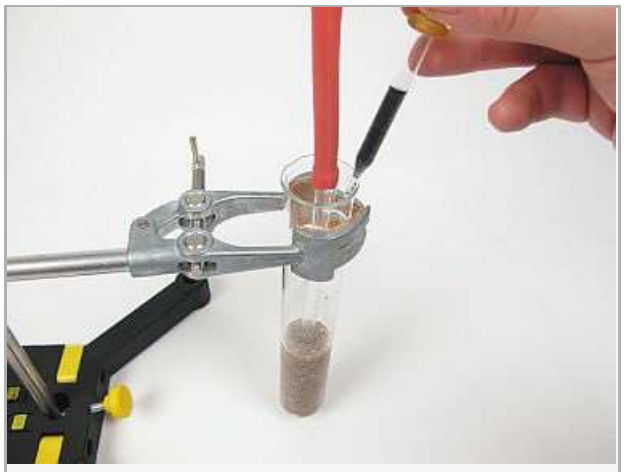

Fig. 8

Cover the crude oil with an approximately 3 cm high layer of gravel (Fig. 9), put a 1 cm high layer of clay on the gravel, and then a 1 cm high layer of gravel on the clay (Fig. 10+11). Slightly press the top gravel layer down onto the clay layer.

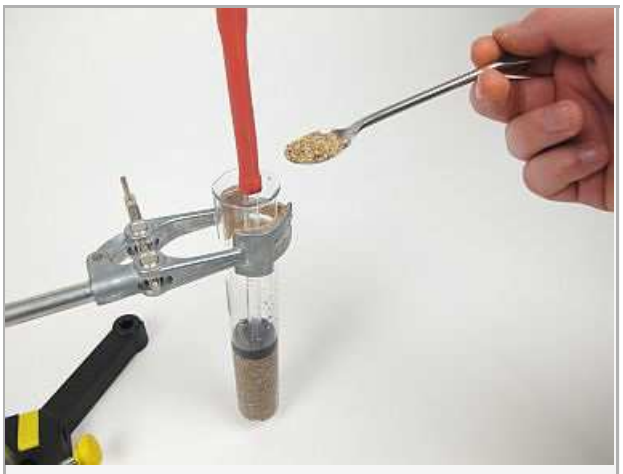
Fig. 9

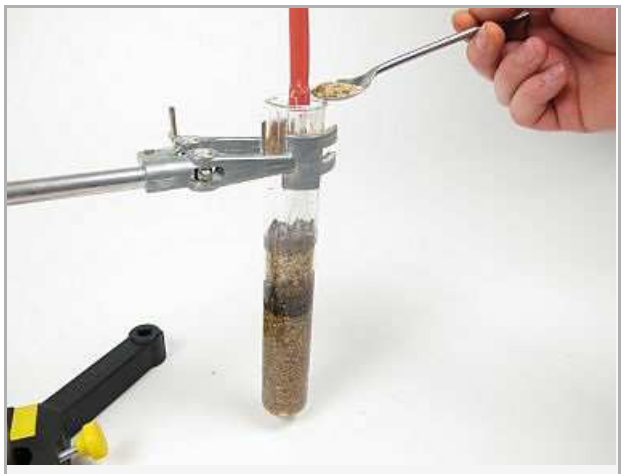
Fig. 10


Fig. 11

Fill the funnel halfway with water and allow the setup to stand for about 10 minutes (Fig. 12).

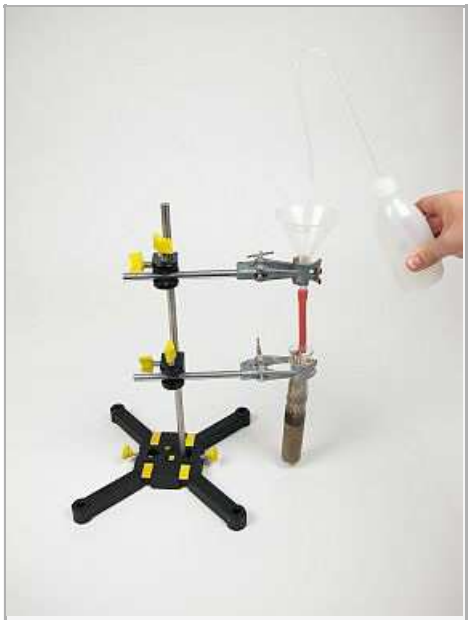
Fig. 12

Waste disposal

- Put oil-wetted gravel in the container for solid organic waste or put it to the used oil collection.

Report: Oil fields

Result - Observations

Note the observations you make.

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Evaluation - Question 1

Draw conclusions from your observations.

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Evaluation - Question 2

Explain on the basis of the experiment how an oil field is formed.

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Evaluation - Question 3

Make a sketch of such an oil field.

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