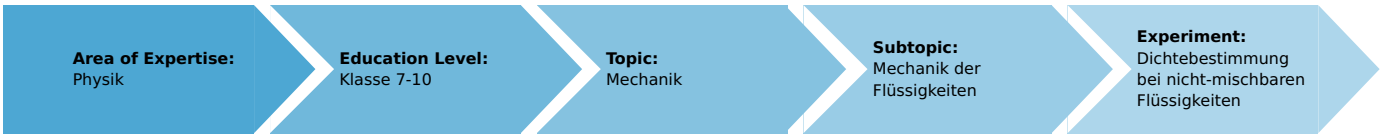
Finding the density of immiscible liquids (Item No.: P1002300)

Curricular Relevance



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

Additional Requirements:

- Scissors

Experiment Variations:

Keywords:

Task and equipment

Information for teachers

Additional Information

Using the knowledge gained in the experiments "Buoyancy and floating" and "Finding the density of solid bodies by measuring the buoyancy", the students should determine the density of petroleum ether in a water-filled U-tube.
After rearranging the given formula they should recognise the correlation between density and height and explain it in their own words.

Remark

Attention: Do not dump petroleum ether down the drain; collect it and use it again!

Finding the density of immiscible liquids (Item No.: P1002300)

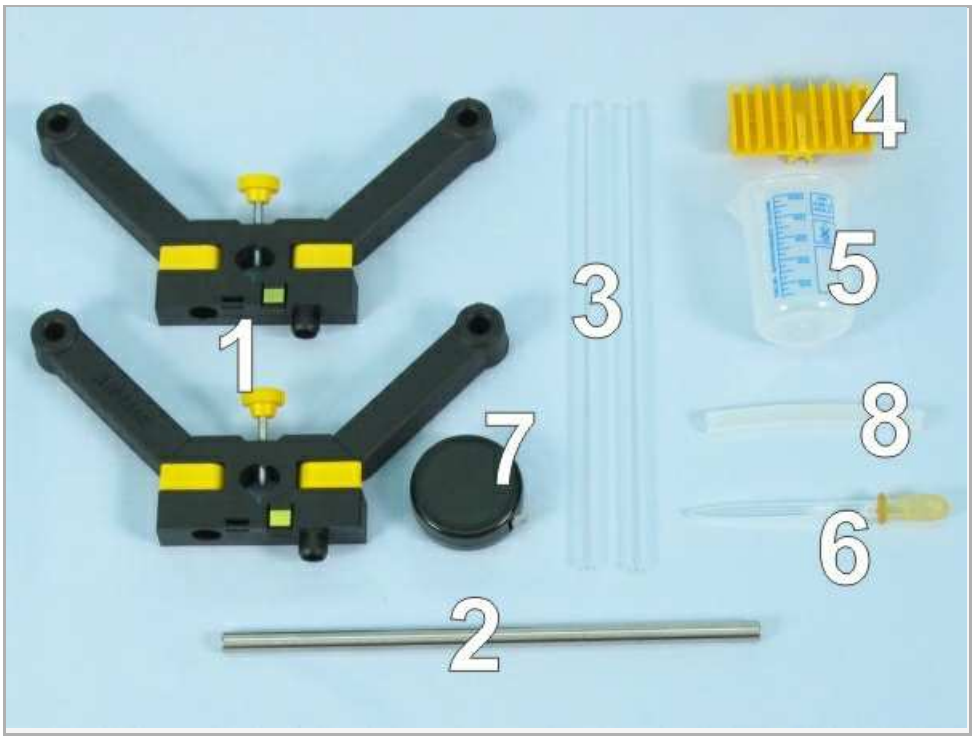
Task and equipment

Task

How do immiscible liquids behave in a U-tube?

In this experiment you will determine the density of petroleum ether in a water-filled U-tube from the heights of the liquids in the U-tube sides.

Equipment



Position No.	Material	Order No.	Quantity
1	Support base, variable	02001-00	1
2	Support rod, stainless steel, l = 250 mm, d = 10 mm	02031-00	1
3	Glass tubes,l.250 mm, pkg.of 10	36701-68	(2)
4	Glass tube holder with tape measure clamp	05961-00	1
5	Beaker, low form, plastic, 100 ml	36011-01	1
6	Pipette with rubber bulb	64701-00	1
7	Measuring tape, l = 2 m	09936-00	1
8	PVC tubing, i.d. 7mm	03985-00	1
	Petroleum ether, 40-60 °C, 500 ml	30184-50	1
	Glycerol, 250 ml	30084-25	1
Additional material			
	Scissors		1

Set-up and procedure

Set-up

Set up a stand with the support base (Fig. 1) and the 250 mm support rod (Fig. 2).

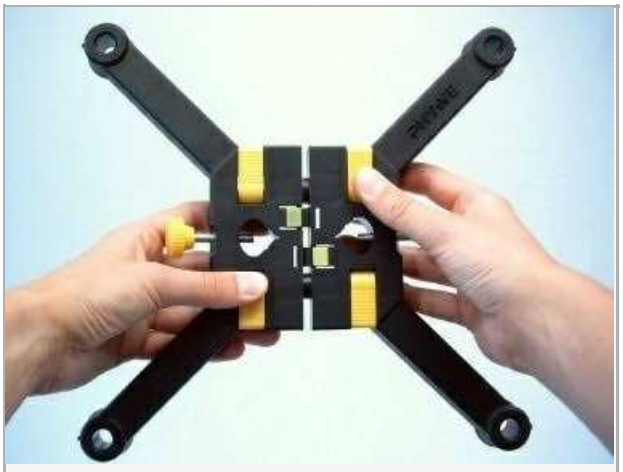


Fig. 1

Fig. 2

Clamp the measuring tape in the glass tube holder (Fig. 3) and fix both onto the support rod (Fig. 4).

Fig. 3

Fig. 4

Set up a U-tube using the two glass tubes and the silicone tubing as shown in Fig. 5.

Use a little glycerol to slip the tubing onto the glass tubes.

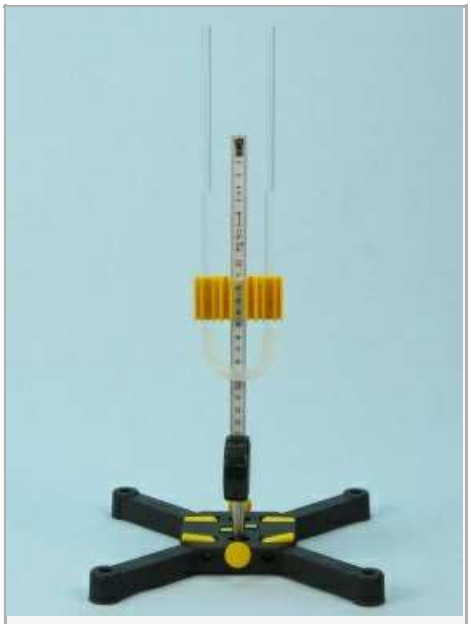


Fig. 5

Procedure

- Using the pipette fill the U-tube with water so that both glass tubes are about half full (Fig. 6).
- Carefully(!) add petroleum ether until the petroleum column is about 2 cm high. Use the pipette to do this.
- Measure the height of the water, h_1, and the height of the petroleum, h_2, above the separating layer (Fig. 7).
- Add petroleum ether 2 to 3 times and determine the heights h_1 and h_2 each time.

Fig. 6

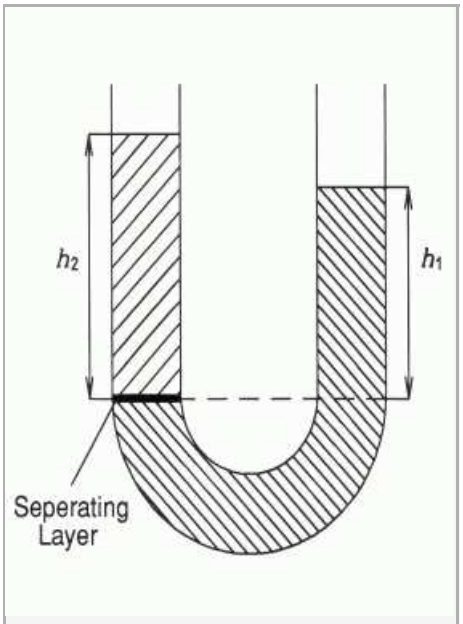


Fig. 7

Attention! Do not dump petroleum ether down the drain; collect it and use it again!

Report: Finding the density of immiscible liquids

Result – Table 1

Enter measured values in the Table.

Calculate the density of petroleum ether using the formula $\frac{\rho_p = h_1}{h_2 \times \rho_W}$ where ρ_W = 1 g/cm^3.

Calculate the average value of the measurements and record it in Table.

h_1 in cm	h_2 in cm	ρ_P in g/cm^3
0,9	1,5	0,60
1,4	2,2	0,63
2,6	3,8	0,68
3,2	4,8	0,66
average value:		0,64

Evaluation – Question 1

Rearrange the formula by dividing by ρ_W and formulate the resulting equation in words.

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Evaluation – Question 2

How can the formula be explained?

[Hint: Consider the experiments "Buoyancy and floating" and "Finding the density of solid bodies by measuring the buoyancy".]

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