Common properties of bodies
Volume

Determining the volume of irregular solid bodies - Differential method

D 1.1.1.4
Physics experiments
Secondary

Object of the experiment

1. Determining the volume of irregular solid bodies by means of the difference method

Setup

Stand setup:

- Slide the 400 mm long stand tube over the other one by about 10 cm, and connect the tubes using the universal bosshead.
- Clamp the stand tube with the smaller diameter in the stand base.
- Fasten the clamp with hook to the other stand tube.

The height of the stand setup can now be adjusted continuously by carefully loosening the lower screw of the universal bosshead.

Apparatus

1 Weight, 0.1 kg	683 10
1 Weight, 0.2 kg	683 11
1 Weight, 0.5 kg	315 38
1 Measuring cylinder, 1000 ml, with plastic base	665 757
1 Stand base, V-shape, small	300 02
1 Stand tube, 450 mm, 10 mm diam., set of 2	666 609ET2
1 Stand tube, 400 mm, 12 mm diam.	666 607
1 Universal bosshead	666 615
1 Clamp with hook	301 08
1 Measuring beaker, PP, 1000 ml	604 211
1 Colouring, red, 10 g	309 42
1 Fishing line, set of 2	309 48ET2

Carrying out the experiment

- Suspend a weight from the hook with a piece of fishing line of about 20 cm length.
- Add colouring to approx. 800 ml of water in the measuring beaker.
- Pour 700 ml of coloured water into the graduated cylinder.
- Read the volume V_1 from the graduated cylinder.
- Loosen the lower screw of the universal bosshead and slide the weight with the stand tube downwards until the weight has entirely dipped into the water.
- Read the volume V_2 from the graduated cylinder.
- Calculate the volume V_{body} by forming the difference of V_2 and V_1.
- Repeat the measurement with other weights.

Measuring example

Body	V_1 in ml	V_2 in ml	$V_1 - V_2$ in ml
weight 0.5 kg	700	780	80
weight 0.2 kg	700	730	30
weight 0.1 kg	700	720	20

Evaluation

The volume of an irregular body can be determined with the aid of a graduated cylinder filled with water.

For this the graduated cylinder is filled with a volume V_1 of water. After the body has dipped into the water, the volume V_2 is read from the cylinder. The volume of the body is obtained by forming the difference of the two volumes: $V_{body} = V_1 - V_2$.

The displaced volume of liquid corresponds to the volume of the body entirely immersed into the water.