Mechanics of liquids and gases
Buoyancy

Dependence of the buoyancy force on the volume the body - Measurement with a precision dynamometer

Object of the experiment

1. Investigating the dependence of the buoyancy force on the volume of the immersed body

Setup

Preparing the bodies to be immersed:

- Tie an 8 cm long piece of fishing line to the aluminium and to the steel body.

Stand setup:

- Slide the 40 cm 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 Bodies of equal mass, set of 3	362 28
1 Plastic beaker	590 06
1 Precision dynamometer, 1 N	314 141
1 Measuring cylinder, 100 ml, with plastic base	665 754
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, 13 mm diam.	666 607
1 Universal bosshead	666 615
1 Clamp with hook	301 08
1 Fishing line, set of 2	309 48ET2

Carrying out the experiment

- First determine the volumes of the two bodies by applying the difference method (D 1.1.1.4).
- Suspend the aluminium body from the dynamometer, and determine its gravitational force *G*.
- Then use the height-adjustable stand to lower the body until it is completely immersed in the water.
- Read the force *F'* from the dynamometer, and calculate the buoyancy force F_b.
- Repeat the experiment with the steel body.

Measuring example

Volume *V* in cm³	Gravitational force *G* in N	Force *F'* in N	Buoyancy force F_b in N
11	0.3	0.18	0.12
4	0.3	0.25	0.05

Evaluation

The buoyancy force depends on the volume of the immersed body.

The greater the volume of the body, the greater the buoyancy force acting on the body.

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