Evidence of buoyancy in air

Object of the experiment

1. Demonstrating the action of a buoyancy force in air

Setup

Apparatus

1 Baroscope	379 10
1 Vacuum experiment plate	378 89
1 Vacuum bell jar, coated	378 561
1 Rotary-vane vacuum pump S 1.5	378 73
1 Pointer manometer, DN 16 KF	378 510
1 Air inlet valve, DN 10 KF	378 771
1 Cross piece, DN 16 KF	378 015
1 Hose nozzle, DN 16 KF	378 031
2 Centering rings, DN 16 KF, set of 2	378 045ET2
1 Centering rings, (adapters) DN 10/16 KF, set of 2	378 040ET2
4 Clamping rings, DN 10/16 KF	378 050
1 Vacuum rubber tubing, 8 mm diam.	667 186

Carrying out the experiment

- Put the baroscope under the vacuum bell jar.
- Evacuate the vacuum bell jar by approx. 1000 hPa, and observe the baroscope.

Observation

When the vacuum bell jar is evacuated, the styrofoam ball sinks.

Evaluation

In air, the two bodies of the baroscope are each subject to a gravitational force G_1 (styrofoam ball) or G_2 (metal body), which is directed downwards, and an upward force F_1 (styrofoam ball) or F_2 (metal body), which is due to buoyancy.

If the baroscope is balanced, we have: $G_1 - F_1 = G_2 - F_2$.

As the volume of the styrofoam ball is much greater than that of the metal body, $F_1 > F_2$ and thus $G_1 > G_2$.

After the vacuum bell jar has been evacuated, the buoyancy is only very weak.

The two bodies are almost exclusively subject to the gravitational forces G_1 and G_2.

Therefore the styrofoam ball sinks after the vacuum bell jar has been evacuated.

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