

Vacuum Student Kit 1003494

Instruction Sheet

04/18 ALF



- 1 Hose with T-piece and valve
- 2 Hose with valve
- 3 Recipient (Experiment plate and bell jar)
- 4 Hand pump in case
- 5 Beaker
- 6 Mini bellows
- 7 Balloon

1. Description

Set of equipment for introducing the fundamentals of vacuum physics by means of student experiments. Subjects that may be studied experimentally may include, for example:

- Determining mass of evacuated air and density of air
- Effect of air pressure on a slightly inflated hot-air balloon and on a suction cap
- Lowering of the boiling point of liquids at decreased air pressure

A complete set of equipment consisting of an experiment plate incorporating a rubber ring and a bell jar that can be joined together with a recipient to enclose a coarse vacuum. The bell jar is equipped with a hose connection for attaching a plastic hose with a built-in valve. Evacuation is achieved using a simple hand pump. Beakers, bellows and balloons are provided for the experiments.

All components are made of transparent plastic.

2. Scope of delivery

- 1 Experiment plate with washer
- 1 Vacuum bell jar
- 1 Hose with check valve
- 1 Hose with T-connector and check valve
- 1 Simple hand pump in storage container
- 1 Suction cap
- 1 Beaker
- 2 Balloons

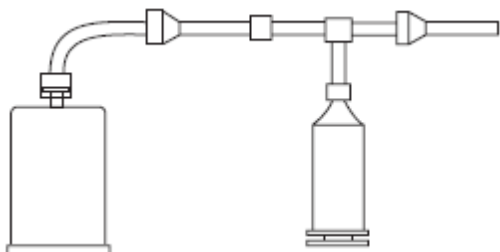
3. Technical data

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|-------------------|--------------------|
| Experiment plate: | 70 mm Ø approx. |
| Bell jar: | 90 mm high approx. |

4. Set-up of experimental apparatus

- When attaching hoses do not use excessive force. Do not exert more than the pressure of your fingertips on the hose connectors when joining them together.

- Connect the hand pump to the bell jar via a hose as shown in the illustration. Slip the hose connectors inside one another and secure by turning with slight pressure from the fingertips.



5. Sample experiments

5.1 Lowering of the boiling point of liquids

- Set up the apparatus as in the illustration.
- Fill the beaker with warm water and measure its temperature.
- Put the beaker on the experiment plate and place the bell jar over the top of them.
- Press the jar onto the plate and operate the pump until the liquid visibly starts to boil.
- Loosen the hose connection to the jar to let in air.
- Measure the temperature of the liquid once again.
- Compare the two temperatures and discuss.

5.2 Effect of reduced air pressure on a balloon

- Set up the apparatus as in the illustration.
- Put a partially inflated balloon on the experiment plate and place the bell jar over the top of them.
- Press the jar onto the plate and operate the hand pump 10-15 times.
- The balloon inflates.
- Alternative experiments can be performed using a mini bellows or a small quantity of shaving foam in a beaker.

5.3 Determining the mass and density of air

Also required:

- 1 set of scales measuring to the nearest 0.01 g
- 1 measuring beaker

- Press the bell jar and experiment plate together. Attach hose (2) and determine the total weight.
- Connect the hand pump and evacuate the recipient.
- Loosen the connection between hoses (1) and (2) and measure the total weight of evacuated jar and hose connection.
- The difference in weight indicates the mass of air pumped out.
- Let air into the bell jar.
- Re-attach hose (2) to determine the volume.
- Fill the recipient and hose (2) with water adding a bung or holding your finger over the end of the hose.
- Pour the water into a measuring beaker and read off the volume.
- Determine the density of air by dividing the mass by the volume.

6. Cleaning

- To clean, use only warm water with a small amount of washing-up liquid. Never use solvents.