

EXPERIMENTAL MANUAL

DENSITY DETERMINATION ALUM. SET/12

QLB012

**Description:**

Density is measure of quantity in a given space.

This density determination Set containing 12 cylinders of aluminum (different length) with different mass and volume but same in diameter, 12.5mm.

These density cylinders are helpful to study that the density of a substance is constant even as its mass and volume change.

Density relates how much mass of a material is in a given amount.

These cylinders can also be used to understand of density, buoyancy, and thermal expansion.

The aluminum cylinders floats in cool water and sinks in warm.

Density:

All the matter has mass and volume.

These are the physical properties of matter and may vary for different materials.

The amount of matter contained in a material is called mass and the amount of space occupied is called volume.

Density is the measure of mass per unit volume.

$$\text{Density} = \frac{\text{mass of the substance}}{\text{volume of de substance}}$$

If D is the density of the object and V is the volume of the object, then:

$$D=M/V$$

The SI units of density is expressed in kg m³ e.g., density of water is 1000 kg m³.

Density of Aluminum is 2.7 g/cm³.

Experiment: To determine the density of the aluminum from the cylinders of different sizes.

Other Components Required:

- Measuring Cylinder • Thread • Electronic Balance

Procedure:

1. Weigh the cylinders using balance, note the reading in grams.
2. Fill the graduated cylinder approximately halfway full. Record the starting level of the water in the table.
3. Tip the cylinder to the side not letting the water spill out and slide the cylinder into the measuring cylinder.
4. When the cylinder will displace the water raising the level of the water. Write down the new volume of the water.
5. Subtract the original volume of the water from the volume of the water with the cylinder to get the volume of the cylinder.
6. Repeat the procedure for each cylinder and record the data.

Table

S.No	Mass of cylinder in g	Volume of water without cylinder in milliliters	Volume of wáter with cylinder in milliliters	Volume of cylinder 1 mL is equal to 1 cm ³	Density of the cylinder Mass/volume = Density
1					
2					
3					
4					
5					

Note: Density should be same in every case. Also one can calculate the percentage error using the experiment value and actual value for the density of aluminum.

Applications:

Density can be used to compute the weight of a piece of machinery or part of a bridge or building before it is constructed. An engineer needs only to know the volume and density of the material of which it is to be made. The engineer can compute beforehand the load that each part of the structure will have to support. This will determine whether the design is of sufficient strength.

Density can also be used to differentiate a pure metal from an alloy, as in the classic case where Archimedes had to determine if Sicily's king had a crown of pure gold or an alloy.