Determining the density of solids and liquids – transcript

In this experiment the densities of an irregularly shaped object (a bolt) and cooking oil are going to be calculated.

To calculate the density of our bolt two values are needed – its mass and its volume. The bolt is placed on the balance and its mass is recorded.

Next, the displacement beaker is filled to the spout with water.

An empty beaker should be placed underneath the spout.

The bolt is gently dropped into the displacement beaker. This displaces the water which will be collected in the empty beaker.

This volume of water is used to determine the density of the bolt.

The displaced water is poured into a measuring cylinder and the volume is recorded.

Density is calculated using this equation

$$\rho = \frac{\text{mass}}{\text{volume}}$$

Density equals mass over volume. Density is represented by the Greek letter rho.

The mass of the bolt was 54.25 grams and its volume was 9 centimetres cubed.

This gives a density of 6 grams per centimetres cubed.

To look at how to calculate the density of a liquid, cooking oil will be used as an example.

An empty beaker is placed on a balance which is set to zero by pressing the ‘zero’ or ‘TARE’ button.

A known volume of cooking oil is measured out. In this experiment 30 centimetres cubed of cooking oil is added to the beaker on the balance.

The mass of the liquid is recorded.

The same equation is used to calculate the density of oil.

Density equals mass over volume.

$$\rho = \frac{\text{mass}}{\text{volume}}$$

The volume of oil used was 30 centimetres cubed and the mass recorded was 26.44 grams.

This gives a density of 0.881 grams per centimetres cubed.

Density is calculated using this equation: mass divided by volume and has the unit grams per centimetres cubed.

Other experiments could be tried using irregular shaped objects and liquids to create a table of solid and liquid densities.