



#### Introduction:

With this clever kit, students try to identify each of 12 different samples by determining their density. Each cylinder varies in size (volume) and density but has the same diameter of 0.5 inches (1.27 cm). Lengths vary between 1.575 and 2.657 inches. We include 12 of the most common materials, a wood base with a linseed oil coating to hold specimens and instructions.

This table lists approximate specific densities for materials in this set.

Material	Density (kg/m <sup>3</sup> )
Copper	8950
Brass	8410
Glass	2230
Rubber	1150
Acrylic	1400
Aluminum	2700
Nylon	1120-1160
PVC	1480-1520
Teflon	2190
Tecaform	1380-1430
Poplar (lighter)	350-500
Oak (darker)	600-900

#### Method for Determining Density:

The most accurate method for determining density is to suspend from a scale or balance and record its weight. A container of water is then raised around the sample completely submerging it and the sample is weighed again. The difference between weighs is the weight of water displaced. From this value, and the density of water (defined at 1 g/ml) you arrive at the volume of the sample.

If you wish to be very exact, take the temperature of the water and find its exact density from a handbook. To be still more exact, take note of the air temperature and barometric pressure since the air exerts buoyancy on the sample, and on the balance weights, of about. 0013 g/ml.

With a laboratory triple beam scale, you can expect an accuracy of 99% with a 10ml sample.

With an analytical balance, you can expect accuracy of 99.99% to 99.999% if you allow for the effects of temperature and air density.

For those materials that do not sink, use a toothpick or needle to push the object down to the bottom of the beaker. Hold the object light, putting no additional pressure on it other than the force required to submerge it, and measure the volume of water displaced. Compute density according to the formula above.

To determine the composition of each sample, compare the values you have determined for each density with the table above.