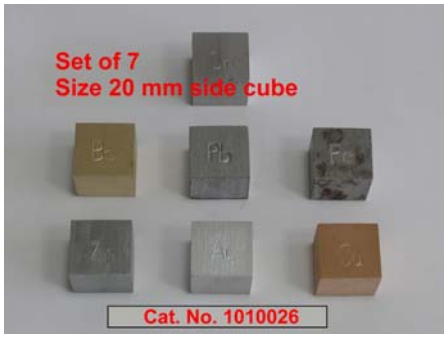
Serrata Specific Gravity Sets

Metal Cubes

Include:

Aluminium specimen
Iron specimen
Brass specimen
Copper specimen
Lead specimen
Tin specimen
Zinc specimen



About Density:

A practical definition of density is a quantity divided by the space it occupies. Since people are measured as a number and the space they occupy is the surface of the Earth, population density is expressed as the number of people per square kilometre. Most material is measured in weight units: pounds, grams, kilograms, tons etc... The space they occupy is volume. Volume is expressed in cubic centimetres, millilitres (almost the same), gallons, cubic feet, litres and occasionally cubic inches.

The most common measure for density is grams per millilitre (or cubic centimetre) for solids and liquids and grams per litre for gases. The standard tor comparing densities is water. At a temperature near 4°C water has a density almost exactly one, 1.000,000 grams per millilitre or 0.999973 grams per cubic cm.

Densities change with temperature and pressure. They are almost always higher at low temperature and higher at high pressure. The specific density of solids falls within a range of 0.08 gm/cm^3 (for solid Hydrogen) to 22.48 gm/cm^3 (for the metal Osmium.)

Determining Density:

The most accurate method for determining density is to suspend the sample by a thin thread or wire 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 weights is the weight of *water displaced*. From this value, and the density of water (defined at 1 gm/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 gm/ml. If you use a laboratory triple beam scale, you can expect an accuracy 99% with a 10 ml 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.

Specific Gravity:

Specific Gravity is almost the same as density except that this density may be determined using water at 20°C, 25°C or some temperature other than 4°C , without correcting for temperature or air pressure.

$$\text{Density} = \frac{\text{(Weight of sample in Air) x (Density of water)}}{\text{(Weight of sample in Air) - (Weight of sample in water)}}$$

$$\text{Specific Gravity} = \frac{\text{(Weight of sample in Air)}}{\text{(Weight of sample in Air) - (Weight of sample in water)}}$$

Here, water and samples are at room temperature, with no corrections made.

How To Use:

1. Compute differing specific gravity values unique to each material.
2. Identify the material by computing specific gravity.

For those materials that sink, use your balance to weigh each object twice - first in air, then in water. Weigh in water by measuring the volume of water displaced when the object is fully submerged in water. To determine specific gravity, divide the weight of the object in air by its loss of weight in water. 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 lightly, putting no additional pressure on it other than the force required to submerge it and measure the volume of water displaced. Compute specific gravity according to the formulas above.

To determine the composition of each sample, compare the values you have determined for its specific gravity to the table.

The Table below lists identifying characteristics and specific densities for materials

Material	Characteristics	Density (g/ml)
Copper (Cu)	Copper coloured cube	8.9
Brass	Gold coloured cube	8.0
Iron (Fe)	Grey coloured cube	7.9
Aluminium (Al)	Silver coloured cube	2.7
Lead (Pb)	Grey coloured cube	11.3
Tin (Sn)	Dark grey coloured cube	7.3
Zink (Zn)	Dark grey coloured cube	7.1

The Information above relates to ALL Cube Sets supplied by SERRATA!