

611-2015 (30-015) Equal Volume Set

Materials Required

- Balance
- Caliper or ruler
- Optional graduated cylinder for measuring volume

Warranty and Parts:

We replace all defective or missing parts free of charge. Additional replacement parts may be ordered toll-free. We accept MasterCard, Visa, checks and School P.O.s. All products warranted to be free from defect for 90 days. Does not apply to accident, misuse or normal wear and tear. Intended for children 13 years of age and up. This item is not a toy. It may contain small parts that can be choking hazards. Adult supervision is required.

Introduction:

The 30-015 Equal Volume Set consists of four handy cylinders of the same length, but varying mass, in specimens large enough for young fingers to handle. The four cylinders (aluminum, glass, nylon and wood) are each 12.5mm x 7.5cm in size. They can be used to demonstrate the relationship between density and volume. They can be used to identify the material out of which they are constructed by determining their density.

About Density:

Why does wood float and metal sink in water? Wood floats because it has a lower density than water. Whether something floats or sinks depends on its density, the amount of mass per volume (or amount of matter per amount of space the object takes up). When an object is in water, it displaces a certain amount of water. Since the displaced water was held up by the water around and below it, the object displacing it is pushed up with the same force by the surrounding water. If the object is the same weight or lighter than the displaced water, it floats; if heavier, it sinks.

When a wooden boat is dropped



into a bathtub, it displaces an amount of water with the same weight as the boat. The rest of its volume sits above the water; in other words, it floats. An iron cube, even a small one, is heavy for its size. When you drop it into a body of water, it weighs more than the water it displaces; therefore, it slides to the bottom. An iron or steel-sided ship floats if its hull contains a big enough bubble of air to make its overall density less than that of an equal volume of water.

The densities of solids range from 0.08 gm/cm³ (for solid hydrogen) to 22.48 gm/cm³ (for the metal osmium.)

How to Use:

1. Take one sample from the four provided.
2. Weigh sample on a balance.
3. Record mass, m, in grams.
4. Measure length, l, of sample in cm with calipers.
5. Record length.
6. Measure dia., of sample in cm.
7. Divide the diameter by 2 to determine radius
7. Record radius.
8. Calculate volume, v, of cylinder as follows:
 $v = \pi r^2 h$
9. Then calculate density, d, as follows:
 $d = \frac{m}{v}$
10. Look up density in the table provided to determine the sample's material. Since materials vary in composition, the supplied values are approximations only.

Try other density and pressure equipment:

- 611-2106 Density Rods: Set of two rods which float and sink at varying temperatures.
- 611-2025 Density cubes: Set of 10, 2.5mm cubes of varying modern materials. Perfect for density and specific heat labs.
- 611-2266 Hydrostatic Studies Kit: A comprehensive kit for exploring critical concepts

How To Teach with Equal Volume Specimens:

Concepts: Mass. Volume. Density. Specific Gravity. Buoyancy. Flotation.

Curriculum Fit: Physical Science and Chemical Science/ Matter. Unit: Observation and Measurement of *Physical Properties*. **Grades 6-8.**

Material	Density (g/cm ³)
Aluminum	2.7-2.9
Glass	2.2
Nylon	1.1-1.2
Oak	0.6-0.9

Note: Materials vary greatly in density. The above figures are guidelines only.

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P/N 24-0015

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