

Table 3 shows the combination of fundamental units used to obtain derived units.

Some combination units are given their own names. For example, pressure expressed in base units is the following.

$$\text{kg/m}\cdot\text{s}^2$$

The name *pascal*, Pa, is given to this combination. You will learn more about pressure in Chapter 11. Prefixes can also be added to express derived units. Area can be expressed in cm^2 , square centimeters, or mm^2 , square millimeters.

Volume

Volume is the amount of space occupied by an object. The derived SI unit of volume is cubic meters, m^3 . One cubic meter is equal to the volume of a cube whose edges are 1 m long. Such a large unit is inconvenient for expressing the volume of materials in a chemistry laboratory. Instead, a smaller unit, the cubic centimeter, cm^3 , is often used. There are 100 centimeters in a meter, so a cubic meter contains 1 000 000 cm^3 .

$$1 \text{ m}^3 \times \frac{100 \text{ cm}}{1 \text{ m}} \times \frac{100 \text{ cm}}{1 \text{ m}} \times \frac{100 \text{ cm}}{1 \text{ m}} = 1\,000\,000 \text{ cm}^3$$

When chemists measure the volumes of liquids and gases, they often use a non-SI unit called the liter. The liter is equivalent to one cubic decimeter. Thus, a liter, L, is also equivalent to 1000 cm^3 . Another non-SI unit, the milliliter, mL, is used for smaller volumes. There are 1000 mL in 1 L. Because there are also 1000 cm^3 in a liter, the two units—milliliter and cubic centimeter—are interchangeable.



FIGURE 5 The speed that registers on a speedometer represents distance traveled per hour and is expressed in the derived units kilometers per hour or miles per hour.

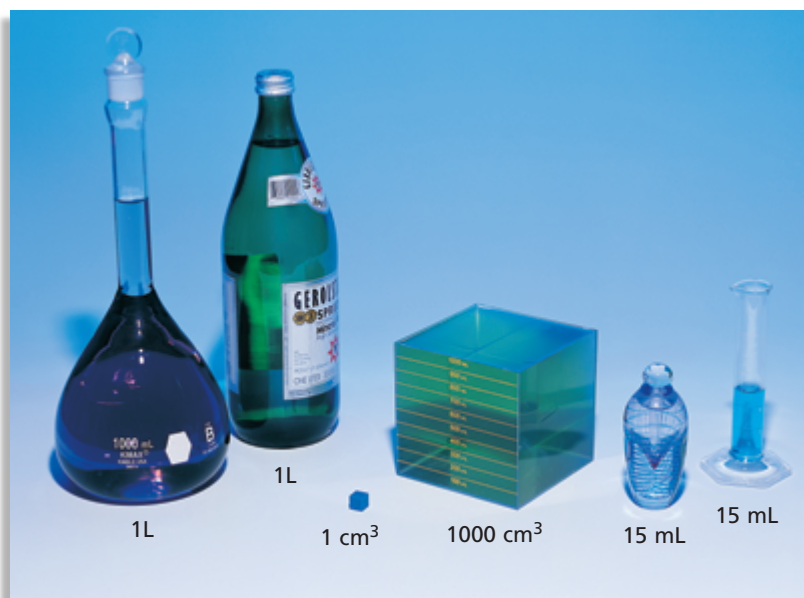


FIGURE 6 The relationships between various volumes are shown here. One liter contains 1000 mL of liquid, and 1 mL is equivalent to 1 cm^3 . A small perfume bottle contains about 15 mL of liquid. The volumetric flask (far left) and graduated cylinder (far right) are used for measuring liquid volumes in the lab.