

Density

- A. The density of a substance is the ratio of mass to volume (grams per milliliters).
- B. Density is a characteristic property of a material and does not depend on sample size; intensive property.
- C. Density is temperature dependant.

Measuring an Object's Density

Calculations:
 final volume: 1760. mL
 initial volume: 1380. mL

 volume of the bolt: 380. mL
 mass of the bolt: 378.84 g

 density of the bolt. 0.997 g/mL

Set up:

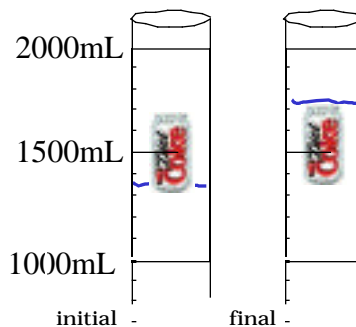


Table 1	Diet Coke (DC)
Weight of full can (grams) (to the 1/100th g)	378.84 g
Final Volume of water in graduate cylinder (mL)	1760. mL
Initial Volume of water in graduate cylinder (mL)	1380. mL
Volume of water displaced by full can (mL)	380. mL
Weight of water displaced by full can (grams)	380. g

$$D = \frac{378.84 \text{ g}}{380. \text{ mL}} = 0.99694736 \text{ g/mL}$$



An Adventure in Buoyancy



Our final hypothesis regarding why an object floats in a liquid

- An object floats when its overall mass is less than mass of the volume of liquid it displaces.

To validate our hypothesis, we must answer the following four questions

- What was the object's mass?
- What was the object's volume? These two questions are related
- What volume of liquid was displaced by the object?
- What is the mass of the liquid displaced?



mass of object was 374.84 g

volume of can and volume of liquid displaced = 380.mL

displaced liquid volume = object volume ←

H₂O

volume of can and volume of liquid displaced = 380.mL

mass of water displaced? 380 g $D_{H_2O} = 1g/1ml$



Volume to mass conversions require that density be known for a given substance



Temperature Conversions

- $^{\circ}F = 1.80 (^{\circ}C) + 32$

- $^{\circ}C = (^{\circ}F - 32) \times 0.555$

memorize this one

- $K = 273 + ^{\circ}C$



To roughly convert $^{\circ}F$ to $^{\circ}C$,
subtract 32 from $^{\circ}F$, then divide by 2.

Complete this table for practice

°F	°C	K
251 °F		
	198 °C	
		298 K
451 °F		
	-16 °C	
		233 K



Conversion Answers

°F	°C	K
251	122	395
388.4	198	471
77	25	298
451	233	506
3.2	-16	257
-40	-40	233

