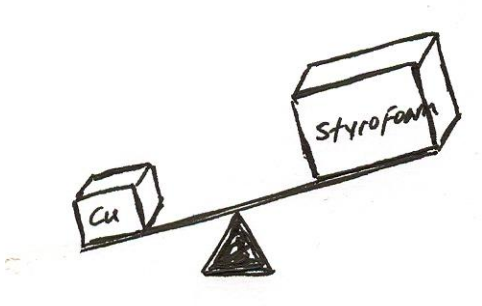
Aim: What is DENSITY?

1) **Density** - the "mass over the volume" of a sample of matter
-a measure of how compact (tightly packed) matter is
-an important physical property

2) Applying density to the 3 states of matter

a) **SOLIDS**
Demo: comparing copper cube to Styrofoam block

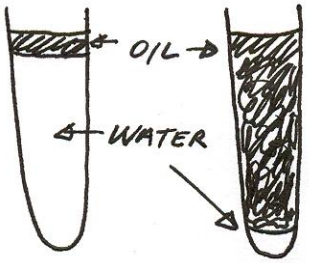


D cu > D styrofoam

Demo: pumice stone, granite, block of lead

Did you know? Pb is so dense that it stops x-rays.
Os is the densest solid element.(Look it up in Table **S)**

b) **LIQUIDS**
Demo: a drop of oil in a test tube of water & a drop of water in a test tube of oil

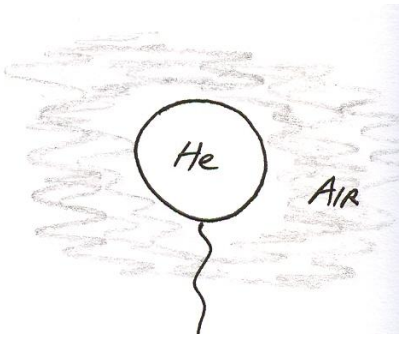


D water > D oil

Rule: a less dense object floats on a more dense object
Did you know? **Hg** is the densest liquid element.

c) **GASES**
Demo: He balloon rising in air

D air > D He



Did you know? $\mathbf{H_2}$ is the least dense gaseous element.

2) **Solving Problems:** Go to handout of class work problems.

{D=M/V }

unit: g /mL or g/cm^3

RCHEM1/Chille density classwk.m&e

Are you dense?!!

{D = M / V}

quantity	unit
Mass	g
Volume	mL or cm^3
Density	g/mL or g/cm^3

Classwork

1) What is the density (D = ?) of an object that weighs 112.0 grams (M) and occupies 4.2 cm^3 (V)?
(Write the formula for Density. Circle and label the quantities given. Plug them into the formula. Solve for the unknown. Don't forget the unit!)

$D = \frac{M}{V}$ $D = \frac{112.0}{4.2}$ $D = 26.\bar{6}\ g/cm^3$

2) What is the mass (M = ?) of 4.9 ml (V) of a liquid having a density of 10.15 g/ml (D)?

$D = \frac{M}{V}$ $10.15 = \frac{M}{4.9}$ $M = 10.15(4.9) = 49.735\ g$

3) What is the volume (V = ?) of 32.35 g (M) of a liquid that has a density of 2.08 g/ml (D)?

$D = \frac{M}{V}$ $2.08 = \frac{32.35}{V}$ $V = \frac{32.35}{2.08} = 15.558\ ml$

4) A 2.84 cm^3 (V) sample of gold has a mass of 52.65 g (M). Calculate its density (D=?). Is this sample pure gold? Refer to Table **S** to find the density of gold.

$D = \frac{M}{V} = \frac{52.65}{2.84} = 18.5387\ \frac{g}{cm^3}$

∴ The densities differ. ∴ It's not pure Au

Table S $D_{Au} = 19.320\ \frac{g}{cm^3}$