Fluids

II. Density (actually mass density)

Concept 2: A fluid can change its shape depending on the vessel that it is placed into. This makes it difficult to talk about the amount of mass in a certain shape. Thus, we don't talk about the mass of the free body, but the mass per volume (density) of the free body.

A. Definition - ρ

The density of a uniformly object is defined as the object's mass divided by the object's volume.

1. Density is a useful concept even for solid objects!! The mass of a gold ball depends on the size of the ball. However, the density of gold is the same for any size ball.

A property that is the same independent of size of the object is called an "intensive property." Density is an intensive property.

A property that depends on the size of the object is called an "extensive property." Mass is an extensive property.

Since density is an intensive property, the density of gold unlike mass is the same for all gold objects for a particular temperature and pressure. Thus, the densities of materials are tabulated in handbooks including the CRC and can be used to distinguish between different materials.

B. Units –

The normal SI units are so large that they are not very convenient. Thus, scientists usually quote the density of a material either in terms of grams/cm^3 or in terms of how its density compares to water (specific density).

Conversions:

Density of Water:

Specific Density =