

## *Density and Buoyancy*

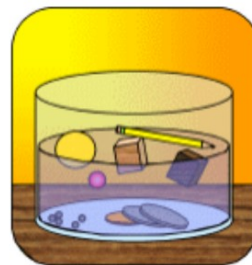
Take a guess at what these terms mean.

You may have heard them before.

Here are a couple of hints:

Density helps explain why a piece of steel sinks in water and a beach ball floats.

Buoyancy explains why a huge piece of steel in the shape of a ship floats!



## Density

- can be described as the crowdedness of the particles in a substance
- Scientifically, it is the amount of substance that occupies a particular space.
- Can be measured (Discussed later)
- A “heavy” substance has a high density
- A “light” substance has a low density



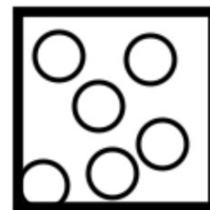


-According to the particle theory, different substances have different sized particles. The size of the particles determines the number of particles that can fit into a given space. Each substance has its own unique density, based on its particle size.



Liquid A

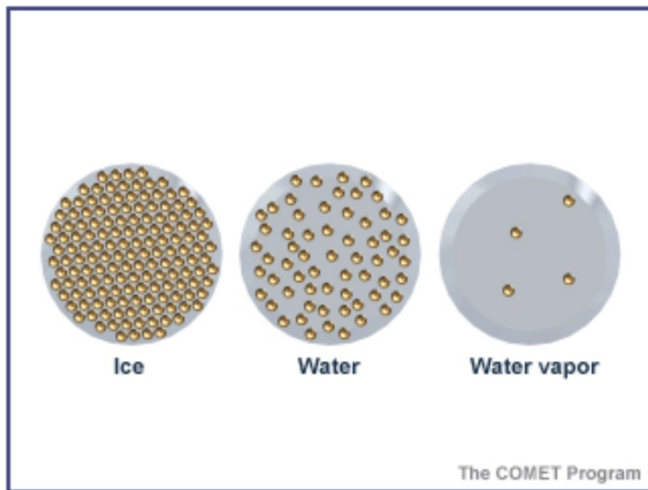
- small particles  
so many can fill  
the area



Liquid B

- Large particles  
so few fill the  
area

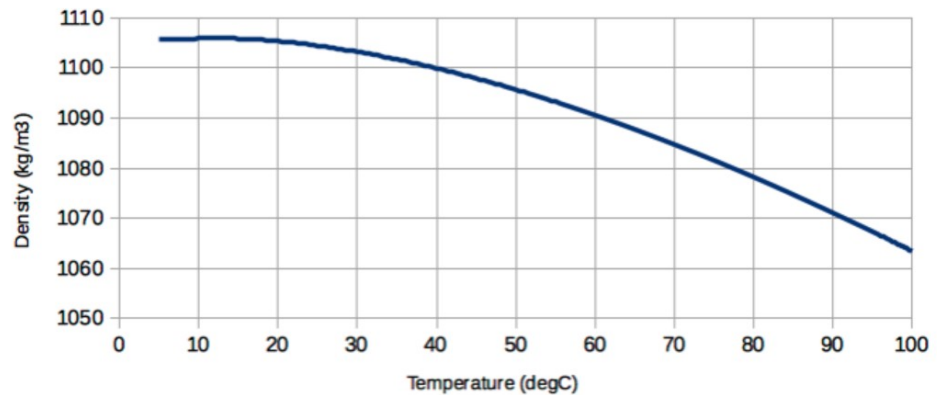
-Each substance has its own density



You can see with ice there is more particles bunched together in the area. Water the particles are spread out some BUT with water vapor the particles are really spread out.

Heavy Water - Temperature and Density

[www.engineeringtoolbox.com](http://www.engineeringtoolbox.com)



As temperature increases the density of water decreases

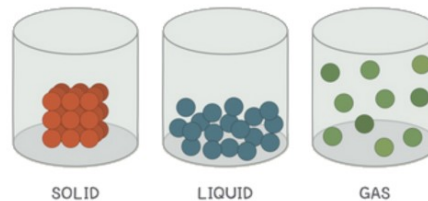


## Density of Solids, Liquids, and Gas

The only way the density of a substance will change is if it changed states.

Ex) Liquid water is a different density than solid water and water vapor

### Water



Both liquid water and water vapor have the same type of particles and the particles are all the same size.

### Why is water vapor less dense than liquid water?

According to the particle theory of gas, gas particles have more space between them than liquid particles. Therefore, water vapor would have fewer particles than liquid water.

The density of the water vapor is less than the density of the liquid water.

Dolphin can leap through the air and dive back into water smoothly and effortlessly.



Solid objects can move easily through liquids and gases. The particle theory states that fluid properties of water and air allow water particles and air particles to move out of the way solids.



You cannot push through a solid substance, like ice, since the particles are held strongly together and will not push aside.

