

Recall

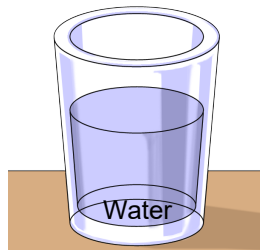
A Homogenous mixtures is called a solution.

Add to your notes

- Solutions have properties that blend together. This depends on how much of one material and how much of the other material are in the mixture.

ex) Salt in water will mix so that the salt will disappear and cannot be seen (As long as you have lots of water) Ice tea, Kool-aid...

→ Why Do Some Materials NOT Dissolve?



Solvent



Solute

→ There is usually less solute than solvent in a solution (more solvent than solute.)

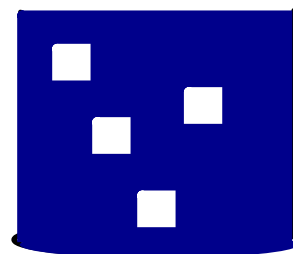
Solute - is the substance that dissolves in a solvent to form a solution (ex. the salt in water)

Solvent - is the substance that dissolves a solute to form a solution (Ex. usually water)



Water
Solvent

Sugar Cube
Solute



Sugar Water
Solution

Solubility

- The ability of a particular substance to dissolve.



I am the Substance that dissolves a solute?

A. Solution



B. Solvent



C. Solubility



I am a mixture of two or more materials that merge to form one set of Properties?

A. Solution



B. Solvent



C. Solubility





The ability of a substance to dissolve?

A. Solution



B. Solvent



C. Soluble





Journal

Close up your notebooks



- Write about 10 facts from the previous notes in you journals

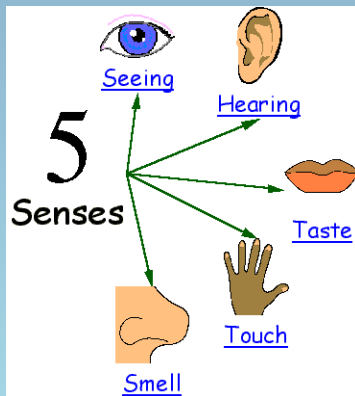




Physical Properties

One of the physical properties of matter is its state.

Another way to describe physical properties is using our senses.



What could we observe from each of the 5 senses?

- i) Sight: color, bright, dull
- ii) Hearing: Bubbling, crackling, snapping
- iii) Taste: sweet, salty, bitter
- iv) Touch: Rough, soft, slimy,
- v) Smell: Sweet, rotten,

Some you can see But some you have to measure with devices.

Physical Properties

Property	Describing the Property
Colour	Is it black, white, colourless, red, greenish-yellow?
Texture	Is it fine, coarse, smooth, gritty...?
Odour	Is it odourless, spicy, sharp, burnt...?
Lustre	Is it shinny, dull..?
Clarity	Is it clear, cloudy, opaque....?
Taste	Is it sweet, sour, salty, bitter...?

Fill in from your knowledge the blanks

Name of Substance	Physical Properties	State of matter
a) Oxygen		
b) Cocoa Powder		
c) Water with food coloring		
d) Olive Oil		



Oxygen that we breathe



Water and food coloring



olive oil



Coco powder

2) Hardness

The measure of the resistance of a solid to being scratched or dented.



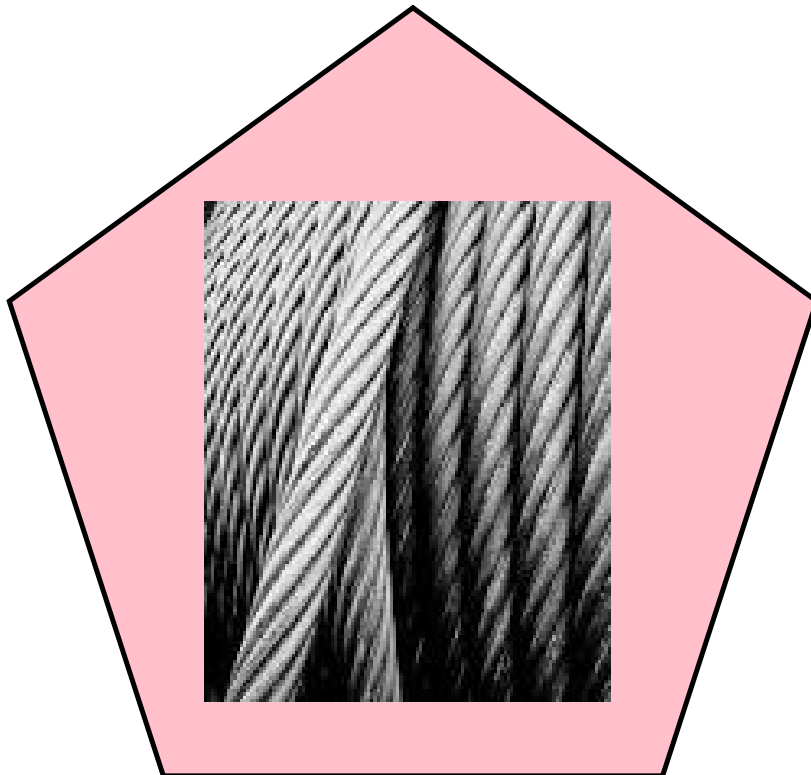
Cool Fact: The Millenium Star (above) is the second largest flawless diamond at 203 carats. These types of diamonds are considered the rarest and the most valuable set of diamonds created. One of these only 10 carat diamonds cost in excess of 10 million dollars.

3) Malleability: ability of a substance to be hammered or bent into different shapes.



4) Ductility: the ability to be pulled into wire.

[Malleability and Ductility-Physical Properties - YouTube](#)



5) Melting and Boiling Points

[Boiling point and Melting point-Physical Properties - YouTube](#)

melting point = the temperature a substance changes from a solid to a liquid

boiling point = the temperature a substance changes from liquid to a gas



Does anyone know the melting point or boiling point of water?



Crystal form (another form of a solid)
A solid mineral structure with a regular pattern of 3-D shapes. Salt crystals are cubic, plastic has no crystal form



Recall
Solubility- The ability to dissolve in a solvent such as water. Salt is **soluble** in water, pepper/copper are **insoluble** in water.

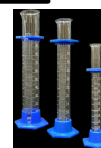
Quantitative physical property is something that can be **measures with an instrument of some kind.**

Some Quantitative Physical properties are:

Volume – **The amount of space occupied by a substance**



- **Volume of liquids can be measured using measuring cups, graduated cylinders.**



- **Volume of gases can be determined by measuring volume of the containers that hold them**

Temperature is a physical quantity that expresses the **degree of hotness or coldness** of a substance and the internal energy given off by a substance. **Measures with a thermometer.**



Mass – **The amount of matter in a substance**

- **Measured in kilograms (Kg) or grams (g)**



Density- The amount of matter (mass) per unit of volume of a substance.

Lead is denser than feathers or some may say lead is heavier than feathers.

For example: Density of water is 1.0 g/cm^3 .



Density and Buoyancy

Take a guess at what these terms mean.

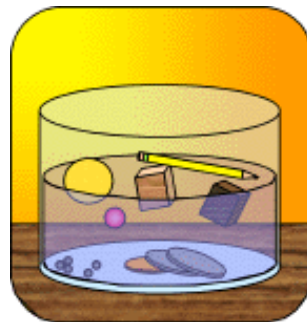
You may have heard them before.



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!



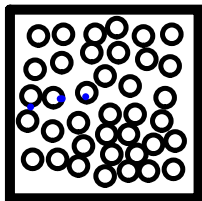
Density

- 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





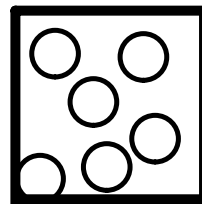
-According to the particle theory, different substances have different sized particles. The size of the particles determines the number of particles that can fit into a given space. Each substance has its own unique density, based on its particle size.



Liquid A

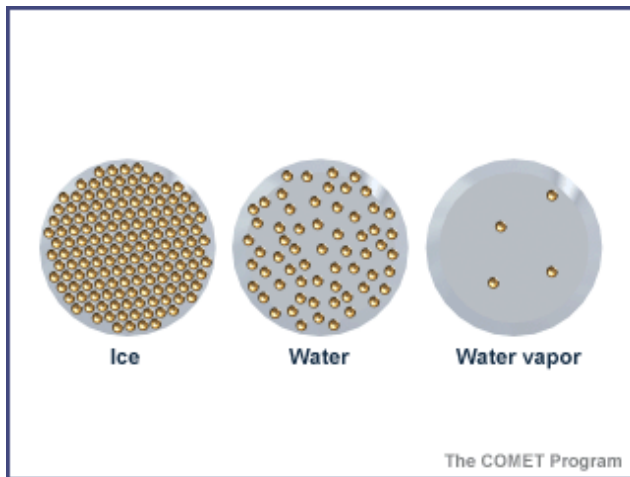
- small particles
so many can fill
the area

-Each substance has its own density



Liquid B

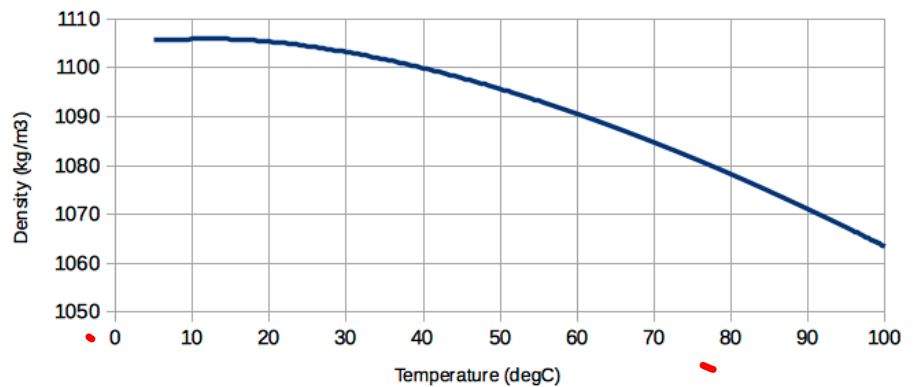
- Large particles
so few fill the
area



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



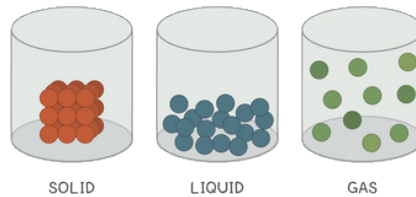
As temperature increases the density of water decreases



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 particles and the particles are all the same size.

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 of solids.

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



We sometimes confuse weight with mass. When you step on a scale at home you are getting your mass.

Force - is a push or pull.

Gravity - is a natural force that causes an object to move toward the center of the earth.



Weight - is the force of gravity exerted on an object.

- Measured in Newtons (N)

The pull of gravity everywhere on an earth' surface is the same. It is a downward force of 9.8 N for every kilogram of its mass. (9.8N/kg)

Ex) A bag of sugar has a mass of 2kg

2 kg x 9.8 N = 19.6 N BUT weighs 19.6 N

1kg

You Try

Assume you have a mass of 50 kg. What would be your weight on earth?

A large, empty rectangular box with a black border, intended for the student to write their answer to the question above.

Supplies soon needed for activity

Density Formula

Density of a substance can be determined by calculating its mass-to-volume ratio.

	Shorthand	Rearranged
Density = $\frac{\text{mass}}{\text{volume}}$	$D = \frac{m}{V}$	$V = \frac{m}{D}$ $m = V \times D$

-For liquids density is measured in g/mL or g/L

-For solids density is measured in g/cm³

Density of water is 1.00 g/mL

A substance that had a density of 2.85 g/mL would _____ in water. It is _____ dense than water.

A substance that had a density of 0.82 g/mL would _____ in water. It is _____ dense than water.

Which substance would float or sink in water?

Substance	Density of substance	Sink or Float
A	1.35 g/mL	
B	0.32 g/mL	
C	2.68 g/mL	

Changing States

Change of state is when the physical state of a substance is transformed into another state.

Requires an increase of heat

Melting is a change from solid to liquid



Vaporization is a change from Liquid to gas

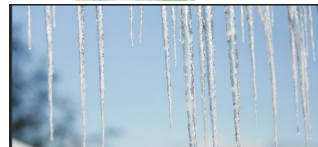


Requires a Loss of heat

condensation - change from gas to liquid



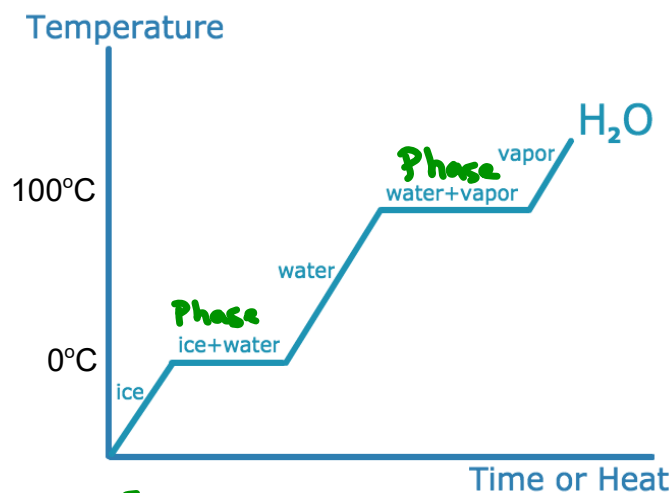
Freezing - change from liquid to solid



Heating Curves

What happens to the temperature of a block of ice when you put a Bunsen burner underneath it?

You might think that the temperature goes up smoothly, but that's not what happens. The graph of temperature against time is called a heating curve. Let's look at the heating curve for water.



Heating Curves

Notice that, in general, the temperature goes up the longer the heating continues. However, there are two horizontal flat parts to the graph. These happen when there is a change of state. The plateaus are also called phase changes

The first change of state (ice+water) is melting (changing from a solid to a liquid). The temperature stays the same while a substance melts.

For water, this temperature is 0°C because the melting point for water is 0°C. Over the course of this line segment, both liquid and solid exist in various ratios, starting at 100% solid and ending at 100% liquid.

The second change of state (water +vapor) is boiling (changing from a liquid to a gas). The temperature stays the same while a substance boils.

For water, this temperature is 100°C because the boiling point for water is 100°C. Over the course of this line segment, both liquid and gas exist in various ratios, starting at 100% liquid and ending at 100% gas.