

4.2 Physical Properties

SNC1D

Physical Property:

A characteristic of a substance that can be observed or measured ***without changing the identity of the substance.***



On your worksheet
Physical Properties,
match the properties
with their definitions!

Physical Properties

Qualitative properties

- Descriptive
- No quantitative measurement

Quantitative properties

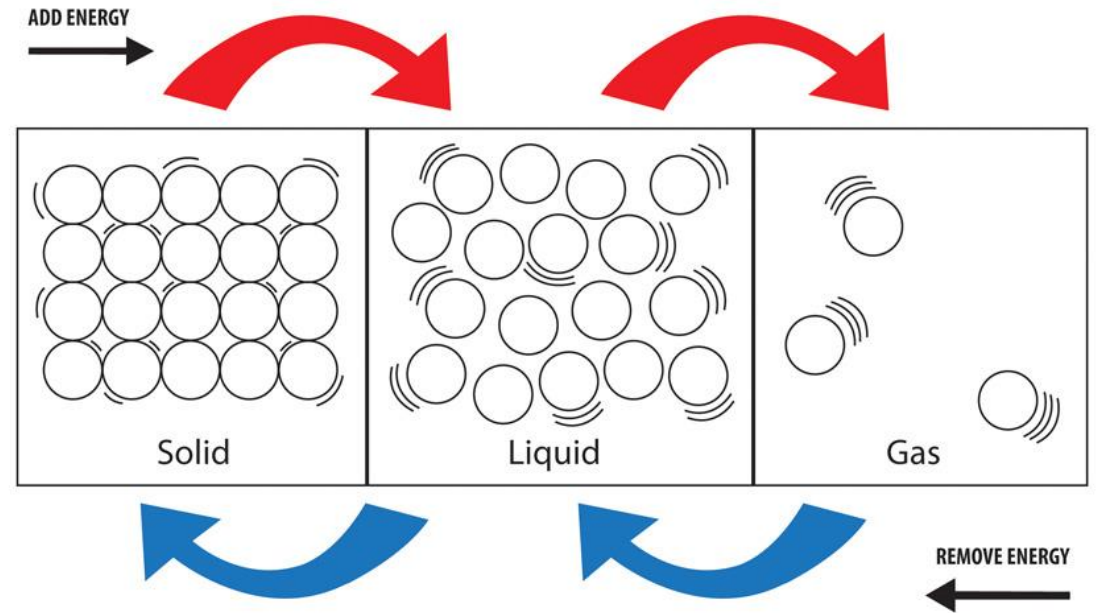
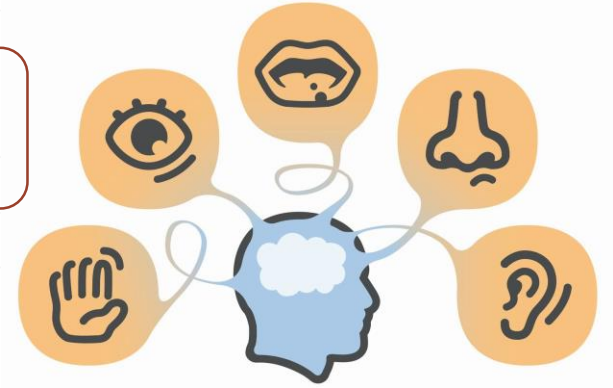
- Numerical measurements

Qualitative Properties:

A qualitative physical property are results that are given in a _____* non- numeric form.

- colour
- odour
- **state**
- texture
- lustre (lustrous vs. non-lustrous)
- malleability (malleable vs. brittle)

Use your senses to observe the results



Ex. The state of the substance can change from one form to another depending on temperature.

Quantitative Properties:

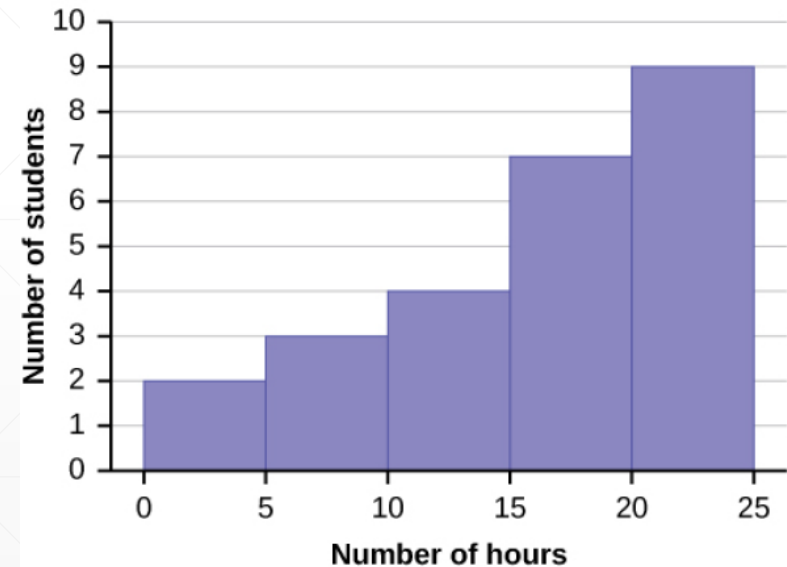
A quantitative physical property give definitive results in a _____ * form – usually with units.

- viscosity (viscous vs. non-viscous)
- melting point
- boiling point
- solubility
- hardness
- conductivity
- density

Use instruments to determine the results



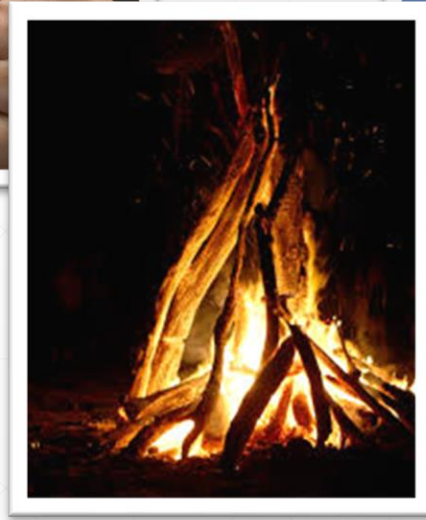
Hours Spent Playing Video Games on Weekends



Ex. Quantitative study looking at number of hours that students spend playing video games

Physical Change:

is a change that alters a _____ * physical properties. IT does not change the _____ * property of a substance.



Which of these pictures is showing a physical change?

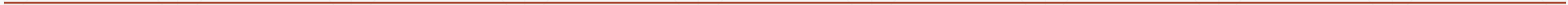
Two Important Physical Changes:

1) Change of State:

- Substances can transform from one state to another.
- These changes either release or take in _____*.

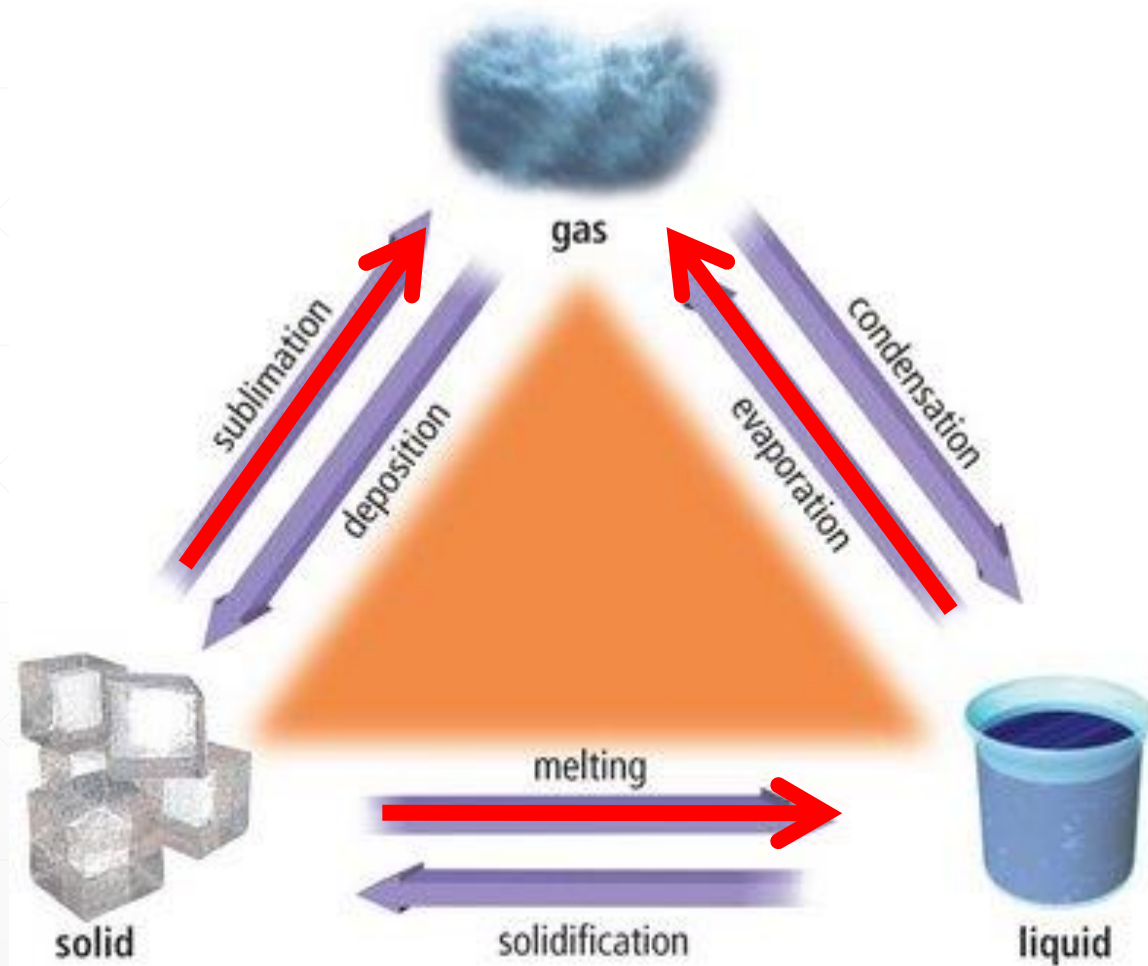
2) Dissolving:

- When a solid is dissolved in water, it is no longer solid.
- It is said to be in the _____**.



1) Change of State:

→ = energy is required



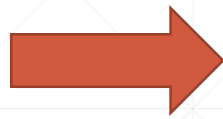
Melting point:

Boiling point:

Figure 7.5A Changes of state

2) Dissolving:

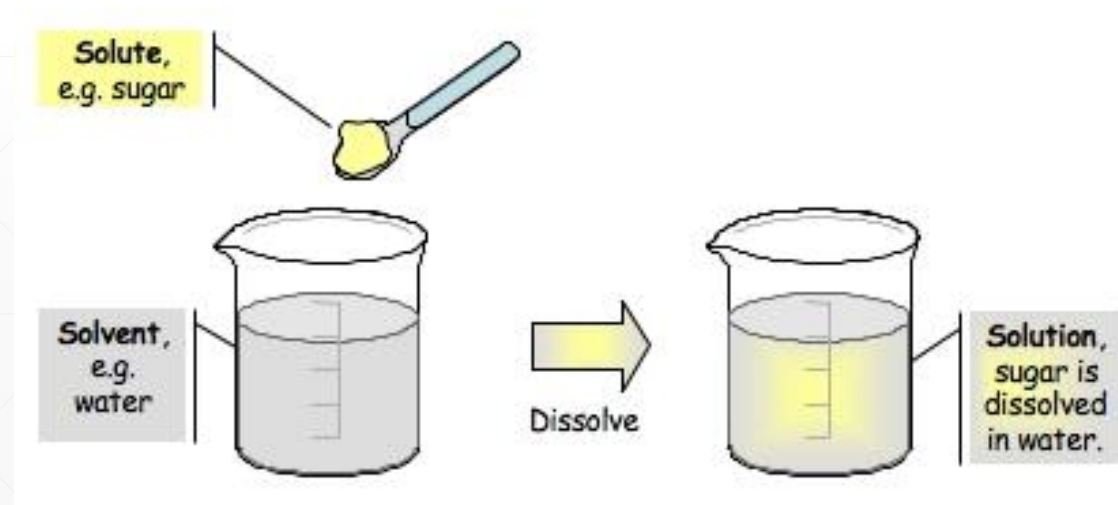
sugar = glucose = $C_6H_{12}O_6$



Solubility:

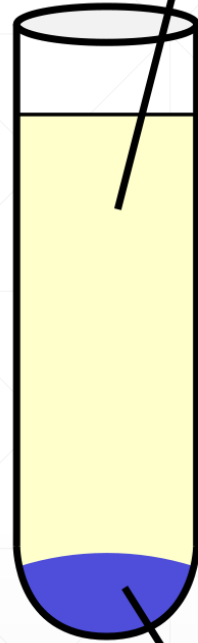
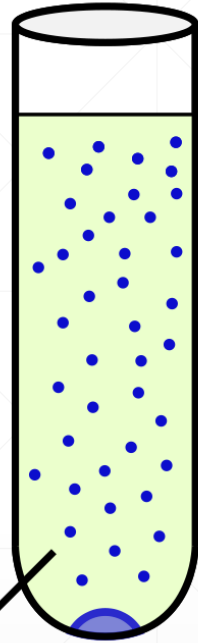
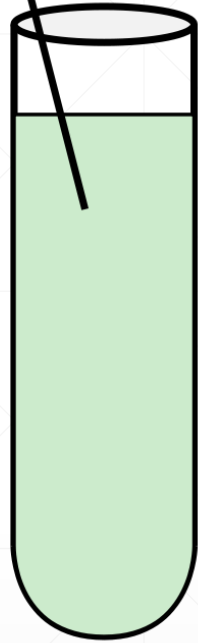
The _____* of a substance can be expressed:

- Qualitatively: Does a substance dissolve in water?
- Quantitatively: What **maximum amount** of substance dissolves in 100 mL of water?



Solution

Supernate



Suspension

Precipitate

High solubility



Low solubility

A substance that has very low or no solubility is known as **'Insoluble'**.

Substances are either **water-soluble** or **fat-soluble** (dissolve in oils).

examples of **water-soluble** substances:

- vitamins
- sugar

examples of **fat-soluble** substances:

- many pharmaceutical drugs
- DDT, a pesticide



Hardness as a Physical Property:

Hardness of a substance is its ability to _____* another substance and it can be used to determine its practical use.



Diamond: **Hardness** rating of 10 (Mohs scale)



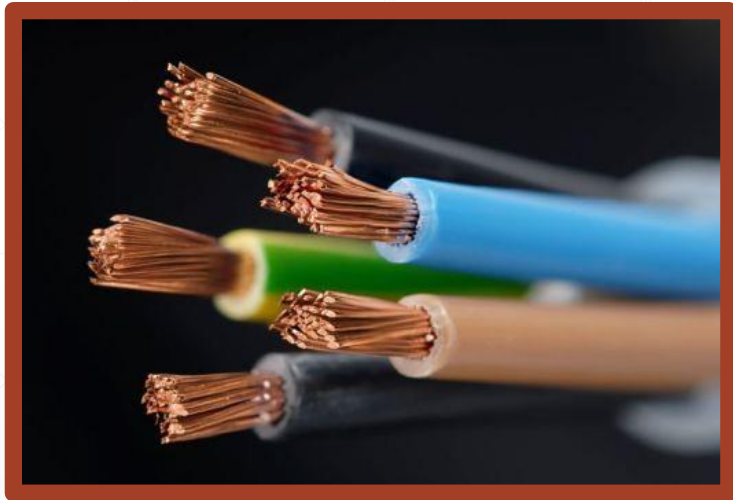
DIAMOND DRILL BITS:

used for cutting/drilling:

- ceramic
- porcelain
- glass
- stone
- marble
- granite

Conductivity as a Physical Property:

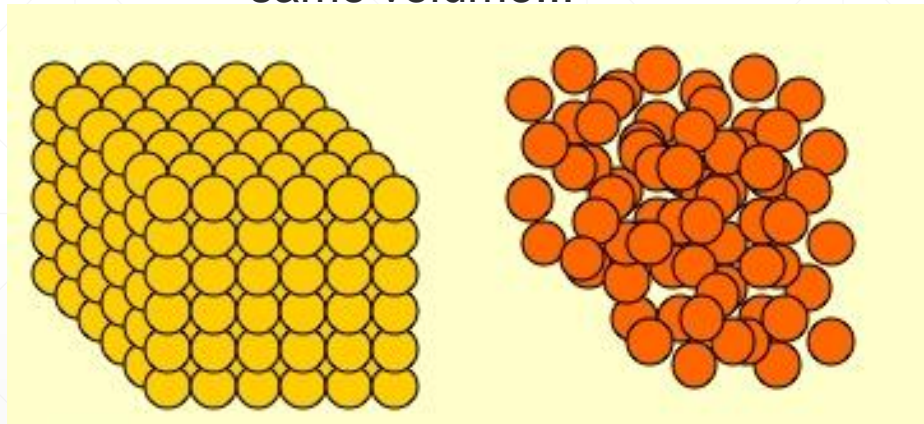
Conductivity of a substance is its ability to conduct _____*.



Density as a Physical Property:

The ratio of the mass of a substance to the _____ * it occupies.

same volume...



High density

More particles
crammed into the
same volume

Low density

*Density determines
whether a substance
sinks or floats.*

$$D = \frac{\text{mass}}{\text{volume}}$$



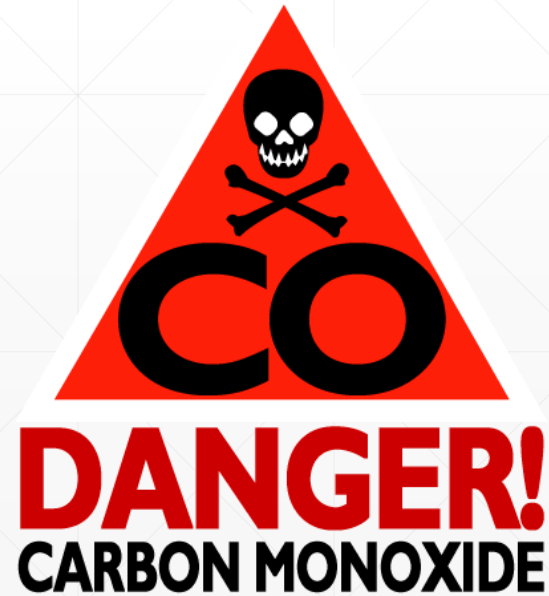
Which of these substances is the least dense?



Ice floats on water...



...and so does oil.



Carbon monoxide is more dense than air...

Where in the house are CO detectors placed?



Determining Density:

A sample of silver has a mass of 5.04 g and a volume of 0.480 cm³. What is the density of silver?

Solution:

$$D = \frac{\text{mass}}{\text{volume}}$$

Practice: Determine Density

A sample of an unknown metal has a mass of 21.6 g and a volume of 8.00 cm³. Calculate the density of the unknown metal.

$$D = \frac{\text{mass}}{\text{volume}}$$

Practice: Determine Density

A balloon contains 5470 cm³ of a gas and has a mass of 10.24g. The mass of the empty balloon is 2.42 g. What is the density of the gas?

$$D = \frac{\text{mass}}{\text{volume}}$$

Homework:

- Read pages 149 – 157 of textbook
 - Complete Questions: pg. 159 # 2-7
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