Science—Matter

Year 9 Term 2

Trinity Academy Bradford | Trinity Academy Halifax

The Particle Model

Solid		Most dense. Particles in fixed positions. Vibrations only
Liquid		Moderately dense. Particles still touch but move randomly past each other
Gas		Least dense. Particles move randomly and quickly

Key Term — Definition

Atom — The smallest particle of a chemical element that retains its chemical properties.

Proton — The positively charged subatomic particle found within the atomic nucleus.

Neutron — The neutral subatomic particle found within the atomic nucleus.

Electron — The negatively charge subatomic particle found within the shells surrounding the atomic nucleus.

Density — Density tells us how much mass there is in a certain volume.

$\text{Density (kg/m}^3\text{)} = \text{(mass (kg))/(Volume (m}^3\text{))}$

Volume — The amount of space atoms in a substance/ object take up.

Temperature — A measure of the average kinetic energy of the particles in a system. Measured with a thermometer using °C or K

Specific latent heat — The energy needed to change the state of 1kg of a material. The units are J/kg.

Energy = mass x SLH

Specific heat capacity — The energy needed to change the temperature of 1kg of a material by 1°C. The units of measurement are J/kg°C.

Energy = m x SHC x ΔT

Gas pressure — A force on a container caused by the collision of particles with the container walls. Higher temperatures lead to higher pressure

Eureka can — Equipment used to measure the volume of an irregular objects.

Sublimation — A change of state from a solid to a gas.

Trinity TV

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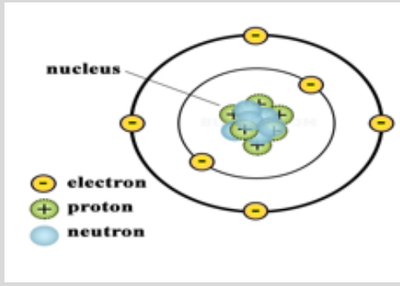
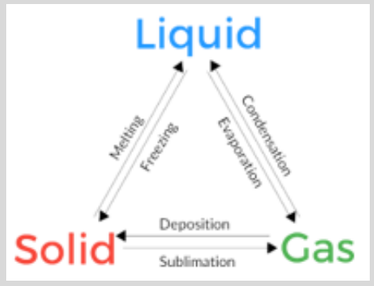
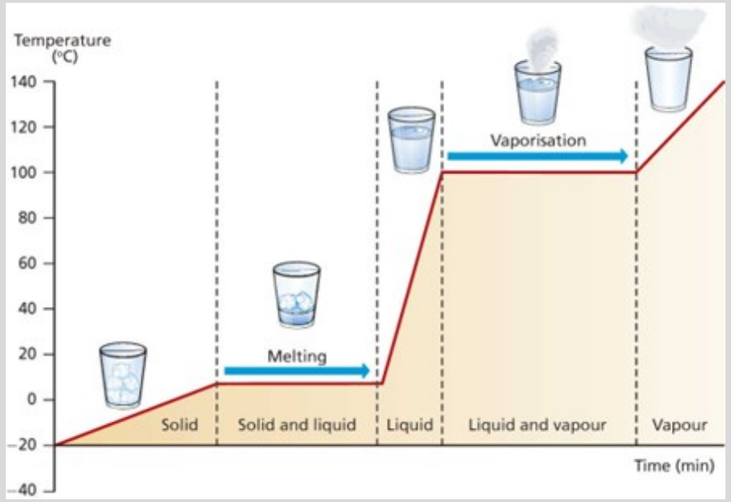
Changing State & Density

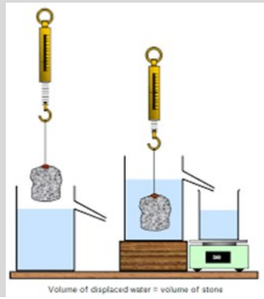




Subatomic Particle	Mass (mass unit)	Charge	Location
Proton	1	+1	Nucleus
Neutron	1	0	Nucleus
Electron	0.0005	-1	Shells surrounding the nucleus

The typical atomic radius is 1×10^{-10}m



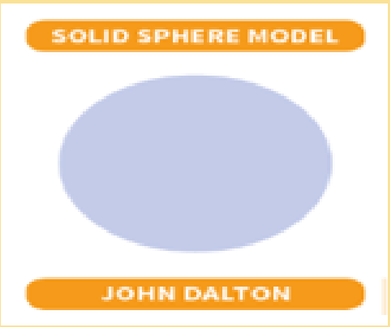


Investigating Density

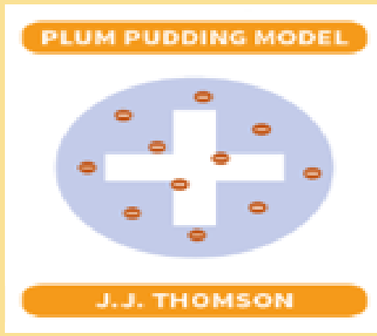
To determine the volume of regular objects use a ruler to measure the length, width and depth. These need to be multiplied to find the volume. To find the volume of irregular objects use a eureka can and measuring cylinder to measure how much water is displaced, this water has the same VOLUME as the object.

The mass can be found using a mass balance. Apply the equation for density.

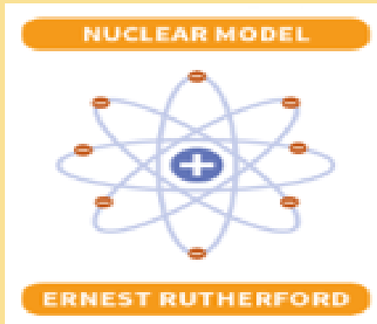
History of the Atomic Model



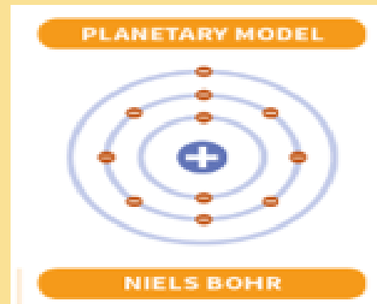
Dalton thought atoms were small indestructible spheres. All atoms of the same element are identical to each other.



Thompson discovered the electron. He created the plum pudding model which shows negative electrons equally spread through positive matter.



Rutherford fired positively charged alpha particles at gold foil. Most passed through, some were deflected at small angles and some at large angles. This shows the majority of the atom is empty space with a small positively



Bohr modified Rutherford's model by stating that electrons move around the nucleus in fixed orbits.