P6 Molecules and Matter Knowledge Organiser PT31.1

Density, ρ	•The mass per unit of volume of a substance •Measured in kg/m^3 •Dense materials are heavy for their size, i.e. Lead •To calculate the density, you need to measure the mass and the volume
Measuring volume	• For a regular object (like a cube), measure the dimensions using the right tool and use them to calculate the volume (e.g. l x w x h) •For an irregular object (like a stone), find out the volume of water it displaces using a Eureka can and measuring cylinder
Solid	•Particles are held next to each other in fixed positions •Particles have the lowest energy •Fixed shape and volume •Doesn't flow •Much higher density than a gas
Liquid	•Particles move around randomly and are in contact with each other •Particles have more energy than a solid •Fixed volume •Takes shape of container •Flows •Much higher density than a gas
Gas	•Particles move randomly, rapidly and are far apart •Particles have the highest energy •Volume can change as it spreads out to fill container •Flows •Low density
Melting point	•The temperature a pure substance melts at •A substance will solidify at the same temperature
Boiling point	•The temperature a pure substance boils at •A substance will condense at the same temperature •Boling happens throughout all of a liquid and only happens at the boiling point.
Evaporation	•Happens at the surface of a liquid below the boiling point

Internal Energy	•The energy stored by the particles of a substance •The particles have energy due to their individual motion and positions •Internal energy = KE due to individual motion relative to each other + PE due to their positions relative to each other •Higher temperature = higher internal energy •This is because the KE increases when temp increases •The PE of a substance increases if it melts or boils
Latent heat	•The energy needed for a substance to change state without changing the temperature
Specific Latent Heat of Fusion, L_f	•The energy needed to melt 1kg of a substance without changing the temperature •Measured in J/kg •E = mass x Specific Latent Heat of fusion •This is the same amount of energy if the substance is going from a liquid to a solid. •The particles need energy to break free from each other and this energy is the latent heat of fusion
Specific Latent Heat of Vaporisation, L_v	•The energy needed to boil 1kg of a substance without changing its temperature •Measured in J/kg •E mass x Specific Latent Heat of Vaporisation
Gas pressure	•This is caused by the particles of a gas colliding randomly with the walls of the container •In a sealed container, pressure increases if temperature increases because the particles move faster because they have more KE and so and hit the surfaces with more force and more times per second •Smoke particles move unpredictably because gas particles collide with them (Brownian motion)

Key Equations To Learn	
Density, ρ	Density = mass ÷ volume ρ = m ÷ V