**P3 Learning Journey**

|  |  |
| --- | --- |
| 1C:\Users\rca\AppData\Local\Microsoft\Windows\INetCache\Content.MSO\751A813A.tmp | **Density** is a measure of the amount of **mass** in a given **volume** and is calculated using the equation **Density (kg/m3 ) = mass (kg) / volume (m3 )** |
| 2C:\Users\rca\AppData\Local\Microsoft\Windows\INetCache\Content.MSO\4FB98D58.tmp | Required practical - **density** of a **regular** object can be found by measuring its **mass** on a mass **balance** and measuring the **length**, **width** and **height** of the object using a ruler and **multiplying** the **values** together- this gives the **volume**. **Density is calculated using the equation density = mass / volume**. Density of an **irregular** shaped object can be found by measuring the **mass** using a mass **balance** and the **volume** using a **Eureka can**; calculate density by mass/ volume. Density of a **liquid** can be found by measuring the **mass** of the liquid on a mass balance and dividing it by the **volume** of liquid you have. |
| 3C:\Users\rca\AppData\Local\Microsoft\Windows\INetCache\Content.MSO\23A35526.tmp | The 3 **states of matter** are **solid**, **liquid** and **gas**. **Particles** in a **solid** are **tightly packed** in a **regular** arrangement, have **little energy** and can only **vibrate** on the spot. **Particles** in a **liquid** are **closely** arranged **but not** in a **regular** arrangement - they are touching but can **slide around** each other and they have **more energy** than particles in a solid. **Particles** in a **gas** **are far apart**, moving at **random** speeds in random directions and they have **lots of energy**. |
| 4C:\Users\rca\AppData\Local\Microsoft\Windows\INetCache\Content.MSO\43D64424.tmp | **Solids** are **dense** because they have **closely packed** particles so have the greatest mass in a given volume. **Liquids** are **less dense** than solids because their particles are **not so closely packed** together. **Gases** are the **least dense** state because particles are far apart so there are **fewer particles**, so less mass, in a given volume. |
| 5C:\Users\rca\AppData\Local\Microsoft\Windows\INetCache\Content.MSO\ECE951D2.tmp | When a substance is **heated** or **cooled** it can **gain** or **lose energy** and **change state**. If a **solid** is **heated**, its particles absorb energy and start to move more- the solid **melts** to a liquid. If a **liquid** is heated, its **particles gain energy** and move around more until the liquid **boils** or **evaporates** and turns into a gas. If a **gas** is **cooled**, it **loses energy**, particles **move less** and the gas **condenses** into a liquid. If a **liquid** is **cooled**, its particles lose energy and move less and eventually the liquid **freezes** to a solid. If a **solid** has a **melting** and **boiling point** very **close** together, when heated it can turn straight into a gas- this is **sublimation**. When **cooled** the gas can turn straight into a solid- **reverse sublimation**. |
| 6C:\Users\rca\AppData\Local\Microsoft\Windows\INetCache\Content.MSO\377E1B0.tmp | **Chemical changes** are **irreversible** because they involve reactant **particles** being **rearranged** into a new substance. **Physical changes** are **reversible** because they **do not involve a new substance** being made. **Changes** of **state** are **physica**l changes because they do not involve making something new and they are **reversible**. |
| 7C:\Users\rca\AppData\Local\Microsoft\Windows\INetCache\Content.MSO\8DD8A33E.tmp | **Energy stored** inside a system **by the particles** that make up the system is called **internal energy**. This is the **total kinetic energy** and **potential energy** of all the **particles** that make up a system. **Heating** changes the energy stored within the system by **increasing** the **energy** of the particles that make up the system. In this case either the **temperature increases**, or **changes of state** happen. |
| 8C:\Users\rca\AppData\Local\Microsoft\Windows\INetCache\Content.MSO\C65771FC.tmp | Any **increase** in **temperature** of a substance depends on the **mass** of the substance heated, what the **substance** is and the **energy** given to the system. The equation that links these variables is: $change in thermal energy= mass x specific heat capacity x temperature change$The **specific heat capacity** of a substance is the amount of **energy** needed to raise the temperature of **1kg of a substance by 1 ⁰C** |
| 9C:\Users\rca\AppData\Local\Microsoft\Windows\INetCache\Content.MSO\EFEA356A.tmp | The **energy** needed for a substance to **change state** is called **latent** **heat**. When a **change of state** occurs, the **energy supplied** changes the **internal energy**, but not the temperature. The **specific latent** **heat** of a substance is the amount of energy required to change the state of one kilogram of the substance with no change in temperature:**energy for a change of state = mass x specific latent heat**. Specific **latent heat of fusion** – change of state from **solid to liquid** or **liquid to solid**.**Specific latent heat of vaporisation** – change of state from **liquid to** **vapour** or **vapour to liquid** |
| 10C:\Users\rca\AppData\Local\Microsoft\Windows\INetCache\Content.MSO\C218C108.tmp | The **molecules** of a **gas** are in **constant ra**ndom motion. The **temperature** of the gas is related to the **average energy** of the molecules. The higher the temperature, the greater the average energy and so the faster the average speed of the molecules. When the **molecules** **collide** with the wall of their container, they **exert a force** on the wall. The **total force exerted** by all of the molecules inside the container on an area of the walls is the walls is the **gas pressure**. Because particles at a higher temperature move faster, they will also collide more **frequently** with the walls of their container so heating a gas increase its **pressure**. |
| 11C:\Users\rca\AppData\Local\Microsoft\Windows\INetCache\Content.MSO\F98FB456.tmp | A **gas** can be **compressed** or **expanded** and this affects its **pressure**. The **more compressed** a gas is, the more gas particles are in a given area, **more collisions** there will be between gas particles and the wall of the container, so the **higher the pressure** will be. |
| 12C:\Users\rca\AppData\Local\Microsoft\Windows\INetCache\Content.MSO\91965AD4.tmp | If the **volume of a gas** is **reduced**, the particles have a **smaller space** to move around. Therefore, they are **more likely to collide** with the walls of their container and the **pressure will increase**. |
| 13C:\Users\rca\AppData\Local\Microsoft\Windows\INetCache\Content.MSO\F5F8C02.tmp | **Boyle’s Law** states that **P₁V₁= P₂V₂** This means that original pressure multiplied by the original volume equals the final pressure multiplied by the final volume. |
| 14C:\Users\rca\AppData\Local\Microsoft\Windows\INetCache\Content.MSO\4AED8B60.tmp | **Work** is the **transfer of energy** by a force. Doing work on a gas increases the **internal energy** of the gas and can cause an **increase** in the **temperature** of the gas. |