

**Science: Particles and Separation Techniques**

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| 1. States of matter | | | | |
| The particles of a substance do not change but the arrangement of the particles are different in each state of matter | | | | |
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| **Solid** | **Liquid** | | **Gas** | |
| **Comparing Properties** | | | | |
| **Property** | **Solid** | **Liquid** | | **Gas** |
| Fixed shape | ✓ | 🗶 | | 🗶 |
| Fixed volume | ✓ | ✓ | | 🗶 |
| Can be compressed | 🗶 | 🗶 | | ✓ |
| Can flow | 🗶 | ✓ | | ✓ |

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| 1. Changing states | | |
| **1** | **Evaporation**  Liquid changing into a gas |  |
| **2** | **Condensation**  Gas changing into a liquid |
| **3** | **Melting**  Solid changing into a liquid |
| **4** | **Freezing**  A liquid changing into a solid |
| **5** | **Deposition**  A gas changing into a solid |
| **6** | **Sublimation**  A solid changing into a gas |
| **7** | **Increasing energy**  Energy is added to the substance |

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| 1. Mixtures & pure substances | |
| **Pure substances** | **Mixtures** |
| Contains one type of particle | Contains particles that are not all the same |
| Cannot be separated | Can be separated |
| Has a fixed boiling and melting point | Has a boiling and melting temperature range |
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| 1. Solubility Key Words | |
| **Solute** | A substance that dissolves to make a solution |
| **Solvent** | A substance that dissolves a solute |
| **Solution** | A substance that is a mixture of a solvent and a solute |
| **Solubility** | A measure of how well a substance will dissolve |
| **Insoluble** | A substance that will not dissolve |
| **Saturated solution** | When the maximum amount of solute has dissolved and no more is able to dissolve |



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| 1. Filtration | | |
| **Separates: an insoluble solid from a liquid** | | |
| 1 | Filter paper |  |
| 2 | Funnel |
| 3 | Residue (solid) |
| 4 | Conical flask |
| 6 | Filtrate (liquid) |

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| 1. Evaporation | | |
| **Separates: a soluble solid from a solution** | | |
| 1 | Evaporating basin |  |
| 2 | Gauze |
| 3 | Tripod |
| 4 | Bunsen burner |

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| Challenge questions | |
| 1 | Describe the arrangement of particles in the 3 states of matter |
| 2 | Describe and explain how you could investigate the saturation point of different solutes |
| 3 | Explain the difference between boiling and evaporation |
| 4 | Explain the changes in energy and particle arrangement as ice is heated to steam. |

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| 1. Distillation | | |
| **Separates: a liquid from a solution** | | |
| 1 | Bunsen burner |  |
| 2 | Solution |
| 3 | Thermometer |
| 4 | Water out |
| 5 | Condenser |
| 6 | Water in |
| 7 | Beaker |
| 8 | Separated liquid |

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| 1. Chromatography | | |
| **Separates: dissolved substances in a mixture** | | |
| 1 | Water |  |
| 2 | Pencil base (start) line |
| 3 | Ink spot |
| 4 | Beaker |
| 5 | Paper |
| 6 | Separated dyes |
| 7 | Solvent front |