Chapter 1 – States of Matter

Lesson 1.1 – Everything is Made of Particles – Slide 1

Slide Title: Everything is Made of Particles

Bullet Points:

* Everything is made of tiny particles too small to see.

* These particles are always moving.

* In solids, particles are close together and vibrate.

* In liquids and gases, particles move more freely.

* The movement of particles causes diffusion.

Suggested Visual: A simple diagram showing particles closely packed in a solid, loosely packed in a liquid, and widely spaced in a gas. Arrows indicating movement could be included.

Optional Think Prompt: How could the movement of particles explain why smells travel?

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Lesson 1.1 – Everything is Made of Particles – Slide 2

Slide Title: Evidence for Particles

Bullet Points:

* Cooking smells spread (diffusion of gas particles).

* Dust motes dance in sunbeams (air particles colliding with dust).

* A crystal of potassium permanganate dissolves and colors water (particles spreading).

* Bromine vapor spreads upwards even though it's heavier than air (particle movement).

Suggested Visual: Three separate small images depicting each bullet point: a cooking pot with steam rising, dust motes in a sunbeam, and a beaker with a dissolving crystal.

Optional Think Prompt: Can you think of other everyday examples that show evidence of particles and their movement?

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Lesson 1.1 – Everything is Made of Particles – Slide 3

Slide Title: Types of Particles

Bullet Points:

* Atoms: The smallest particles that cannot be broken down chemically.

* Molecules: Two or more atoms joined together.

* Ions: Atoms or groups of atoms with a charge.

Suggested Visual: Simple diagrams representing an atom, a water molecule (H2O), and a simple ion (e.g., Na+).

Optional Think Prompt: Why do you think it's important to understand the difference between atoms, molecules, and ions?

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Lesson 1.2 – Solids, Liquids, and Gases – Slide 1

Slide Title: States of Matter: Solids

Bullet Points:

* Fixed shape.

* Fixed volume.

* Particles vibrate in fixed positions.

* Do not flow easily.

Suggested Visual: A diagram of a solid with particles in a regular, tightly packed arrangement.

Optional Think Prompt: Why does a solid have a fixed shape and volume?

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Lesson 1.2 – Solids, Liquids, and Gases – Slide 2

Slide Title: States of Matter: Liquids

Bullet Points:

* No fixed shape (takes the shape of its container).

* Fixed volume.

* Particles move around each other but are still close together.

* Flow easily.

Suggested Visual: A diagram of a liquid with particles less regularly arranged than in a solid, but still relatively close together.

Optional Think Prompt: Why can liquids flow but solids cannot?

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Lesson 1.2 – Solids, Liquids, and Gases – Slide 3

Slide Title: States of Matter: Gases

Bullet Points:

* No fixed shape (fills its container).

* No fixed volume (expands to fill its container).

* Particles are far apart and move randomly.

* Flow very easily.

Suggested Visual: A diagram of a gas with particles widely spaced and moving rapidly in all directions.

Optional Think Prompt: How does the arrangement and movement of particles explain the properties of gases?

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Lesson 1.2 – Solids, Liquids, and Gases – Slide 4

Slide Title: Changes of State

Bullet Points:

* Melting: Solid to liquid (ice to water).

* Freezing: Liquid to solid (water to ice).

* Boiling/Evaporation: Liquid to gas (water to steam).

* Condensation: Gas to liquid (steam to water).

Suggested Visual: A diagram showing the transitions between the three states of matter, with arrows indicating the processes (melting, freezing, boiling, condensation).

Optional Think Prompt: What are the conditions needed for each of these changes of state to occur?

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Lesson 1.2 – Solids, Liquids, and Gases – Slide 5

Slide Title: Heating Curve for Water

Bullet Points:

* Shows temperature change during heating.

* Flat sections represent changes of state (melting and boiling).

* Melting point of ice/freezing point of water: 0°C

* Boiling point of water: 100°C

Suggested Visual: A heating curve graph showing temperature on the y-axis and time on the x-axis, with plateaus at 0°C and 100°C.

Optional Think Prompt: Why are the sections of the graph showing changes of state flat (horizontal)?