

1 States of matter – Part 1

Name: _____ Class: _____ Date: _____

Vocabulary

Write each word three times.

English	Write it 3 times (English)
particles	_____
kinetic particle	_____
theory	_____
solid	_____
liquid	_____
gas	_____
regular	_____
vibrate	_____
melting	_____
freezing	_____
boiling	_____
evaporating	_____
condensing	_____
melting point	_____
boiling point	_____

Recall

Everything is made of tiny **particles** that are always moving. This is the **kinetic particle theory**. How close the particles are, and how they move, decides the **state** of matter.

- The three states are **solid**, **liquid** and **gas**.
- Heating and cooling change one state into another.

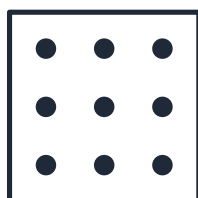
Nothing here is hard – it just adds the particle picture.

New ideas

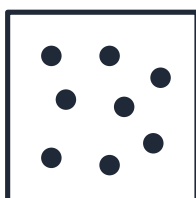
Read these first, then do the Practice.

■ 1 The three states

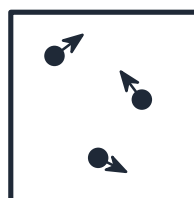
	Solid	Liquid	Gas
shape	fixed	takes the container's shape	fills the container
separation	touching, very close	close	far apart
arrangement	regular	random	random
motion	vibrate in place	slide past each other	move fast, random



solid



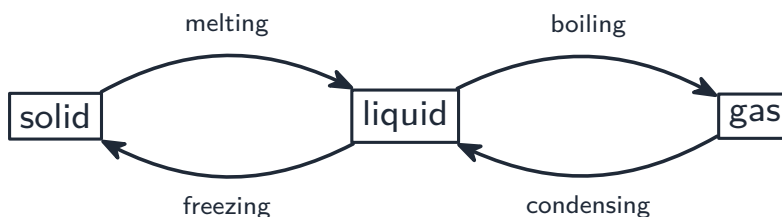
liquid



gas

■ 2 Changes of state

Change	Name
solid → liquid	melting
liquid → solid	freezing
liquid → gas	boiling / evaporating
gas → liquid	condensing



A pure solid melts at one fixed **melting point** ; a pure liquid boils at one fixed **boiling point** .

■ 3 Energy and changes of state

While a substance **melts or boils**, the temperature **stays the same** – the energy goes into breaking the forces between particles, not into speeding them up.

Watch out: a **pure** substance has one sharp melting point; an impurity lowers it and spreads it over a range. And while a substance melts or boils its temperature is **constant** – the energy breaks forces, it does not raise the temperature.

Practice

Try these in order.

1.1 In which state are the particles (a) far apart and fast, (b) in a fixed regular pattern? [2]

1.2 Name the change of state from (a) solid to liquid, (b) gas to liquid. [2]

1.3 Why can a gas be compressed (squeezed smaller) but a solid cannot? [2]

1.4 What name is given to the fixed temperature at which a pure liquid boils? [1]

1.5 Explain why the temperature stays the same while a solid is melting. [2]

1.6 Challenge. A pure solid is heated steadily until it has all melted. Describe what happens to its temperature (a) before it melts, (b) while it is melting, (c) after it has all melted. [3]