

1 States of matter – Part 1

Name: _____ Class: _____ Date: _____

Vocabulary 词汇

Write each word three times. 把每个单词抄写三遍。

English	中文	Write it 3 times (English)		
particles	粒子	_____	_____	_____
kinetic theory	粒子动理论	_____	_____	_____
solid	固体	_____	_____	_____
liquid	液体	_____	_____	_____
gas	气体	_____	_____	_____
regular	规则	_____	_____	_____
vibrate	振动	_____	_____	_____
melting	熔化	_____	_____	_____
freezing	凝固	_____	_____	_____
boiling	沸腾	_____	_____	_____
evaporating	蒸发	_____	_____	_____
condensing	凝结	_____	_____	_____
melting point	熔点	_____	_____	_____
boiling point	沸点	_____	_____	_____

Recall

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

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

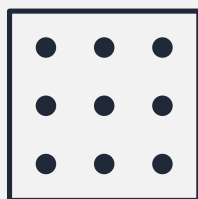
Nothing here is hard —it just adds the particle picture.

New ideas

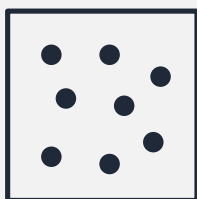
Read these first, then do the Practice.

■ 1 The three states

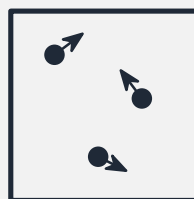
	Solid	Liquid	Gas
shape	fixed	takes the container's shape	fills the container
separation	touching, very close	close	far apart
arrangement	regular 规则	random	random
motion	vibrate 振动 in place	slide past each other	move fast, random



solid



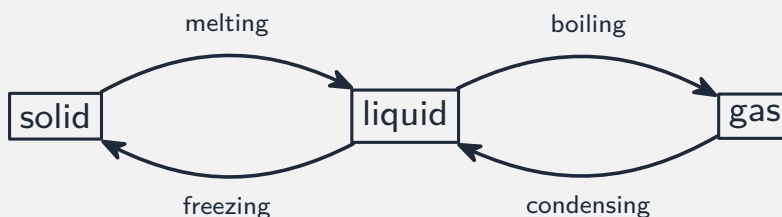
liquid



gas

■ 2 Changes of state

Change	Name
solid → liquid	melting 熔化
liquid → solid	freezing 凝固
liquid → gas	boiling 沸腾 / evaporating 蒸发
gas → liquid	condensing 凝结



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

■ 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]