Name _____ Date _____

1A: States of matter

1 This question relates to explaining the properties of solids, liquids and gases. For each statement about a property, write 'solid', 'liquid' or 'gas'.

Property	State of matter
Has the highest kinetic energy	*Gas*
Vibrates in a fixed spot	
Fills an entire container	
Close arrangement of particles but with no regular ordering	
Very high density – a large number of particles are covered in a small area	
Can take the shape of the container but not change volume	

2 Complete the diagram in Figure 1.1 to show what happens to particles at different changes of state.

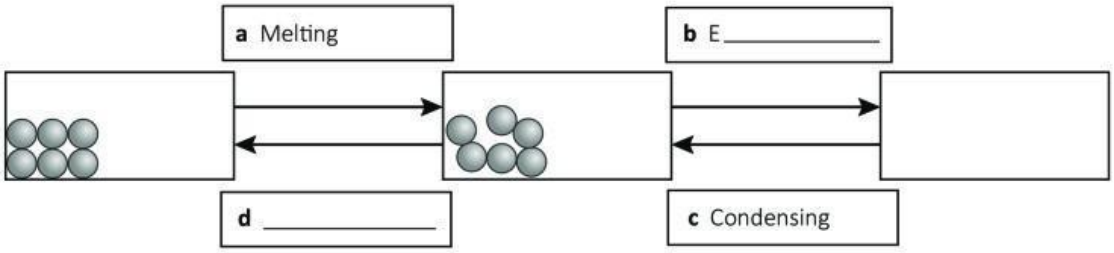

Figure 1.1

3 Explain the following energy changes:

Think about the terms endothermic (takes in energy), exothermic (gives out energy) and intermolecular forces. Consider what is happening to the kinetic energy of the particles.

For example, a gas turning into a liquid is exothermic because the particles need to give out energy to turn into a liquid (which is at a lower energy).

a Liquid turning into a solid.

_____

b Liquid turning into a gas.

_____

LIVEWORKSHEETS

4 This question relates to the physical states of elements at different temperatures.

Element	Melting point (°C)	Boiling point (°C)
Hydrogen	−259	−253
Oxygen	−218	−183
Iron	1538	2861
Magnesium	650	1090
Sulfur	115	445
Carbon	3550	4027
Neon	−249	−246

a Which elements are a solid at 200 °C?
There are three, and they need to have a melting point above 200 °C.

_____

b Which elements are a gas at 1500 °C?
There are five, and they need to have a boiling point below 200 °C.

_____

c What state is neon in at −250 °C?
Think about whether −250 is higher than −249. Try placing the MP, BP and −250 °C on a vertical line. Where does −250 °C sit?

_____

d What state is oxygen in at −200 °C?
Think about whether −200 is higher than −183. Try placing the MP, BP and −183 °C on a vertical line. Where does −183 °C sit?

_____

LIVEWORKSHEETS

5 This question relates to how changes of state of a substance can be represented graphically.

a Add the missing labels to the graph in Figure 1.2.

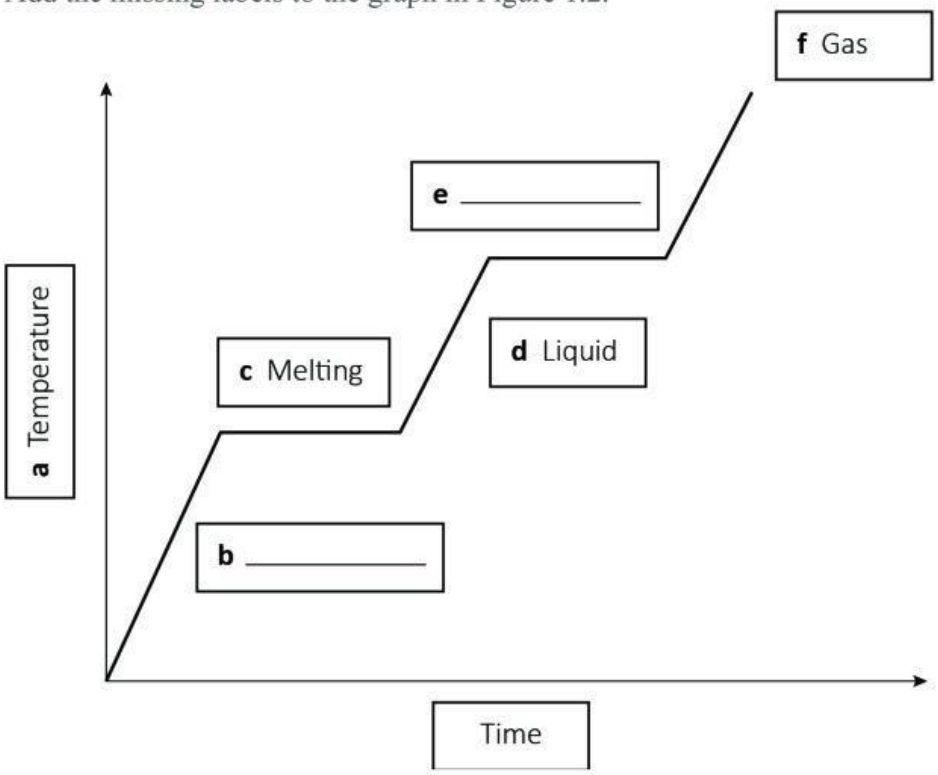

Figure 1.2

b Explain the increase in temperature at points b and d.
Think about kinetic energy.

c Explain why there is no change at points c and e.
Think about intermolecular forces. They interact with the particles. If there is a change in state, what needs to happen to these intermolecular forces to allow the change of state?

d How can you tell from the graph that the substance is pure?
Pure water melts at 0 °C. Think about what adding salt to pure ice (water) does to the purity and melting point.

LIVEWORKSHEETS

6 This question relates to diffusion.

a Explain the term *diffusion*.
Include the words particles and concentration in your answer.

_____

b Complete the diagram in Figure 1.3 to show how bromine liquid can be used to explain diffusion.

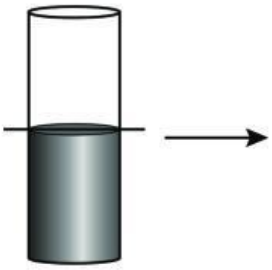

Figure 1.3

c Give **two** factors that can affect the rate of diffusion.
Think about how particles are more likely to move from one place to another more quickly.

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_____

LIVEWORKSHEETS