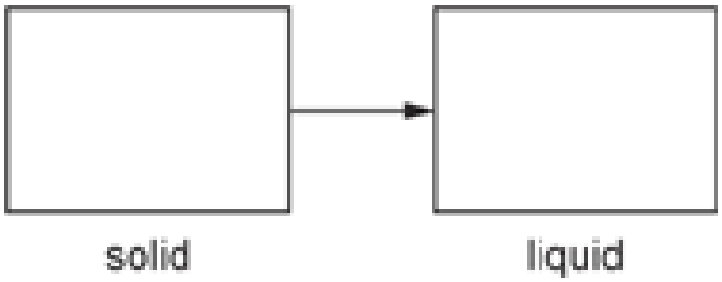
1. The particle model can be used to show changes of state.

i. Complete the diagram to show what happens to the particles as a solid changes to a liquid.



[2]

ii. Which statements about changes of state are **correct**?
Tick (✓) **two** boxes.

Boiling describes a gas turning into a liquid. ☐

Freezing is a chemical change. ☐

Melting is a physical change. ☐

The amount of energy needed to melt a substance depends on the strength of the forces between particles. ☐

The arrangement of particles becomes more random during condensing. ☐

[2]

iii. The particle model has limitations when showing changes of state.

Explain **two** limitations of the particle model.

1 _____

_____

2 _____

_____ **[2]**

2.

i. At –78 °C, and 0.1 MPa pressure, carbon dioxide changes state from a solid to a gas.

Changing state from a solid to a gas is called **subliming**.

Describe what happens to the **movement** and **arrangement** of the particles when a solid turns into a gas. Use the particle model.

[3]

ii. Carbon dioxide can be a liquid at different pressures and temperatures.

Pressure (MPa)	Melting point (°C)	Boiling point (°C)	Sublimation point (°C)
0.1			–78
1.0	–56	–40	

State a temperature and a pressure at which carbon dioxide is a **liquid**.

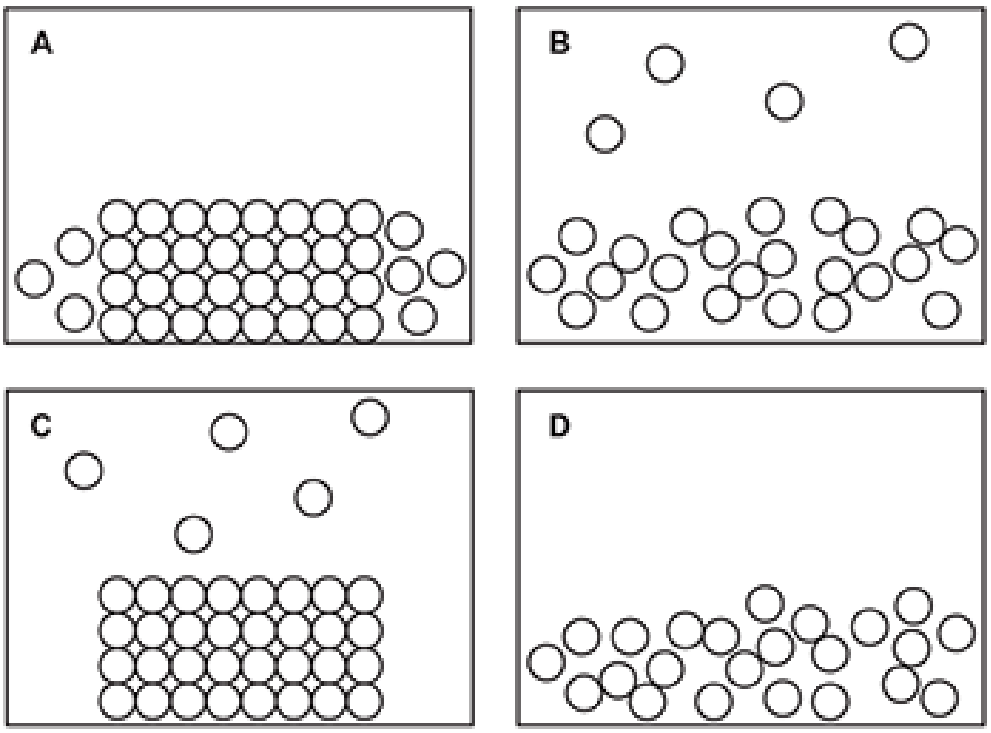
Explain your answer.

Temperature _____ °C Pressure _____ MPa

Reason _____

[3]

3. Which particle model diagram shows evaporation?



Your answer ☐ **[1]**

END OF QUESTION PAPER