

1 The solid and liquid phases of water can exist in a state of equilibrium at 1 atmosphere of pressure and a temperature of

- (1) 0°C (2) 100°C (3) 273°C (4) 373°C

2 Given the equation:  $\text{H}_2\text{O}_{(s)} \rightleftharpoons \text{H}_2\text{O}_{(l)}$  At which temperature will equilibrium exist when the atmospheric pressure is 1 atm?

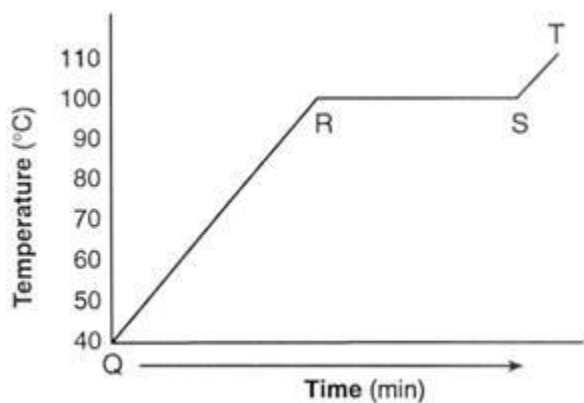
- (1) 0 K (2) 100 K (3) 273 K (4) 373 K

3 The table below shows the normal boiling point of four compounds.

Compound	Normal Boiling Point (°C)
$\text{HF}(\ell)$	19.4
$\text{CH}_3\text{Cl}(\ell)$	-24.2
$\text{CH}_3\text{F}(\ell)$	-78.6
$\text{HCl}(\ell)$	-83.7

Which compound has the strongest intermolecular forces? (1)  $\text{HF}_{(l)}$  (2)  $\text{CH}_3\text{Cl}_{(l)}$  (3)  $\text{CH}_3\text{F}_{(l)}$  (4)  $\text{HCl}_{(l)}$

A sample of water is heated from a liquid at 40°C to a gas at 110°C.



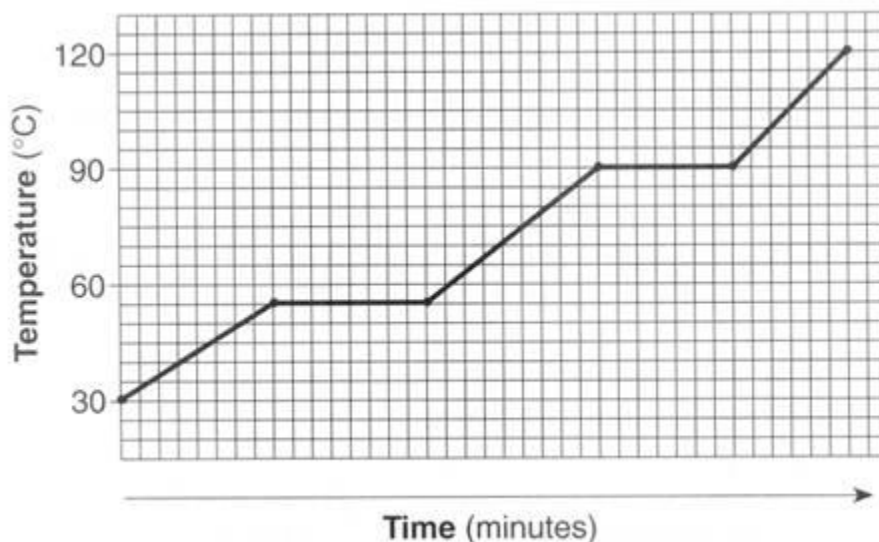
a) On the heating curve diagram provided above, *label* each of the following regions:

Liquid, only ; Gas, only; Phase change

b) For section QR of the graph, state what is happening to the water molecules as heat is added.

c) For section RS of the graph, state what is happening to the water molecules as heat is added.

3 The graph below represents the heating curve of a substance that starts as a solid below its freezing point.

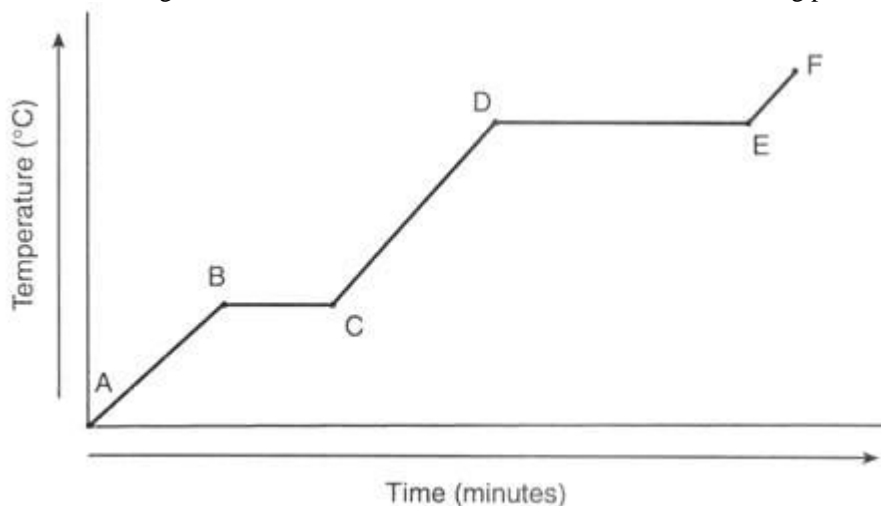


What is the melting point of this substance? (1) 30°C (2) 55°C (3) 90°C (4) 120°C

8/03

Base your answers to questions 59 through 62 on the information below.

Given the heating curve where substance X starts as a solid below its melting point and is heated uniformly:



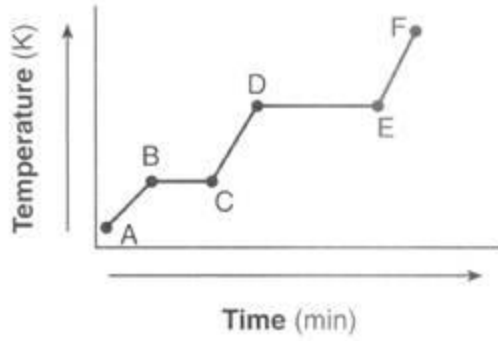
59 Identify the process that takes place during line segment *DE* of the heating curve.

60 Identify a line segment in which the average kinetic energy is increasing.

61 Using "o" to represent particles of substance X, draw at least five particles as they would appear in the substance at point *F*.

62 Describe, in terms of particle behavior or energy, what is happening to substance X during line segment *BC*.

Base your answers to questions 54 and 55 on the heating curve below, which represents a substance starting as a solid below its melting point and being heated at a constant rate over a period of time.



54 What is happening to the average kinetic energy of the particles during segment BC?

55 How does this heating curve illustrate that the heat of vaporization is greater than the heat of fusion?

---

6/05

17 In which process does a solid change directly into a vapor?

- (1) condensation (2) sublimation (3) deposition (4) solidification