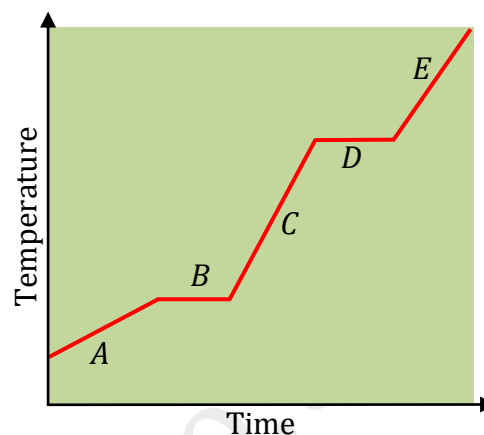


Assessment Question Set 1

1. Consider the following cooling curve and identify:

- (a) The latent heat of fusion**B**
- (b) The latent heat of vaporisation**D**
- (c) The region in which the substance is a solid**A**
- (c) The region in which the substance is a liquid**C**
- (c) The region in which the substance is a gas**E**



2. In general, for a given substance which is greater, the latent heat of fusion or the latent heat of vaporisation? **The latent heat of vaporisation.**

3. 0.4kg of water is collected by condensing steam onto a cold surface in order to purify some drinking water. The latent heat of vaporisation of water is 2.25MJ/kg. Calculate the total energy released by the steam during this time.

900000J

4. Calculate the minimum amount of energy required to heat 4kg of ice at 0°C to the point where the ice has completely turned to steam given that;

The latent heat of fusion for ice is $3.36 \times 10^5 \text{J/kg}$

The latent heat of vaporization for water is 2.25MJ/kg

The specific heat capacity of water is 4200J/kg

The boiling point of water is 100°C

The melting point of ice is 0°C

Give your answer in MJ to 2s.f. **12MJ**

5. It takes 2.388MJ of energy to melt 6kg of aluminium at its melting point without a change in temperature. Calculate the latent heat of fusion for aluminium. Give your answer in kJ/kg. **398kJ/kg**

6. When an insulating rod is heated gently at one end, thermal energy is slowly transferred up the rod in the direction from hot to cold, until the rod reaches thermal equilibrium. This is because;

A. The ions in the rod vibrate more when heated, bumping into each other and transferring energy along the rod.

B. The kinetic energy of the free electrons in the rod increases, as a result they move faster and further, bumping into other electrons and ions, transferring energy.

C. A combination of both A and B.

7. Calculate the energy released when 0.2kg of steam at 100 °C condenses on a cold surface. Assume the specific latent heat of vaporisation of water to be 2.25MJ kg⁻¹. **450kJ**

8. Which of the following substances transfer energy by convection;

A. Liquid helium

B. Water

C. Ice

D. Air

E. A metal block

9. The fact that liquids and gases expand when heated gives rise to

A. convection currents in fluids due to changing masses.

B. convection currents in fluids due to changing densities.

C. heat transfer by conduction.

D. convection currents in fluids due to constant temperatures.

10. Which of the following would *increase* the rate of evaporation?

A. Increasing the surface area

B. Increasing the volume

C. Decreasing the temperature

D. Blowing over a hot cup of coffee

Assessment Question Set 2

1. A solid is heated at a constant rate and as the solid turns into a liquid the temperature of the substance remains constant. What does this region of constant temperature represent?

A. Latent heat of fusion

B. Latent heat of vaporisation

2. When a solid or liquid is heated at a constant rate the temperature of the substance increases at a constant rate. When the substance undergoes a phase change, the temperature of the substance stops increasing and remains constant. this is because;

A. The substance is radiating energy to its surroundings at the same rate as the input energy, and has therefore reached thermal equilibrium.

B. The energy that was going into increasing the temperature of the substance is now going into the potential energy of the particles because they are at resonance, and vibrating with much larger amplitude.

C. The energy that was going into increasing the temperature of the substance is now going into breaking the intermolecular or interatomic bonds between the atoms or molecules of the substance.

D. None of the above.

3. A 0.8kg solid substance is heated past its melting point. During the time that the solid starts to melt, and the entire substance is turned to liquid, 4000J of energy is supplied. Calculate the latent heat of fusion for the substance, clearly stating the units. 5000Jkg^{-1}

4. 0.2kg of water in a kettle is held at boiling point until the kettle boils dry. The latent heat of vaporisation for water is 2.25MJ/kg . Calculate

(a) the energy transferred to the water by the kettle 450000J

(b) the time taken (to the nearest second) to convert all the water to steam given that the power rating of the kettle is 1300W . Give your answer in seconds. 346s

5. A container of water is placed in the freezer until all the water has turned to ice. The latent heat of fusion for ice is $3.36 \times 10^5\text{J/kg}$ and the latent heat of vaporisation for water is 2.25MJ/kg . If the water releases 241920J of energy during the phase transition, calculate the final mass of the ice. 0.72kg

6. Double glazing reduces the heat loss from a room to the surroundings. This is because;

- A. Glass is a good insulator, and two layers of glass is better than one
- B. Air is a good insulator, and the air gap between the two panes of glass prevents the convection of heat
- C. Air is a good insulator, and the air gap between the two panes of glass prevents the conduction of heat

7. Calculate the energy released when 0.6kg of water at 0°C is turned into ice. Assume the latent heat of fusion for ice to be $3.36 \times 10^5 \text{ J/kg}$.

8. For each of the following processes, state whether the thermal energy transfer occurs through convection or conduction or both.

- A. Under floor heating warming a room Both
- B. The Atlantic ocean heated by the sun and increasing in temperature from 9°C in January to 18°C in September Convection
- C. Water pumped around a car engine to cool it Conduction
- D. The gas burner heating the air in a hot air balloon Convection

9. Conduction is the transfer of heat by;

- A. Molecular contact B. Changes in density
- C. Electromagnetic waves D. Radiation

10. When only molecules at the surface of a liquid and not throughout the volume changes into a gas, the process is called and produces;

- A. boiling and steam
- B. boiling and vapour
- C. evaporating and steam
- D. evaporating and vapour