STATES OF MATTER AND THE KINETIC MOLECULAR THEORY

11 FEBRUARY 2014

Lesson Description

In this lesson we:

- Use the Kinetic Molecular Theory to consider properties of three states of matter
- Consider what occurs during phase changes

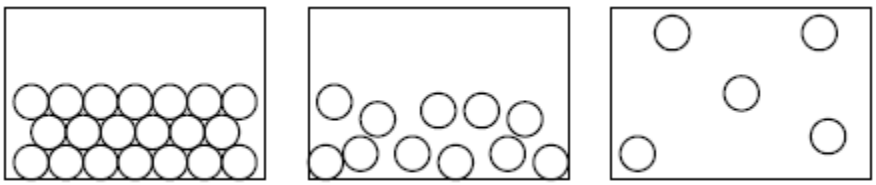
Summary

KMT and States of Matter

Kinetic Molecular Theory

- All matter is made up of tiny particles (atoms, ions or molecules)
- The particles are continually moving (at a higher temperature, particles move faster, and heavier particles move slower than lighter particles)
- There are electrostatic forces of attraction and repulsion between particles

States of Matter



(Picture: Siyavula)

Heating a substance causes an increase in its internal energy.

Internal energy = kinetic energy + potential energy

Temperature is a measure of the **average kinetic energy** of the particles
increase kinetic energy = increase speed at which particles move = increase temperature

Phase changes occur as a result of the increase in **potential energy** of the particles – they gain enough energy to overcome the forces of attraction between them and break away from each other. Temperature remains constant.

Test Yourself

Select the most correct answer from the options given. Write down only the correct letter.

(Adapted from Study and Master, Grade 10 Physical Science, 2002)

Question 1

According to the Kinetic Molecular Theory, matter is made of

A crystals

B molecules

C small particles in continuous motion

D energy

Question 2

Which of the following is not a state of matter?

A solid

B metal

C liquid

D gas

Question 3

When ice melts...

A its temperature increases.

B its temperature decreases.

C it releases heat to its surroundings.

D its temperature remains constant.

Question 4

A phase change from a solid directly to a gas is called...

A evaporation.

B sublimation.

C condensation.

D freezing.

Question 5

Water is spilled on a counter top and evaporates. The drop in temperature of the remaining water is due to...

A the remaining liquid gains internal energy.

B the higher kinetic energy of the remaining water molecules.

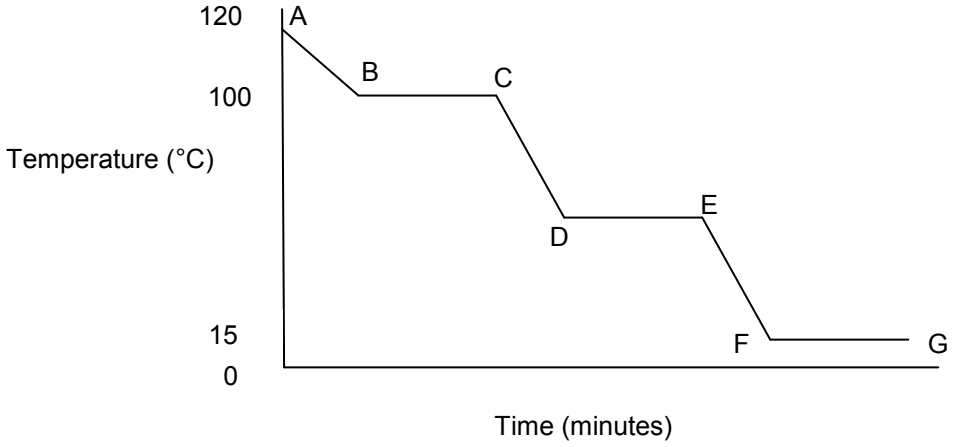
C the vapour molecules that escape have a higher average kinetic energy than the liquid molecules left in the liquid.

D change of phase.

Improve your Skills

Question 1

The graph below indicates a cooling curve – the temperature of a substance as it cools over time.



a. Identify any phase changes occurring in the substance.
b. What is the boiling point of the substance?
c. Identify the region on the graph when the substance is all a liquid.
d. What is the temperature of the room?

Question 2

Steven wants to know why his fingers often stick to the ice or the ice tray when he takes ice out of the freezer. Explain this to him using your knowledge of the kinetic molecular theory and states of matter.

Links

- www.everythingscience.co.za