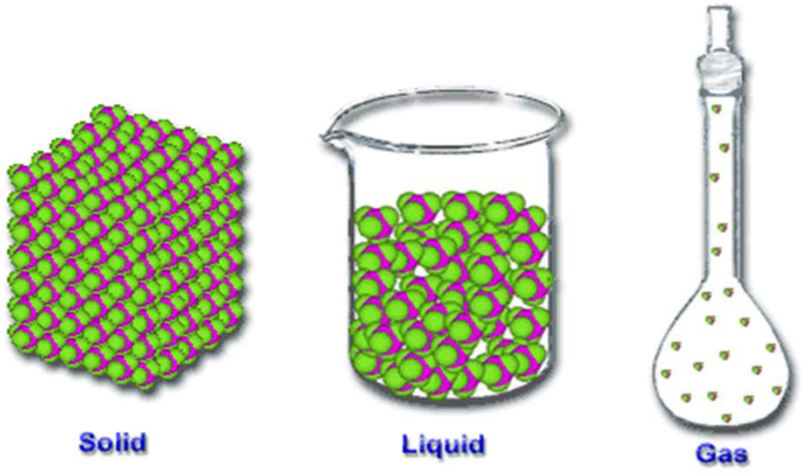
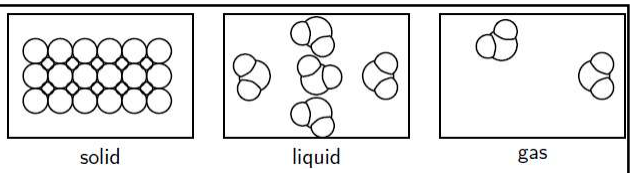
Unit 1: Heat
Kinetic Theory of Matter



1

1

Kinetic Theory of Matter

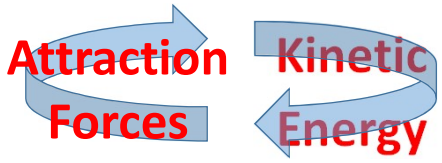


1. All matter is composed of small particles (atoms, molecules, or ions).
2. They are in constant, random motion.
3. These molecules constantly collide with each other and their surroundings.

2

2

Forces of Attraction



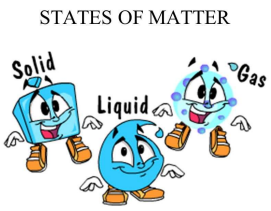
According to the kinetic theory of matter, the state (phase) of a substance is determined by the interplay of two opposing forces within a substance.

Kinetic energy pulls particles apart while **forces of attraction** hold them together.

3

3

States of Matter



States of ***matter:*** solid, liquid and gas.

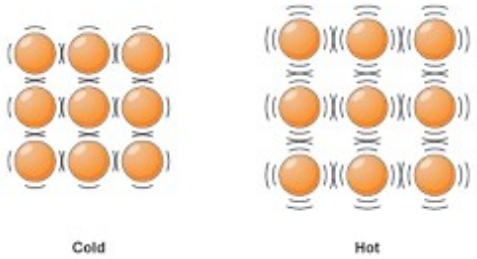
Whether a substance is a solid, liquid or gas depends on the kinetic energy (KE) and the atomic forces of attraction holding the particles together.

4

4

Solids

Low kinetic energy
Particles are close
Vibrate
Fixed shape

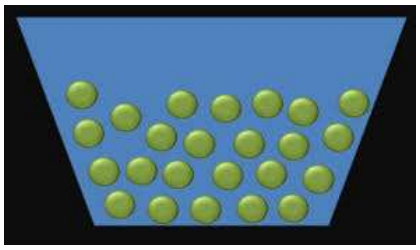


5

5

Liquids

Higher kinetic energy
Particles are farther apart
Collide and move around
Fixed volume not shape



6

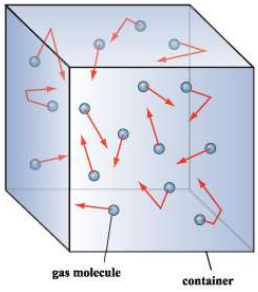
6

Gases

High kinetic energy

Particles are far apart

No fixed shape or volume

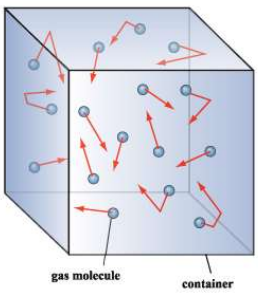


7

7

Thermal Energy

The specific form of Kinetic Energy (KE) concerning *Kinetic Theory of Matter* is **Thermal Energy E_{th}**.

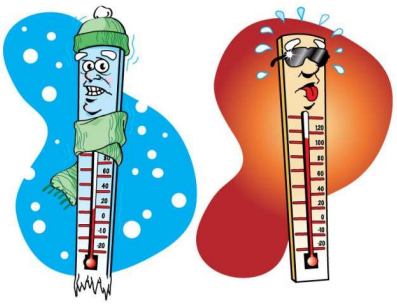


E_{th} = # of particles × KE

8

8

Temperature



Definition: is a measure of the average kinetic energy of the particles of a substances.

Hot objects: higher ave KE, higher temperature

Cold objects: lower ave KE, lower temperature

9

9

Heat

Heat is the TRANSFER of thermal energy.

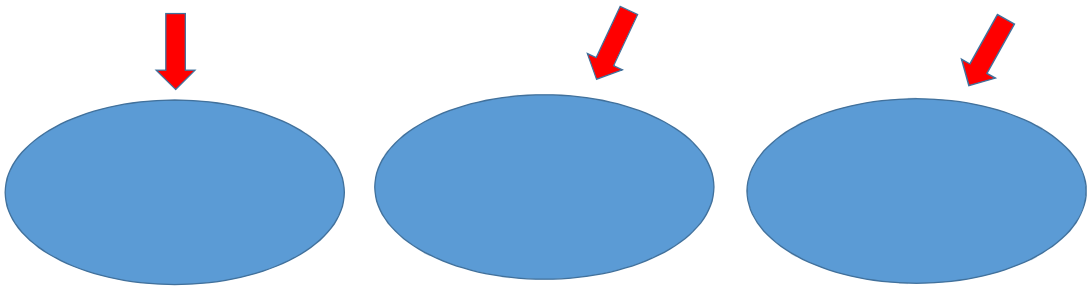
Heat: $Q = \Delta E_{Th}$

10

10

Summary

Thermal Energy (E_{th})≠ Temperature ≠ Heat

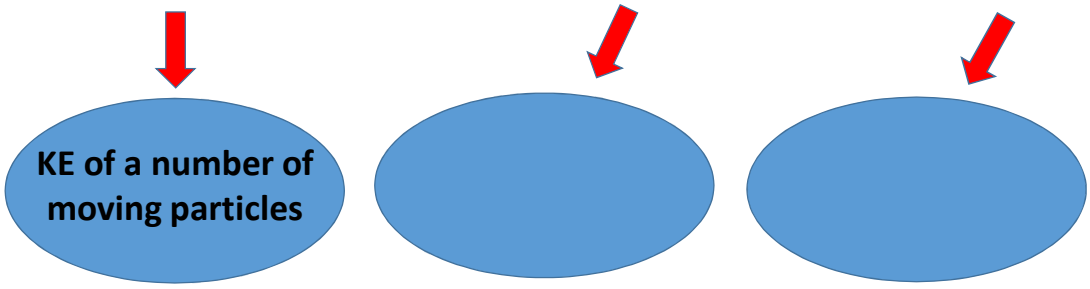


11

11

Summary

Thermal Energy (E_{th})≠ Temperature ≠ Heat

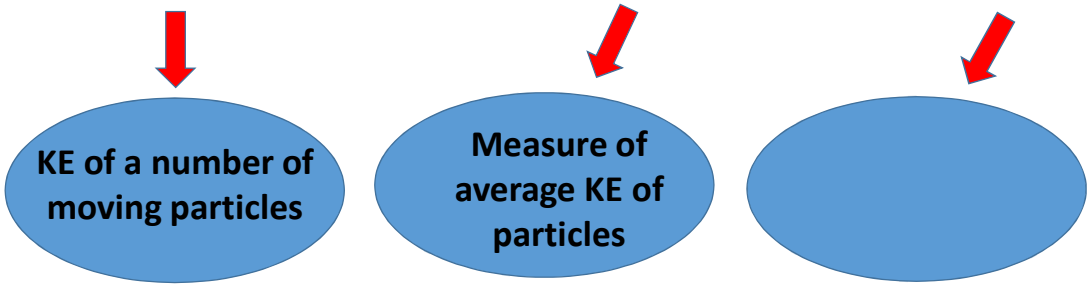


12

12

Summary

Thermal Energy (E_{th})≠ Temperature ≠ Heat

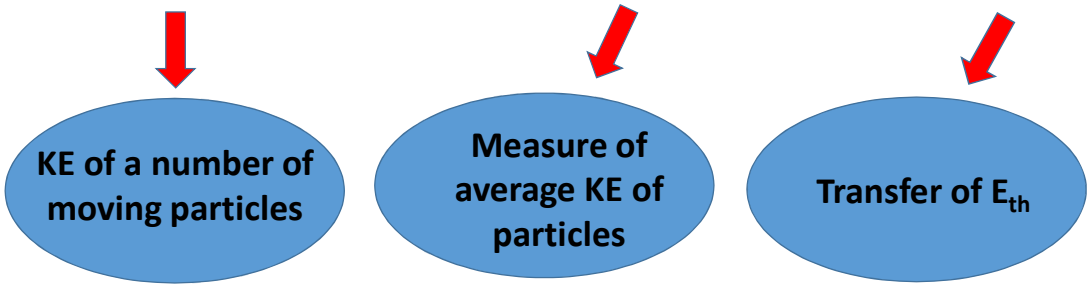


13

13

Summary

Thermal Energy (E_{th})≠ Temperature ≠ Heat



14

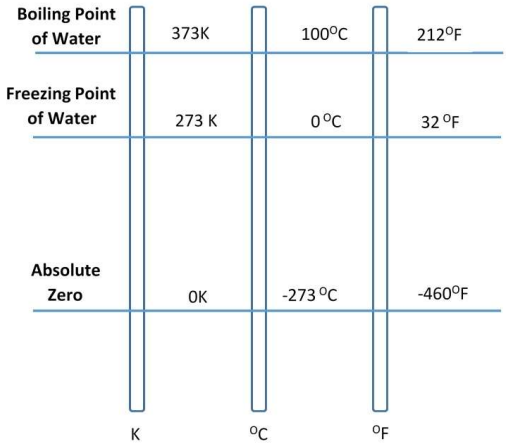
14

Temperature Scales

Kelvin: K

Celsius: °C

Fahrenheit: °F



15

15

Temperature Scales

°C = (°F – 32) × 5⁄9 - What is 72°F?

K = °C + 273 – What is 100°C?

°F= °C × 9⁄5 + 32 – What is 0°C?

16

16