Section 16 Thermal Energy



Three States of Matter



Solid

Liquid

Gas

Three States of Matter



Heat

Heat

Transfer of thermal energy from one object to the next because of temperature difference.

• Heat flows naturally from hot objects to cold objects.

Temperature

Temperature

The measure of how hot or cold an object is compared to a reference point.

• Temperature is related to the average kinetic energy of the particles in an object due to their random motion through space.

Temperature

Important

You must understand that as objects are heated and gain energy that the molecules in that object move faster and tend to spread out. As we add heat to a solid block of ice, the molecule speed

up and spread out and create a liquid, water. If we take heat away, molecules slow down and will create a solid, ice.

Thermal Energy

Thermal Energy

The total potential and kinetic energy of all the particles in an object

Three things that Thermal Energy depends on:

- 1. Mass of object
- 2. Temperature of the object
- 3. Phase (solid, liquid, gas) of the object

Thermal Expansion

Thermal Expansion

An increase in the volume of a material due to a temperature increase.

• Thermal expansion occurs when particles of matter move farther apart as temperature increases.







Specific Heat

Specific Heat

The amount of heat needed to raise the temperature of 1 gram of a material by 1° Celsius.

<u>Formula</u>

- $\mathbf{Q} = \mathbf{m} \cdot \mathbf{c} \cdot \Delta \mathbf{t}$
- Q = Specific Heat (Joules)
 m = mass (grams)
 c = specific heat (J/g·°C)
 Δt = change in temperature (°C)

Specific Heat

Example #1

How much heat is needed to raise the temperature of 100 grams of water by 85°C? The Specific heat of water is 4.18 J/g.°C

35,500 J

Specific Heat

Example #2

How much heat is absorbed by a 750 gram iron skillet when it's temperature rises 100°C? The Specific heat of iron is .449 J/g.°C

34,000 J

16.1 Assessment

Take the next 10 minutes to answer the questions in your packet. We will review the information after 10 minutes.

<u>Note:</u> We will have a quiz at the beginning of class tomorrow based on this information!!!!