Thermal Energy



Thermal Energy

- Temperature is a measure of the average kinetic energy of the particles of a substance – the faster the particles are moving, the higher the temperature is
 - It depends on the material the substance is made of and its mass
- Heat is the transfer of energy due to differences in temperature
 - Thermal energy always flows from hot to cold

- Conduction is the transfer of energy through direct contact
 - It is fastest in solids and basically non-existent in gases
 - Example: touching a hot pan
 - A thermal conductor is a substance that is good at transferring thermal energy – it transfers the thermal energy easily
 - Example: any type of metal
 - A thermal insulator is a substance that is poor at transferring thermal energy – it holds onto thermal energy
 - Examples: rubber, plastics, wood, air



- Convection is the transfer of energy through mass movement
 - It can only happen in fluids (liquids and gasses) and amorphous solids
 - Examples: ocean currents, air currents, the movement of molten rock in Earth's mantle

- Radiation is the transfer of energy through waves
 - Unlike the other two forms of energy transfer, radiation does NOT require a material to travel through – it is capable of traveling though the vacuum of empty space
 - Example: transfer of heat and light from the sun to Earth

- Things to Remember About Radiation
 - All objects, regardless of temperature, radiate energy
 - Hotter objects radiate more energy than colder ones
 - Both substances will end up at the same temperature (applies to all methods of energy transfer, not just radiation)

Thermal Expansion and Contraction

- Thermal expansion is when the volume of substance increases due to an increase in temperature
- Thermal contraction is when the volume of a substance decreases due to an decrease in temperature
- Thermal expansion and contraction occur the most in gases and the least in solids

Specific Heat

- Specific heat is the amount of heat that needs to be added to or removed from a substance in order to change the temperature of 1g of the substance by 1°C
 - The greater the specific heat, the more heat that needs to be added or removed to change the temperature and the slower the temperature will change
 - Water has a very high specific heat, which is why coastal cities have less temperature variation than inland cities and water takes a long time to boil



Thermal Energy Diagrams

• You are holding a hot cup of coffee Heat flows from the Cup into the hand



• A glass of soda contains ice to keep it cold Heat flows from theSota + b + he ice



