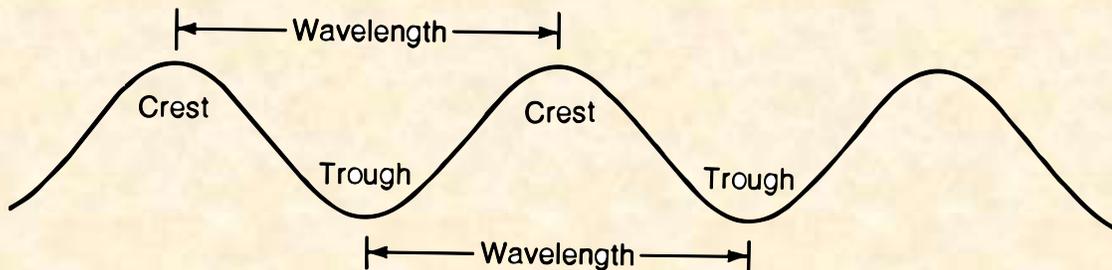


Energy in Earth Processes

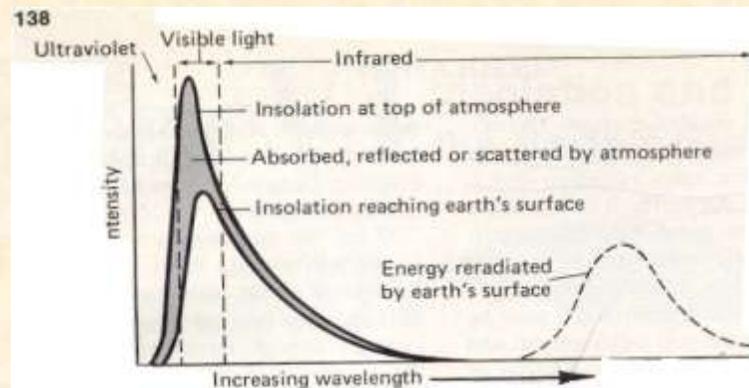
- I. **Energy** – is the capacity to do work, or cause change. Energy cannot be created nor destroyed, it just changes form.
- A. **Kinds of Energy** – two basic types of energy include potential energy (stored energy), and kinetic energy (energy of motion).
- B. **Electromagnetic Energy** – is energy that travels in the form of electromagnetic waves. The amount of electromagnetic energy an object gives off varies with its temperature. The source of electromagnetic energy is the kinetic energy of atoms, molecules and other particles. Absolute Zero is the theoretical temperature at which all particle motion stops.
- C. **Electromagnetic Waves** – all electromagnetic energy travels in the form of a wave, at the speed of light (186,000 miles/second or 300,000 km./sec). The greater the wavelength, the lower the energy. The shorter the wavelength, the higher the energy.



- D. **Electromagnetic Spectrum and the Environment** - Electromagnetic energy can interact with objects in five ways.
1. **Refraction** – wave direction is changed or bent when they pass through a material.
 2. **Reflection** – waves bounce off a material.
 3. **Scattered** – waves are reflected and/or refracted in various directions when they pass through a material.

4. **Absorbed** – wave energy is taken in by the material. Materials that are good at absorbing E.M. energy, are also good at radiating E.M. energy. Absorbed short wavelength radiation can be re-radiated as long wavelength radiation.
5. **Transmitted** – waves pass through a material without interacting with it.

E. **Solar Energy** – the Sun is the main source of energy on Earth. The Solar E.M. spectrum includes a wide range of wavelengths, with the maximum intensity occurring in the visible light wavelengths.



II. **Energy Transfer** – energy is transferred from one material to another, and from one place to another by three main processes.

A. **Radiation** – is the movement of energy through empty space in the form of electromagnetic waves. Heat and light sensed from a fire, or from the Sun, is an example of radiation.

B. **Conduction** – the transfer of energy by the direct contact of molecules and atoms colliding with one another. When the handle of an iron skillet gets hot when placed on the stove, energy is transferred by conduction. Conduction can only occur in solids, liquids, and gasses. Solids are the best conductors of energy.

C. **Convection** – the transfer of energy by the circular movement of heat in a liquid or gas, caused by differences in temperature and density. Convection is an important way energy is transferred in both the atmosphere and the mantle.

III. **Heat and Temperature** – include two different ways that energy is measured.

A. **Temperature** – is a measure of the average kinetic energy of the particles in a substance.

B. **Measuring Heat** – heat energy is measured using the quantity called a calorie. 1 calorie equals the temperature required to raise one gram of liquid water, 1 degree Celsius.

C. **Specific Heat** – is the amount of heat needed to raise one gram of a substance, 1 degree Celsius. Liquid water has the highest specific heat of any naturally occurring substance on Earth.

D. **Latent Heat** – potential energy that is absorbed by a substance during a change in state. Latent heat (potential energy) is gained by a substance when it changes from a solid to a liquid, or a liquid to a gas. Latent heat is lost by a substance when it changes from a gas to a liquid, or a liquid to a solid.

A change in the state of matter = a loss or gain of energy

