Chapter 9

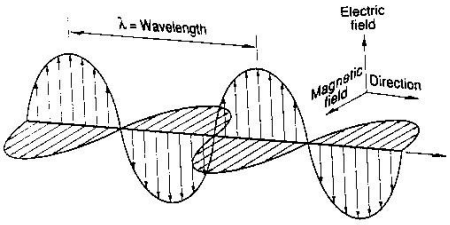
The Nature of Electromagnetic Waves

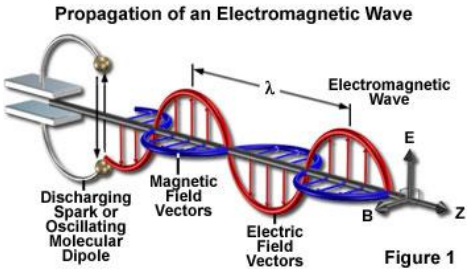
Electromagnetic Radiation

- EMR requires no medium to travel- can travel thru a vacuum
- Speed
  - 300,000 kilometers /sec
  - 186,000 miles /sec
- Consists of changing electric and magnetic fields

Changing electric and magnetic fields

- Electric field is a region where particles can be pushed or pulled.
  - Wherever there is an electric charge there is an electric field associated w/it.
  - A moving electric charge is part of an electric current
  - An electric current is surrounded by a magnetic field
- A magnetic field is a region in which magnetic forces are present
- When electric field changes – so does the magnetic field.





EMR - Wave or Particle?

- Acts like a wave sometimes – ie: Polarizing Filter

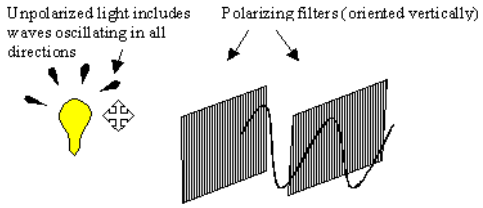


Figure 2a: Light from an incandescent bulb vibrates in all directions. Two vertically oriented polarizing lenses will allow only the vertically polarized light through and will block out the horizontal components.

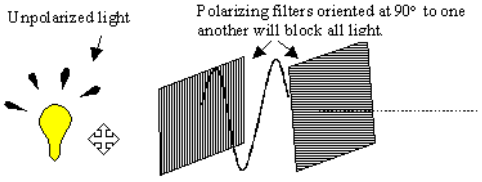
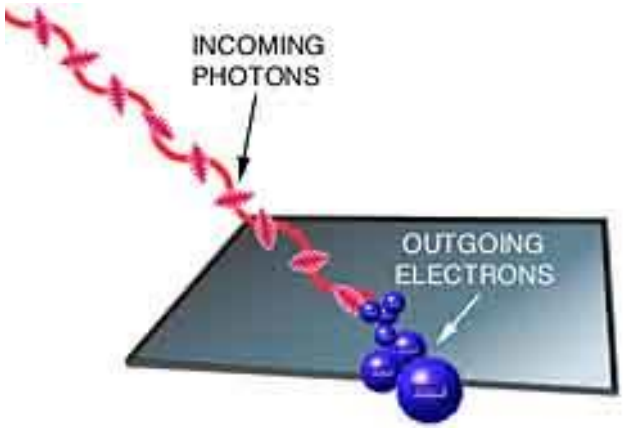


Figure 2b: When the two polarizing filters are placed perpendicular to one another, the first will block all but the vertically polarized waves while the second is oriented only to allow horizontally polarized waves to pass.

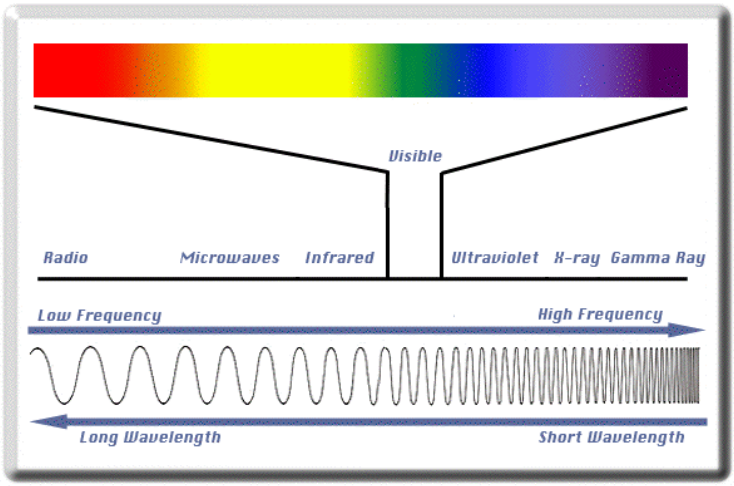
EMR - Wave or Particle?

- Acts like a particle, a photon, sometimes – ie: Photoelectric Cell



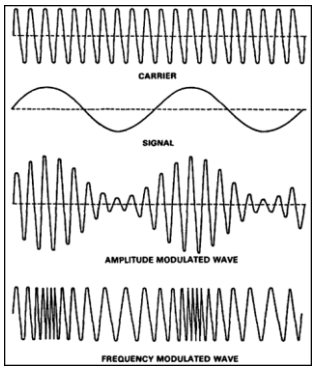
EMS waves

- Long wavelength : Low Frequency & Low Energy
- Short wavelength : High Frequency & High Energy



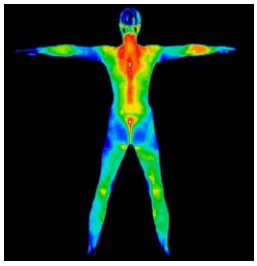
Radio & Microwaves

- Longest wavelengths & lowest frequency of the EMS
  - Include Am, FM and Television frequencies
    - AM – Amplitude modulation: same frequency waves just a change in the amplitude to get different sounds etc.
    - FM – Frequency Modulation: slight changes in frequency



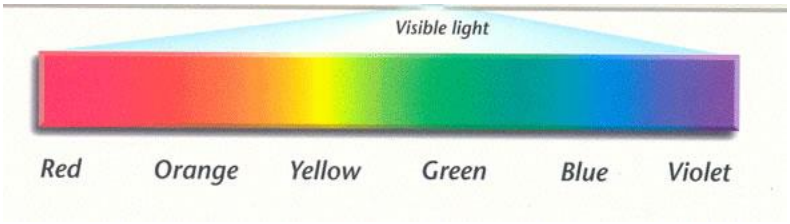
Microwave & Infrared EMR

- Microwave: used in microwave ovens & cellular phones
- Infrared: Fast Food Heat Lamps, use as a night time surveillance tool.



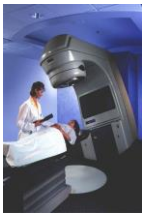
Visible Light

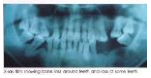
- White light is a mixture of the entire visible light spectrum

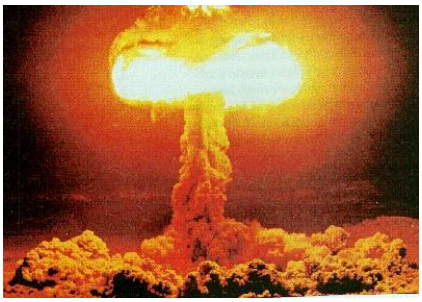


UV, Xray & Gamma rays

- UV from the Sun helps the body produce vitamin D, too much exposure can cause skin cancer
- Xrays: used extensively in medicine to see "into" the body
- Gamma Rays: used in medicine to treat cancer or destructive radiation from nuclear explosions.







I can’t think of nuttin’ else for Chapter 9!!

TTFN !