Light

Learning Objectives

★Properties of Light
- Wave and Particle Properties
- Different forms

★ Properties of Matter
- Atoms

★ Interaction of Light and Matter

Basic Properties of Light & Matter

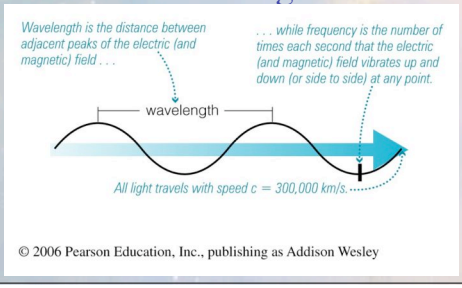
★ Light - the cosmic messenger
- How to "read" the message
--> composition, temperature, motion of object

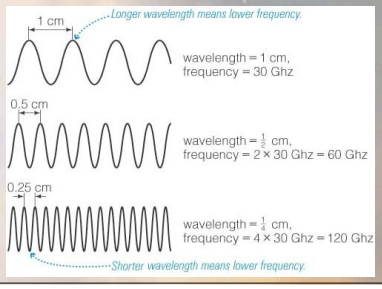
★ What is light?
- Spectrum, with prism (visible light)

Wave Properties of Light

★Wave: transmits E without carrying along matter

- Wavelength, λ
- Frequency, f
- Speed of wave = c (speed of light)
- λ f = c = 3.0 x 10^5 km/s
- can travel in a vacuum
- Electromagnetic radiation





Particle Properties of Light

★Discrete entity - photon

- photons: packets of EM energy
- Speed = c
- (wave-particle duality: paradox)

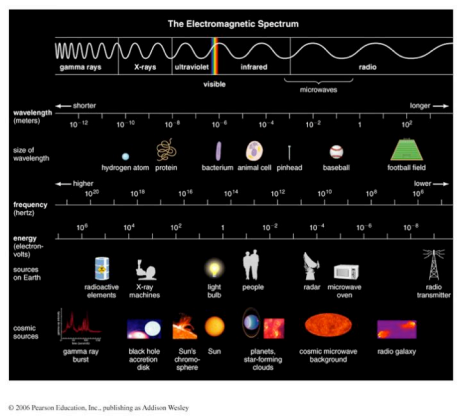
★Wave-Particle duality: paradox

- E of photon = h f = h c/λ

The Electromagnetic Spectrum

★Forms of light

- γ rays, x-rays, ultraviolet (UV), visible (optical), infrared (IR), radio



What is Matter?

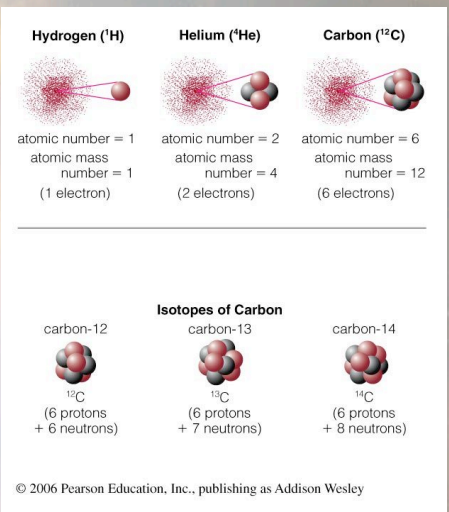
★The atom

– p(+), e(-), n

– description of H, He, C

– Isotopes - #p → element
#n can vary

– Molecule - combination of two or more atoms bound together



Light and Radiation

★ How do light and matter interact?

- emission
- absorption
- transmission
- reflection/scattering