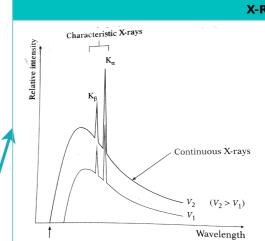## X-Rays

Production of X-Rays
- X-Rays are produced when cathode rays strike a target
- Energy is released (photon) when accelerated electrons hit the target (tungsten).
- Approximately 5% energy is released as form of heat, dissipated by cooling fins.

X-Rays Spectra

Continuous(Bremsstrahlung) Spectrum
$$qV = hf_{max} = \frac{hc}{\lambda_{min}}$$

Characteristic Line Spectrum
$$\Delta E = hf$$

Properties of X-Rays
- Neutral, not deflected by electric or magnetic fields
- Can penetrate through solid matter
- Can cause certain compounds to fluorocence, i.e. Zinc Sulphide
- Can ionize atoms.
- Can cause photoelectric emmision.

Application of X-Rays
- Detection of bullet in patient's leg
- Observation and photography of the healing of a broken bone.
- Detection of contraband in baggage.
- Discrimination between authentic gems and artificial gems.
- Detection of pearl in oyster.

Bragg's Law
$$m\lambda = 2d \sin \theta_m$$

$$\frac{m\lambda}{2d} \leq 1 \quad m \leq \frac{2d}{\lambda}$$

Crystal Atomic Spacing
- Diffraction of x-ray occurs in the crystal atomic spacing.
- Used to calculate wavelength of x-rays.