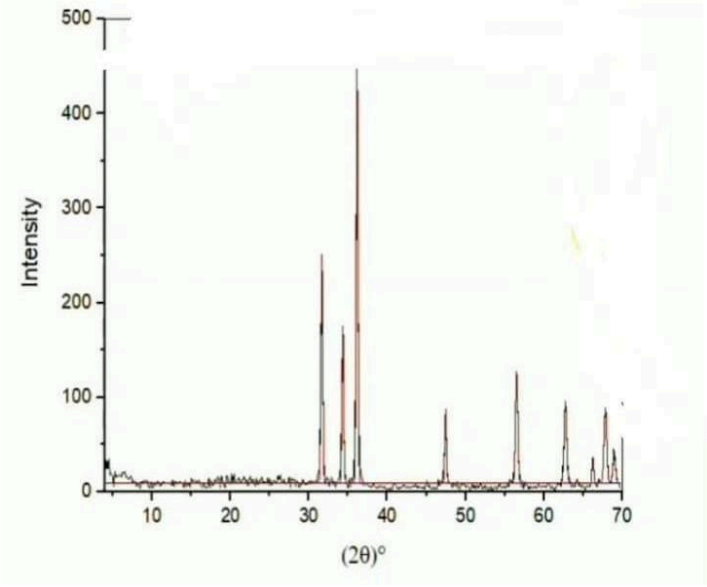
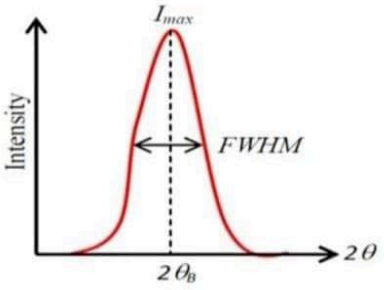
DEBYE - SHERRER'S FORMULA OR SHERRER'S EQUATION

- **Introduction:**
- The Debye–Scherrer formula is used in XRD to estimate the crystallite size of nanocrystalline materials.
- It relates the average crystallite size (D) of a material to the broadening of diffraction peaks in the XRD pattern.
- **Principle:** When X-rays strikes very small crystallites (nanometer scale), the diffraction peaks broaden.
- **Formula:**

$$D = K\lambda / \beta\cos\theta$$

- **Where:** K = Scherrer's constant shape factor & commonly taken as 0.9
  λ = Wavelength of incident X-ray
  β = FWHM (full width at half maximum) of the diffraction peak
  θ = Bragg's diffraction angle (equal to half of 2θ from the XRD pattern)
- **Calculator of crystallite size fro XRD using sherrer's formula:**





$$D = \frac{K\lambda}{\beta\cos\theta}$$

- **Applications:**
- Measuring nanoparticle crystallite size.
- Determining degree of crystallinity.
- Distinguishing between amorphous and crystalline phases.