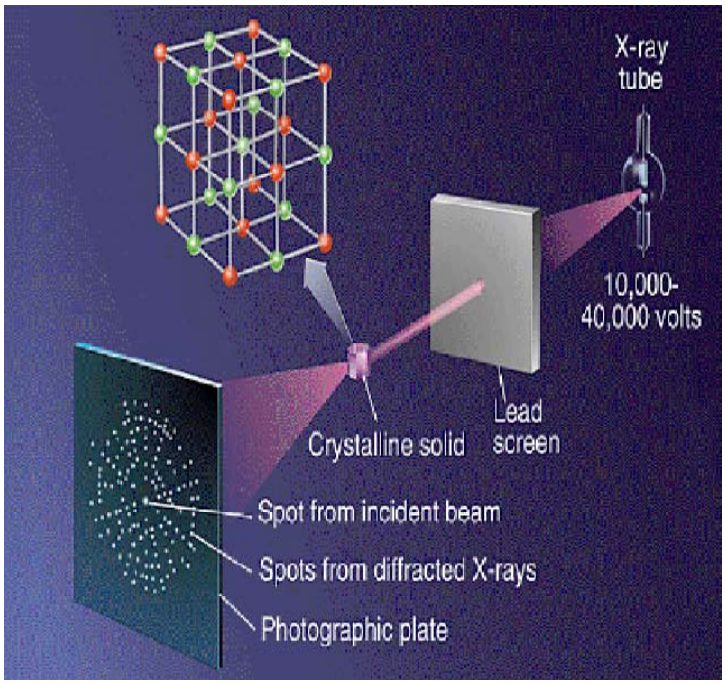
Objective: X-ray diffraction analysis (XRD) is a technique used in materials science to determine the crystallographic structure of a material. X-ray diffraction is also useful for evaluating minerals, polymers, corrosion products, and unknown materials.

Operating principle: XRD works by irradiating a material with incident X-rays and then measuring the intensities and scattering angles of the X-rays that leave the material.

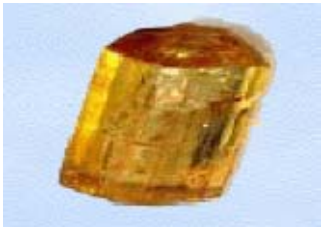


There are numbers of ways used in XRD. It will be appllied depending on each works' requirements. Two common techniques will be used:

- By phases: monocrystal/ single crystal, powder, bar/ block.
- By purposes: structure, qualitative, quantity.

Classifying by phases:

✓ **Monocrystal:** samples are adequately big crystals.



- ✓ **Powder:** samples are small tiny separate crystalline particles such as: oxides, pigments, etc...

- ✓ **Bar/ block:** samples are small tiny aggregated cystalline particles such as: pieces of metals, ceramics, etc...

Classifying by purposes of analysis:

- ✓ **Structural analysis:** diffraction spots were found on film (not rings or lines) when analysing monocrystals. Then those will be consolidated with analytical methods of monocrystals to determine their structures.

- ✓ **Qualitative analysis:** a crystal has its own values of d and I of its XRD spectrum. Comparing at least 3 lines of XRD spectrums which hold biggest I (intensities) of research samples to reference ones in order to identify research samples structures. Then check up with figures given in handbook (values of d and I of reference samples).

- ✓ **Quantitative analysis:** itensities (I) of XRD lines are ratios with the amount of substances in research samples.