XRf (x-ray fluorescence) جهاز التألق الأشعاعي

 What is x-ray fluorescence ?

XRF is a technique used for chemical analysis of materials. An X ray source is used to irradiate the specimen and to cause the elements in the specimen to emit (or fluoresce) their characteristic X-rays. A detection system (wavelength dispersive) is used to measure the peaks of the emitted X-rays for qual/quant measurements of the elements and their amounts. The techniques was extended in the 1970 ís to to analyze thin films.

XRF is routinely used for the simultaneous determination of elemental composition and film thickness.

XRF (X-ray fluorescence spectrometry) is a non-destructive analytical technique used to identify and determine the concentrations of elements present in solid, powdered and liquid samples. XRF is capable of measuring elements from Beryllium (Be) to Uranium (U) and beyond at trace levels and up to 100%.

Applications

 During the last two decades, the development in X-ray detectors has established the XRF

Method as a powerful technique in a number application fields, including:

1. Ecology and environmental management: measurement of heavy metals in soils, sediments, water and aerosols
2. Geology and mineralogy: qualitative and quantitative analysis of soils, minerals, rocks etc.
3. Metallurgy and chemical industry: quality control of raw materials, production processes and final products
4. Paint industry: analysis of lead-based paints
5. Jewelry: measurement of precious metals concentrations
6. Fuel industry: monitoring the amount of contaminants in fuels
7. Food chemistry: determination of toxic metals in foodstuffs
8. Agriculture: trace metals analysis in soils and agricultural products

Quantitave and qualitative measurement in XRF

Qualitative elemental analysis of solid samples, quantitative and trace element analysis of silicate rocks, cement, limestone samples are routinely done in the XRF.

Sample in the form of dry powder about 200 mesh, about 10gm is required for estimation of major and minor element oxides and qualitative analysis. Qualitative analysis may be possible with less amount of sample in some cases and in case of non-powder the sample should be in suitable form. For analysis of traces 20gm sample is required.

1. Qualitative Analysis

2. Quantitative Analysis

1.Qualitative Analysis :

Qualitative elemental analysis are done for detection of elements present in the sample.

\* Detectable elemental range is from oxygen to uranium.

\* \* Lower limit of detection (LLD) varies from element to element

\* Lower Limit of Detection (LLD) also depends upon nature and compositional matrix of the sample

2.Quantitative Analysis : Quantitative analysis of following types of samples are done

\* Silicate Rocks \* Cement \* Limestone

Quantitative analysis of silicate rocks for 10 major element oxides SiO2, Al2O3, Fe2O3 (T), MnO, MgO, Na2O, CaO, K2O, TiO2, P2O5 and 32 Trace Elements Ag, As, Ba, Br, Cd, Ce, Co, Cr, Cs, Cu, Ga, La, Mn, Nb, Nd, Ni, Mo, Pb, Rb, S, Sb, Sc, Sn, Sm, Sr, Th, Tl, U, V, Y, Zn, Zr are being done on routine basis.