

**INFRASTRUCTURE FACILITY**

**MAJOR INSTRUMENTS AND ASSOCIATED ACTIVITIES**

**1. Inductively Coupled Plasma-Mass Spectrometer (ICP-MS)**

The ICP-MS is an analytical technique used for elemental determinations. It has many advantages over other elemental analysis techniques such as atomic absorption and optical emission spectrometry. An ICP-MS combines a high temperature ICP (Inductively Coupled Plasma) source converts the atoms of the elements in the sample to ions. These ions are then separated and detected by the mass spectrometer. The ICP-MS instrument measures most of the elements in the periodic table. The elements can be analysed with detection limits at or below the part per billion (ppb). The ICP-MS detects only elemental ions and can determine the individual isotopes of each elements



**2. Energy Dispersive X-Ray Fluorescence Spectrometer (EDXRF)**



EDXRF is an analytical method for determining the elemental composition of all kinds of material. The material can be solid, liquid powder, filtered or any other form. The method is non-destructive fast and accurate and usually requires minimum of sample preparation. The instrument including the analytical requirement of metal, cement, oil, polymer, plastic and food industries along with mining, mineralogy and geology, and environmental analysis of water and waste materials.

### 3. Inductively Coupled Plasma-Atomic Emission Spectrometer (ICP-AES)

A new analytical technique Inductively Coupled Plasma Atomic Emission Spectroscopy (ICP-AES) has been simultaneously used for multi element analysis of environmental samples. The technique offers advantage over AAS and other multi element methods as matrix problems are eliminated or minimized through use of high temperature argon plasma & detection limit are equal to or better than the AAS depending on the element to be analysed.



### 4. Atomic-Absorption Spectrometer (AAS)



Apart from use of ICP-AES, AAS is being used to analyse Heavy Metals in environmental samples i.e. Solid (sludge/ sediment), Water & wastewater samples using flame, hydride & graphite furnace. Atomic-absorption spectroscopy (AAS) uses the absorption of light to measure the concentration of gas-phase atoms. Since samples are usually liquids or solids, the analyte atoms or ions must be vaporized in a flame or graphite furnace. The analyte concentration is determined from the amount of absorption. The light source is usually a Hollow-cathode lamp of the element that is being measured.

## 5. Total Organic Halides (TOX) Analyzer

Total organic halides (TOX) are the organic compounds bounded with halides viz. Chlorine, Bromine, Iodine and are one of the pollutant generated from pulp and paper industry during the bleaching process. They may be in the form of Adsorbable, Extractable and Purgeable organic halides. TOX analyzer in the laboratory is being used for determination of these compounds as summary parameters in water and waste water samples by adsorption and pyrolysis at 9500C followed by coulometric titration.



## 6. Total Organic Carbon (TOC) Analyser



The Total Organic Carbon Analyzer (TOC) is being used for determination of Total Carbon, Total Organic Carbon and Total Inorganic Carbon in the environmental samples. The existing TOC Analyser is based on high temperature combustion of the samples resulting in production of Carbon dioxide which is measured by NDIR Detector of the instrument.

## 7. Mercury Analyzer

Mercury Analyzer used for determination of mercury at Nano gram level in the environmental samples. It is a thermal decomposition, Atomic Absorption Spectrophotometer (AAS) based on the principle that Mercury vapour (atoms) absorbs resonance radiation at 253.7 nm. The mercury is sparged from digested samples with a stream of air and passed through an absorption cell, which is situated in the light path of mercury lamp. The absorption is read at 253.7nm.



## 8. Water Purification System



Water purification system is used for the preparation of Type I and Type II water to run sophisticated instruments in instrumentation laboratory. The system is capable of producing R.O pure and Nano pure water, a pre-requisite for preparation of samples before analysis.

## Equipments available for pre-treatment of Environmental samples



**Planetary Ball Mill**



**Hydraulic Press**



**Fume Hood**



**Microwave Digester**