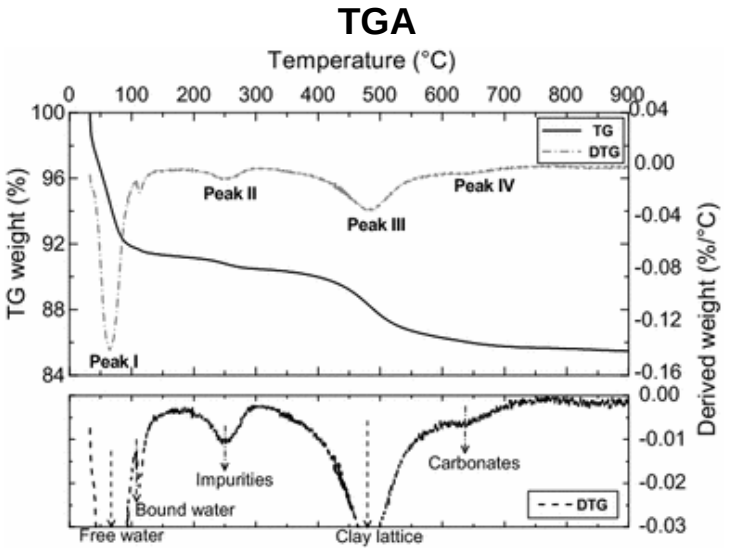
Thermogravimetric Analyzer

Working Principle

TGA measures a sample's weight as it is heated or cooled in a furnace

Application

To determine the composition and decomposition behavior of complex materials, thermal stability analysis



TGA and DTG graph for sodium bentonite

Differential Scanning Calorimeter

Working Principle

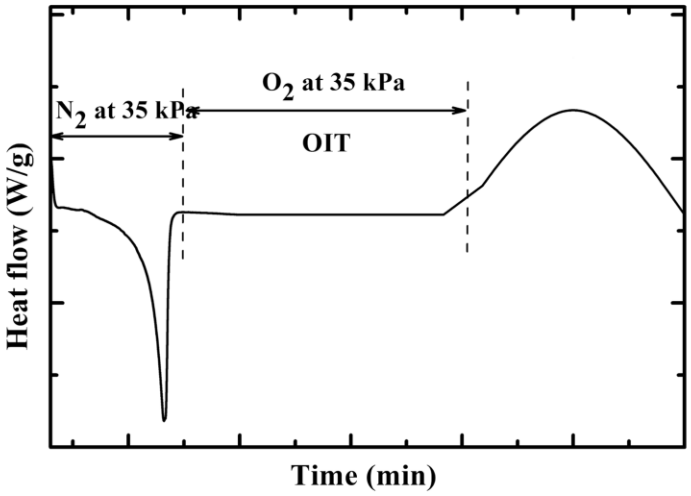
Measures enthalpy change of sample as a function of temperature

DSC Instrument

Application

Used to identify polymer and its properties

Determination of thermodynamic and thermophysical properties

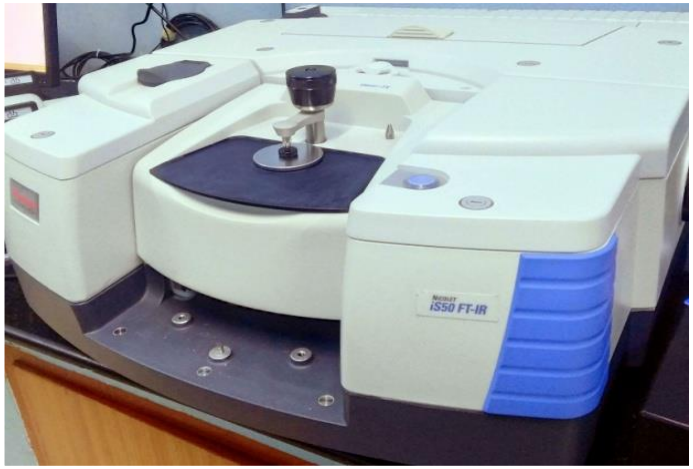


OIT response of HDPE

Fourier Transform Infrared Spectrometer

Working Principle

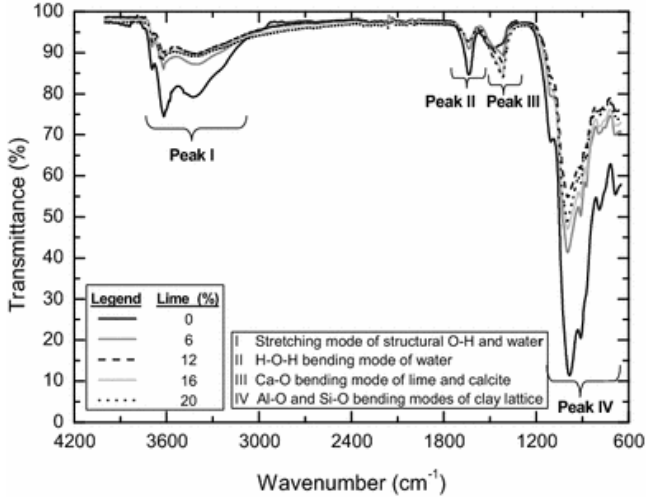
The chemical bonds present in the material absorbs the infrared radiation at corresponding wavelength.



FTIR instrument

Application

To qualitatively determine chemical composition of materials
Forensic analysis, quality control and assurance.

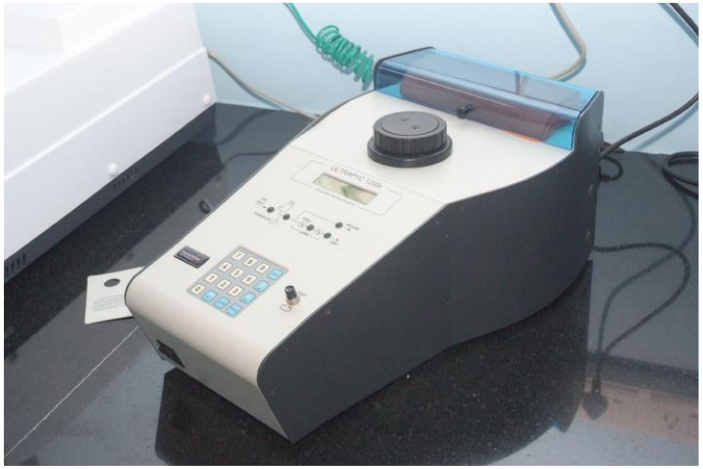


FTIR spectra of lime stabilised soils

Helium Gas Pycnometer

Working Principle

Solid volume is measured by employing gas displacement as per Boyle's law.



Helium gas pycnometer

Application

To accurately measure the volume of solids and true density.

Gas Chromatography

Working Principle

In gas chromatography (GC), the mobile phase is a carrier gas. The stationary phase is a polymer on an inert solid support. The gaseous compounds being analyzed interact with the walls of the column, which is coated with a stationary phase. This causes each compound to elute at a different time, known as the retention time of the compound.

Agilent gas chromatograph (GC) 7890A

Application

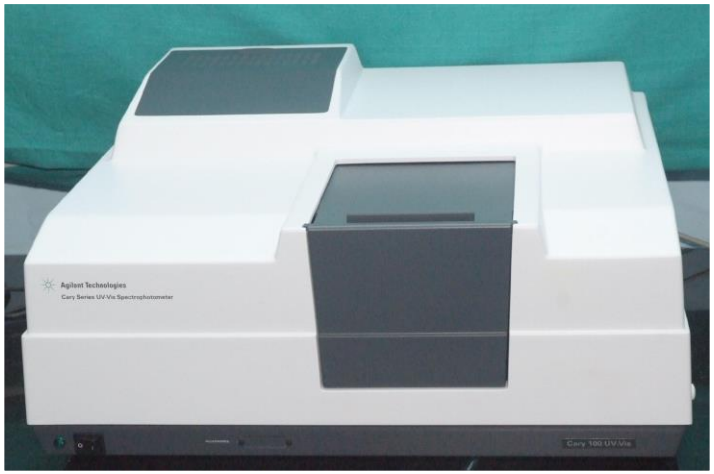
GC is used for qualitative and quantitative analysis of compounds that can be vaporized without decomposition.

Gas tight syringe for gas injection

UV Visible Spectrophotometer

Working Principle

The absorption of ultraviolet light or visible light by chemical compounds results in the production of a distinct spectra.



UV-Visible spectrophotometer

Application

Quantification of specific substances and aggregate parameters in water and wastewater, quantitative determination of transition metal ions, organic compounds, and biological macromolecules

Atomic Absorption Spectrometer

Working Principle

AAS measures the concentration of elements in a liquid sample based on energy absorbed from certain wavelengths of light

AAS instrument

Application

To quantify the elements in a solution.
To detect trace amounts of harmful chemicals in water samples

Water Quality Analyzer

Working Principle

Water quality standards are measured using an electrode after suitable calibration with the standards

Application

Measurement of pH, electrical conductivity and total dissolved solids

Water Quality Analyzer

iSorb-HP

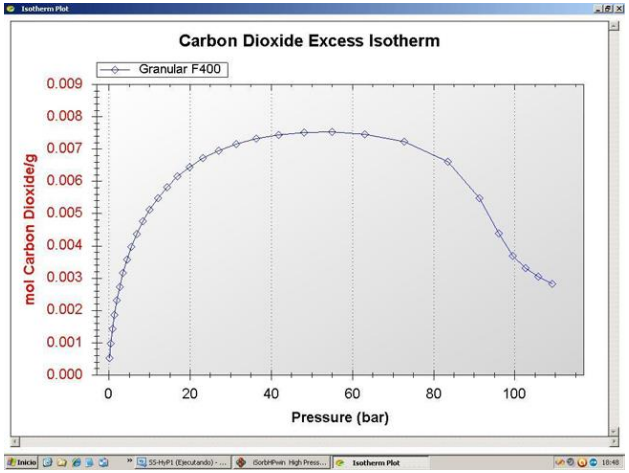
Working Principle

A known amount of gas is allowed to expand into a sealed container with sorbent. The amount of gas adsorbed can be calculated from the mass balance equation, provided the void volume of sorbent is known.

Application

To determine the adsorption-desorption isotherms and kinetics for gases over a wide range of pressures (upto 200 bar) and temperatures(upto 400°C).

iSorb-HP



CO_2 adsorption isotherm on F400

AutoSorb

Working Principle

Extended- range opore size and surface area analysis using appropriate adsorbate is made by high vacuum, oil free turbomolecular system and high precision low pressure transducers

Application

BET surface area, TPD, TPR.

Representative Image of AutoSorb Equipment, Yet to Install)

Accelerated UV Weatherometer

Working Principle

Simulates field exposure conditions in a landfill using fluorescent UV and condensation weathering methods

Application

To study the longevity of geomembranes subjected to accelerated UV ageing

UV weatherometer

Accelerated Xenon Arc Weatherometer

Working Principle

Simulates field weathering conditions using xenon arc lamps and condensation techniques

Application

To study the longevity of geomembranes subjected to accelerated UV ageing

Xenon Arc weatherometer

Melt Flow Index

Working Principle

Measures the rate of extrusion of molten polymer at specified conditions

Application

Indicative of molecular weight, quality control

Melt Flow Index

Geomembrane Dog Bone Cutter

Working Principle

To cut the geomembrane into a dog bone shaped sample

Application

To assess the tensile strength, crack resistance of geomembranes

Dog Bone cutter

Research Centrifuge

Working Principle

The radial acceleration causes denser particles to settle to the bottom of the tube, while low-density substances rise to the top

Application

Separation of mixtures with close densities,separate immiscible liquids, suspended solids and insoluble particles

Research Centrifuge

Geotechnical Centrifuge

Working Principle

Centrifugal acceleration to simulate increased gravitational acceleration

Application

Used for testing physical scale models of geotechnical engineering systems

Geotechnical centrifuge

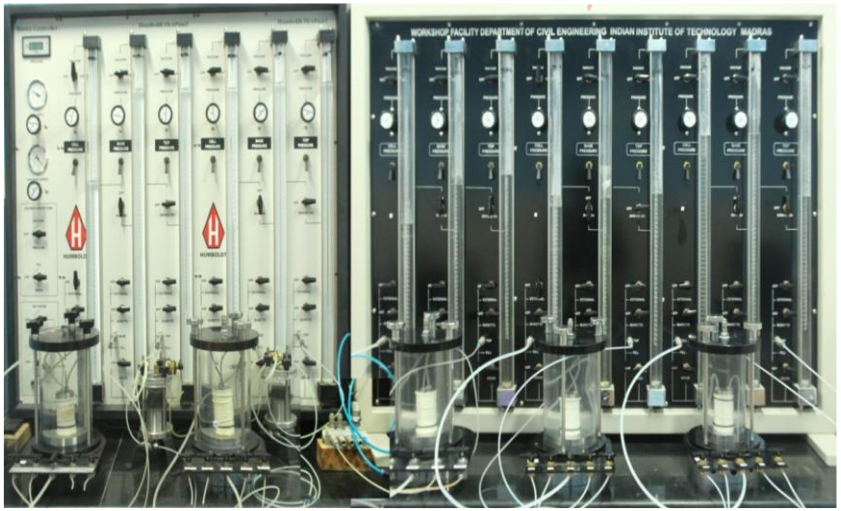
Flexible-wall Permeameter

Working Principle

Controls the effective stress conditions and degree of saturation by back-pressure application, and prevention of side-wall leakage during permeation via use of a latex membrane in close contact with the specimen

Application

Measurement of hydraulic conductivity of saturated porous material



Flexible wall permeameter

Sieve Shaker

Working Principle

A sieve shaker separates particles by passing them through a sieves and agitating the sample in order to obtain complete separation.

Application

To assess the particle size distribution of granular materials

Sieve shaker

Time Domain Reflectometer

Working Principle

TDR sensors use parallel rods, acting as transmission lines. A voltage is applied to the rods and reflected back to the sensor for analysis. The speed or velocity of the voltage pulse along the rod is related to the apparent permittivity of the substrate

Application

Determination of soil moisture content, rate of infiltration.

Time domain deflectometer

Fabricated Diffusion Cells

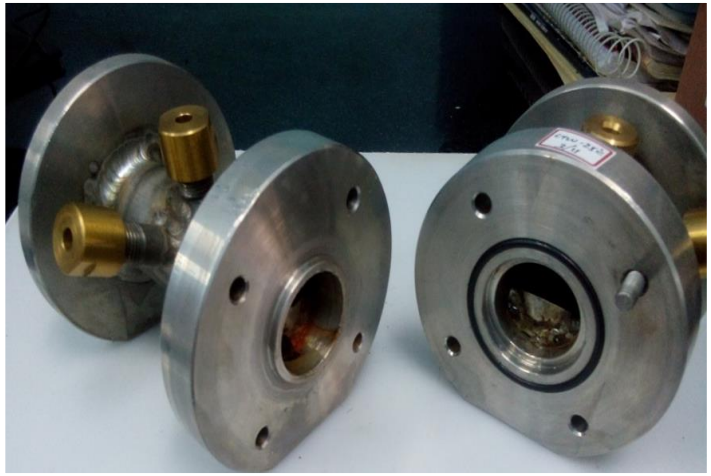
Working Principle

The concentration gradient between the source and receptor cell drives the contaminant by a process called diffusion

Application

Determination of diffusion coefficient of VOCs in both aqueous and vapor phase

Aqueous phase

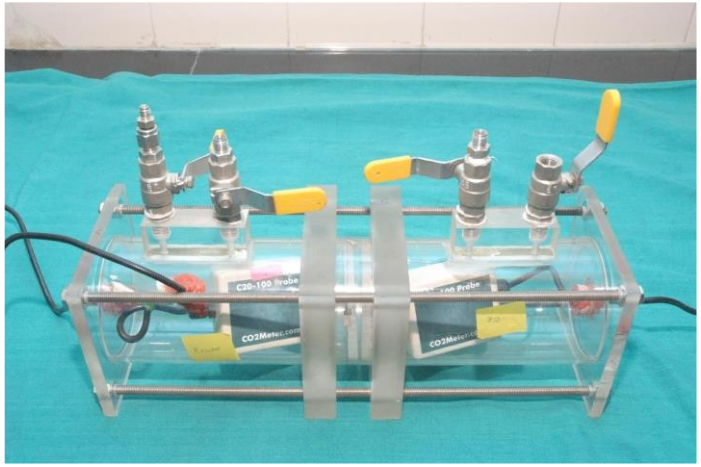


Vapour phase

Fabricated Carbon dioxide Diffusion cells

Working Principle

The carbon dioxide sensors kept at the source and receiver end measures the variation in the concentration of gas and hence the rate of diffusion



Carbon dioxide diffusion measurement

Application

To estimate the coefficient of carbon dioxide gas diffusion through a compacted geomaterial