HETEROGENOUS CATALYSIS LAB

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Lab Scope and Nature of Work: The core scope of this laboratory is dedicated to advancing sustainable chemical and energy processes through the foundational sciences of catalysis. The nature of the work involves the design, synthesis, and characterization of novel catalytic materials to address critical environmental and energy challenges. Key research areas include the development of highly efficient systems for water splitting to generate clean hydrogen fuel, water purification, and the degradation of persistent environmental pollutants. Furthermore, the lab focuses on renewable energy generation and storage.

Laboratory Facilities

Centrifugation Apparatus

Dry Oven

Gas Chromatograph

Potentiostat

Sonication Apparatus

UV-Vis Spectrometer

WELab Instrument

Box-Resistance Furnace Controller

Centrifugation Apparatus

A centrifugation apparatus is used to separate mixtures based on component densities. It operates by spinning samples at very high speeds, forcing denser materials to the bottom of the tube while lighter components remain on top. It is commonly used in biological, chemical, and clinical laboratories.

Dry Oven

A dry oven provides controlled heating for drying, sterilizing, or heat-treating samples. It operates under atmospheric pressure and is essential for removing moisture from materials or curing coatings and resins in industrial and research laboratories.

Gas Chromatograph

A gas chromatograph separates and analyzes compounds that can be vaporized without decomposition. It is used to identify and quantify chemical components in a mixture by passing them through a column and detecting their retention times. Widely applied in chemical and environmental analysis.

Potentiostat

A potentiostat is used in electrochemical experiments to control the voltage between electrodes and measure the resulting current. It enables researchers to study redox reactions, corrosion, and battery behavior with high precision and stability.

Sonication Apparatus

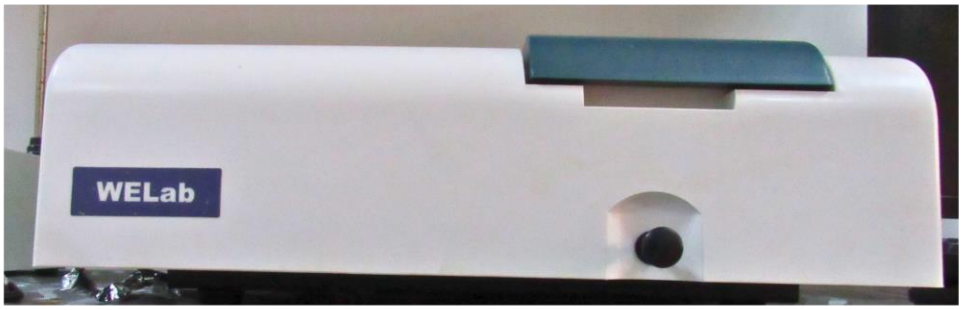
A sonication apparatus uses high-frequency ultrasonic waves to agitate particles in a sample. It is primarily used for breaking cell membranes, dispersing nanoparticles, and homogenizing mixtures. Sonication ensures uniform mixing at the microscopic level.

UV-Vis Spectrometer

A UV-Visible spectrometer measures light absorbance in the ultraviolet and visible ranges. It helps determine the concentration and chemical composition of solutions based on Beer-Lambert law. This instrument is widely used in biochemistry, environmental testing, and material science.

WELab Instrument (Image 1)

The WELab instrument shown is a UV-Visible Spectrophotometer. It analyzes light absorption by liquid samples across UV and visible wavelengths, providing quantitative concentration data. It is used extensively for chemical and biological analysis.



Box-Resistance Furnace Controller (Image 2)

The second image shows a box-type resistance furnace (drying oven). It is used for heating, annealing, or ashing samples at high temperatures under controlled conditions. It is commonly found in material science and industrial labs for precise heat treatments.