



An ISO 9001:2015 Certified Company

"Transforming Bold Ideas into Real-World Solutions through Comprehensive Research, Innovative Development, and Superior Manufacturing Expertise"



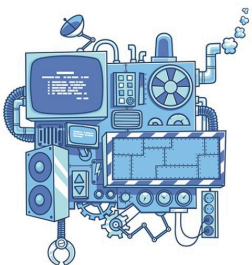
COMPANY PROFILE

ABOUT US

Balief Corporation leads in specialized manufacturing and sustainable solutions, focusing on cutting-edge technologies like CO₂ capture, green hydrogen production, and waste energy conversion through the Organic Rankine Cycle (ORC). As an ISO 9001:2015 certified company, we pride ourselves on a team of highly skilled technical experts and a distinguished mentor board, driving innovation and delivering cost-effective, high-quality solutions. Our commitment to excellence and sustainability is reflected in our 3 Granted Product Patent & 10 Granted Design Registration and the deployment of our advanced equipment in renowned R&D divisions, including IOCL and HPCL. At Balief, we continually push the boundaries of our industry, pioneering advancements that contribute to a greener and more sustainable future.

OUR SERVICES

- **Sustainable Technology Solutions:** Expertise in CO₂ capture, waste energy conversion (ORC), air and water treatment, green hydrogen production, and more sustainable innovations.
- **R&D Services:** Comprehensive R&D support for industry leaders, research divisions, and academic institutes, offering tailored solutions to meet diverse research needs.
- **Experimental Setup Design:** End-to-end solutions for experimental setups, including concept development, implementation, prototyping, and MVPs.
- **Lab Equipment:** Innovative design and fabrication of lab equipment, enhancing conventional models to support advanced research requirements
- **Product Development:** Delivering cutting-edge solutions through innovative product development, including thorough prototyping and rigorous testing.



Sustainable Solutions

**"Empowering a Sustainable Future:
Innovative Solutions for a Greener,
Cleaner, and Healthier Planet!"**



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Contact No. : +91 90167 64095

Capture CO2 for a future that benefits the next generation



About System

Advanced CO2 capture pilot plant features separate absorber and desorber columns for seamless batch and continuous operations. It includes dedicated storage for lean and rich solvents, sophisticated processing units, a high-efficiency cooling tower, and a pre-heating tank with an integrated heat exchanger. Automated control of input parameters and real-time data monitoring ensure precise operation. The plant is expandable from pilot scale to industrial scale.

Application

- Pilot Studies for CO2 Absorption and Desorption
- Research and Development Initiatives
- Educational Research & Studies
- Effectiveness Testing of Chemical Processes or Solvents
- Testing & Evaluation of Different types of Packing
- Powerplants, manufacturing & chemical industries etc.

Key Feature

- HMI-PLC based fully automatic control system reduces human interaction and increases safety
- Advanced static Absorber - Desorber Column System
- Diverse Packing & Solvent Selection
- Capacity: Up to 10 TPD
- Comprehensive Instrumentation
- Efficient Heat Exchange Mechanisms



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Hi - GAS RPB Carbon Sequestering System

Revolutionizing Mass Transfer Efficiency

Key Feature

- Rotating Packed Bed (RPB) Technology
- Packing Dia: 150 to 1000 mm
- Speed control: 200 to 1440 RPM
- Working Pressure: 0 to 4 barg
- Operation Customizable
- Precise Measurement and Control
- Safety Features: Interlocks, HP trip, PRV, Emergency shut-off
- HMI-PLC based Fully automatic Control system

Application

- CO2 Capture Pilot Studies
- Chemical Process or Solvent Effectiveness Testing
- Testing for different types of Packing
- Research and Development (R&D)
- Educational Institutions
- Laboratory Experiments



About System

Discover the cutting-edge Hi-Gas technology, revolutionizing Carbon Sequestration with advanced capabilities for enhanced chemical reactions. Ideal for diverse applications, from laboratories to industrial setups, its customizable Hi-Gas rotor unit ensures seamless integration into existing facilities, empowering your operations with unparalleled efficiency and environmental impact. Explore expandable technology that evolves with your needs and accelerates your journey towards sustainable innovation with Hi-Gas technology today.



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Efficient Emission Control for Small-Scale Laboratories



Specifications

- CO2 Capture Process
- Applicable for Different Solvent Testing
- Column Dia. : 50-250mm
- Column Height: Up to 2m
- Tank: up to 80 Liter
- Evaluation of Different Packing Types
- Liquid Flow control
- Gas Flow Control
- Liquid distributor
- Gas Mixing chamber
- Immersion Heater
- Different flow meters
- PT-100 Temp Sensors
- Modular Plug & Play Design
- Customizable Settings
- Manual or Automatic control panel

Application

- Academic and research institutes
- Solvent and Packing Testing

About System

Our innovative solution not only efficiently captures carbon dioxide from exhaust emissions but also integrates seamlessly with diverse process components and a sophisticated control panel. This compact static column CO2 absorber serves as a versatile regenerator, ideal for laboratory-scale applications, contributing to sustainable environmental practices and technological advancements in carbon capture and utilization.



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Efficient Energy Conversion



Key Feature

- Capacity: 1 to 20 KW
- Variety of working fluids can be selected for optimized performance
- Suitable for waste heat, geothermal, and solar energy
- Efficient energy generation
- Comprehensive technical specifications
- Manual or HMI-PLC based fully automatic Control Panel

Application

- Academic & Industrial Research
- Waste heat recovery Solutions
- Solar thermal systems
- Process heating applications
- Geothermal power plants
- Electricity generation with low-grade heat sources
- Power plants

About System

Explore the cutting-edge of sustainable energy with our Organic Rankine Cycle (ORC) Pilot Scale Plant. This innovative system is designed to convert low-temperature heat sources into electricity, available in various power ranges to suit diverse applications. Ideal for both research and small-scale industrial uses, our ORC plant features advanced technology and robust construction to ensure high efficiency and reliability. Perfect for renewable energy projects, it contributes to reducing carbon emissions and promoting environmental sustainability. Invest in a greener future with our ORC pilot plant and harness the power of clean energy.



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Biomass Combustor Food Dryer

Embrace the power of green preservation



About System

The biomass combustor-assisted food dryer revolutionizes agricultural practices by efficiently harnessing biomass to generate hot air, essential for drying food across multiple trays. This innovative system not only optimizes biomass utilization but also enhances food preservation capabilities, offering farmers a sustainable and cost-effective solution. With its potential for significant return on investment (ROI), the dryer proves invaluable to agricultural communities seeking reliable methods to process and store food efficiently.

Key Feature

- Tray: For 2 to 4 kg , MOC- SS/Al
- Fuel burning chamber
- 1 to 10 HP Air Blower
- Energy Efficient
- Versatile Features
- Cost-Effective & Environment Freidly

Application

- Academic & Industrial Research
- Agricultural and Farming Operations
- Hospitality & Food Service Industry
- Off-Grid Locations



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Industrial Products

"Advanced Solutions for a Cleaner, Cooler,
and More Efficient World"



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Solutions for Sustainable
Industrial Waste
Management



Key Feature

- Plug & Play type compact system
- No Site Installation Required
- High Efficiency in Pollutant Removal
- Product variant: Up to 100 KLD
- Fully customized as per customer requirements
- Prefabricated & Fully operational inhouse tested, so no site testing required for leakages and others
- Modular and Sturdy Structure

About System

Effluent Treatment Plants (ETPs) use physical processes such as screening and sedimentation to remove solids, while chemical methods like coagulation and flocculation target dissolved contaminants. Biological treatments, such as activated sludge or biofilters, break down organic pollutants with the help of microorganisms. These processes collectively reduce organic matter, nutrients, heavy metals, and pathogens in wastewater. Disinfection, typically through chlorination or UV irradiation, ensures the treated water meets safety standards before discharge or reuse. ETPs play a vital role in safeguarding water quality and environmental health by treating industrial and municipal wastewater effectively before it enters the ecosystem or re-enters the water cycle.

Application

- Wastewater Treatment in Textile, Pharmaceutical, Chemical and Petrochemical Industries.
- Food and Beverage Industry
- Automotive and Manufacturing Industries
- Power Plants



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Safeguarding your Environment



About System

An air scrubber is a device used to remove contaminants, pollutants, and particulates from the air. It operates by drawing air through a series of filters and purification mechanisms to clean it before releasing it back into the environment.

Key functions and benefits of an air scrubber:

- **Particulate Removal:** Air scrubbers effectively remove dust, pollen, mold spores, and other airborne particles.
- **Chemical Fume Removal:** They can filter out harmful gases and chemical fumes, making the air safer to breathe.
- **Odor Control:** Air scrubbers can eliminate unpleasant odors by trapping or neutralizing odor-causing particles.
- **Microbial Control:** They help reduce airborne bacteria, viruses, and other microorganisms, improving overall air hygiene.
- **Improved Indoor Air Quality:** By removing various contaminants, air scrubbers contribute to a cleaner and healthier indoor environment.

Key Feature

- Types : Dry / Wet / Venturi / Combine
- Fully customizable as per need
- Air blower and water pump (customized)
- Air & water filtration Filtration
- Smooth and quite Operation
- Air flow meter , Water rotameter (optional)
- High Airflow Capacity (as per need)
- Energy Efficient
- Durable Construction
- Low running cost
- Environmental Impact Reduction

Application

- Manufacturing industries
- Pharmaceutical and Chemical Industries
- Food and Beverage Industries
- Waste air Treatment
- Process Optimization
- Construction Sites



Contact Us:

Efficiency meets versatility in heating solutions



About System

Discover the future of heating with our state-of-the-art Heat Pump utilizing VCR (Variable Capacity Ratio) technology. Engineered for optimal energy efficiency and adaptable thermal management, this advanced system ensures precise temperature control across diverse residential and commercial environments. With its innovative design and sustainable performance, our VCR-based Heat Pump redefines comfort and efficiency, setting a new benchmark in HVAC solutions for modern living and working spaces.

Specification

- Heating Capacity: Up to 10 TR & Above
- Industrial & commercial Heating Solution
- Modern and Compact Design
- Temperature Controller
- Air Blower/Water Pump capacity : As per Requirement
- Inbuilt and Separate Storage Tank Options
- In-built Water Pump
- High-Efficiency PHE
- Modular Setup
- User-Friendly
- Plug & Play System



Contact Us:

Efficiently preserve freshness with Heat Pump Food Dryer

About System

Introducing our cutting-edge Heat Pump Assisted Food Dryer, which revolutionizes food preservation with advanced heat pump technology for precise temperature control and gentle drying. This innovative system not only reduces energy consumption but also preserves nutritional integrity by maintaining natural flavors and textures. By harnessing the efficiency of heat pumps, it significantly minimizes environmental impact through reduced greenhouse gas emissions.

From small-scale artisanal operations to large-scale commercial production, our dryer offers versatile and cost-effective drying solutions across a variety of foods. Its ability to ensure consistent quality and extended shelf life makes it an ideal choice for businesses aiming to enhance product quality and sustainability in food processing. Experience superior efficiency, enhanced food quality, and sustainable growth with our Heat Pump Assisted Food Dryer—a game-changer in the field of food preservation technology.



Specification

- Capacity: up to 10 TR and Above
- Industrial and commercial food drying
- Customized based on application
- New and Compact design
- Air Temperature control
- Tray Capacity: as per requirements
- Customized Tray Distribution and Size
- Plug & Play to Use



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Enhance industrial efficiency with our advanced chillers



About System

Discover the pinnacle of industrial cooling precision with our Air & Water chiller systems. Crafted to exacting standards, these advanced units blend state-of-the-art thermodynamics with rugged durability. Engineered for efficiency, they balance optimal energy use with steadfast cooling power, guaranteeing reliable performance across dynamic manufacturing environments. Whether it's ensuring equipment longevity or meeting stringent production demands, our chiller solutions stand as indispensable assets, driving seamless operations and setting new benchmarks in industrial cooling excellence.



Specification

- Capacity: up to 50 TR and Above
- Customization (optional)
- Air & Water chillers
- Safety interlocks
- Alarm for errors & problems
- Temperature controller
- In-built water pump
- High efficient PHE
- Modular setup
- User friendly
- Plug & Play system

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Academic R&D Projects

"Driving Breakthroughs in Education and Research: Bridging Ideas and Impact Through Innovative Academic R&D Projects."



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Milestone R&D

**"Advancing Education Through Innovative
Research and Development"**



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Optimize cooling with our Variable VCR System's versatile parts



Learning Outcome

- Understanding the principle of vapour compression refrigeration system.
- Familiarity with controlling of flow rate and different expansion devices such as electronic expansion valves, capillary tubes, and thermostatic expansion valves.
- Ability to learn the system performance characteristics.
- Evaluation of results and calculate the C.O.P. of the system.
- Comparative study with different expansion devices and live water cooled condenser and live load evaporator.

Specification

- HMI-PLC based fully automatic system with data logging
- Ethernet and Wi-Fi enabled for remote operation
- IoT based system (optional)
- Variable speed compressor
- Two type of Condenser : Air-cooled and Water-cooled condenser
- Two type of Evaporator : PHE and Submerged coil type evaporator
- Three types of expansion valves : Thermostatic Expansion valve (TXV), Capillary, Electronic Expansion valve (EXV)
- Flow selection : Live circulation & Tank Circulation



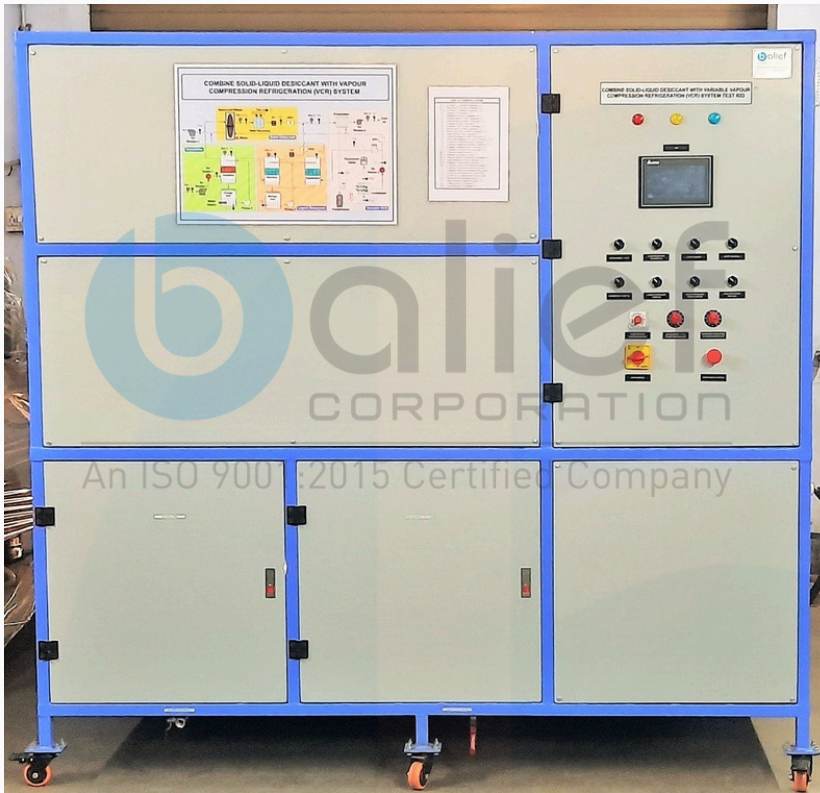
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Combine Solid-Liquid Desiccant Test Rig

Save energy with hybrid desiccant system



Learning Outcome

- Gain comprehensive knowledge of the operation of AHUs and domestic air conditioning systems.
- Understand the impact of variable speed compressors on system performance.
- Analyze the role of humidifiers, Solid and Liquid desiccant systems in creating desired ambient conditions.
- Explore the flexibility of operating different AHU features alongside a variable VCR system.
- Study and evaluate 19 combinations of psychrometric processes.
- Develop skills in configuring and operating systems at various compressor speeds.
- Master seamless data acquisition and control through HMI.

Specification

- HMI-PLC based fully automatic with data recording
- Ethernet and Wi-Fi enabled for remote operation
- IoT based system (optional)
- Variable speed compressor
- Integrated humidifier (optional)
- Two Types of combine desiccant systems: Solid & Liquid
- Four different AHU features
- Combinations: 19 possible configurations for operation
- Safety feature : HP-LP , Interlocks, Pressure cutoff, Emergency switch etc.



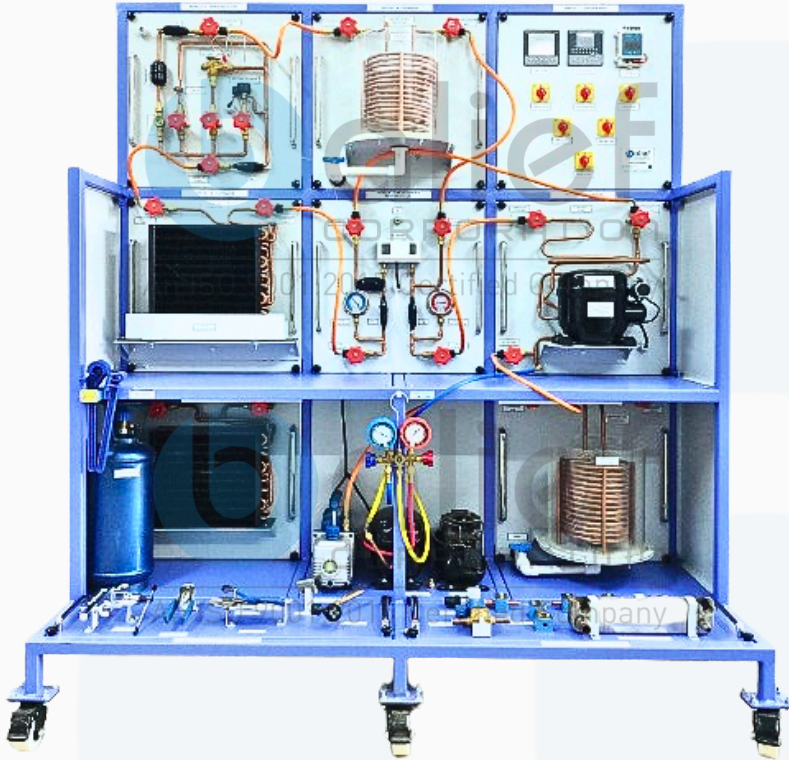
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Refrigeration System With Interchangeable Modules

Transform training with our modular refrigeration system



Specification

- Hands-On Learning system
- Air-cooled and Water-cooled condenser
- Fin & tube type and Submerged coil type evaporator
- Three types of Expansion Devices : Capillary, TXV and EXV
- Detachable and replaceable Components
- Facilitating quick module changes
- Data logging Facility
- Dashboard for the Tools & Components and their section views

Learning Outcome

- Understanding the principles of refrigeration, including heat transfer, the refrigeration cycle, and the role of different components in the system.
- Familiarity with different types of condensers and evaporators, their characteristics, and applications.
- Knowledge of expansion devices, such as expansion valves, capillary tubes, and thermostatic expansion valves.
- Skills in changing condensers and evaporators, including removing and attaching modules and tightening connections.
- Proficiency in conducting leakage tests using air filling and checking for leaks using bubbling liquid.
- Competence in evacuating air and moisture from the system using a vacuum pump.
- Ability to charge gas into the system from a gas cylinder.
- Understanding the importance of data collection and documentation for analysis and troubleshooting.

Application

- Education , Learning and hands on training in Academic institutes



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Hi - GAS RPB Carbon Sequestering System

Revolutionizing Mass Transfer Efficiency

Key Feature

- Rotating Packed Bed (RPB) Technology
- Packing Dia: 150 to 1000 mm
- Speed control: 200 to 1440 RPM
- Working Pressure: 0 to 4 barg
- Operation Customizable
- Precise Measurement and Control
- Safety Features: Interlocks, HP trip, PRV, Emergency shut-off
- HMI-PLC based Fully automatic Control system

Application

- CO2 Capture Pilot Studies
- Chemical Process or Solvent Effectiveness Testing
- Testing for different types of Packing
- Research and Development (R&D)
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About System

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Tri-Axial Core Fracturing Test Unit

Precision meets reliability in every fracture



Specification

- Triaxial Pressure/force (Confining, Axial and Lateral)
- Core Holder MOC : SS 316L
- Customizable to fit core samples of various sizes Up to 6 Inches
- Air Driven Gas Booster Pump working Up to 15,000 psi
- Working Pressure Range: Up to 10,000 psi
- Water bath temperature Range: Up to 80 °C
- Hydraulic pumps working pressure Up to 10,000 psi (Servo operated Optional)
- Modular Design
- Consist of Vacuum Pump, Air Compressor
- Safety : Pressure Safety Valve, Overflow Point, Auto Pressure cutoff system & Air compressor

Learning Outcome

- Understand the core testing process.
- Comprehend the principles of core fracturing using a triaxial system.
- Analyze the effects of supercritical CO₂ (SC-CO₂) on rock fracture behavior.
- Learn to control and adjust pressure in a triaxial core system.
- Assess the impact of temperature variations on core fracturing.
- Utilize acoustic emission sensors to detect and analyze fracture events.
- Understand the significance of pressure variations in fracturing.
- Collect and analyze experimental data.

Application

- Academic and industrial research for geological studies and core testing.
- Applied in petroleum engineering for reservoir characterization and hydraulic fracturing.
- Geothermal energy, seismology & environment engineering research
- Integral to rock mechanics for fracture analysis and strength testing.



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Key Feature

- Tray: For 2 to 4 kg , MOC- SS/Al
- Fuel burning chamber
- 1 to 10 HP Air Blower
- Energy Efficient
- Versatile Features
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Application

- Academic & Industrial Research
- Agricultural and Farming Operations
- Hospitality & Food Service Industry
- Off-Grid Locations



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Unlocking Membrane Potential



About System

Spiral-wound nano-filtration (NF) and reverse osmosis (RO) membranes represent significant advancements in water treatment technology. NF membranes selectively allow certain ions and molecules to pass through while rejecting others based on size and charge, making them suitable for applications such as partial desalination and ion removal. Both NF and RO membranes play vital roles in industries ranging from municipal water treatment to pharmaceutical manufacturing, ensuring water purity and safety.

Application

- Research and Development
- Quality Control in Water Treatment Plants
- Pilot Testing in Industries
- Training and Education
- Product Validation for Manufacturing

Key Feature

- Advance water treatment Process
- Various selection of membrane
- Comprehensive Component Set
- Adaptive Membrane Technology
- Modular Scalability
- Sustainable Efficiency
- Monitoring Instruments



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Flat Sheet Reverse Osmosis (RO) System

Water is the driving force of all nature



Key Feature

- New concept for water treatment
- High Efficiency Water Filtration
- Less energy consumption
- High pressure leakproof system
- Reliable Performance
- Easy Installation and Maintenance
- Versatile Application
- Environmental sustainability
- Long-lasting Durability

Application

- Research and Development
- Membrane Performance
- Water Quality Analysis
- Process Optimization
- Contaminant Removal Studies
- Energy Efficiency
- Water desalination

About System

The Flat Sheet Reverse Osmosis (RO) System is a state-of-the-art water purification technology designed to provide high-quality drinking water by effectively removing impurities and contaminants. With its advanced Flat Sheet Membrane Technology, this system ensures efficient and reliable performance, making it suitable for research studies. Easy to install and maintain, the Flat Sheet RO System offers superior water purification, long-lasting durability, and user-friendly operation. Experience the difference in water quality with this innovative system.



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Efficient and eco-friendly solutions for industrial wastewater



About System

Mini - adsorption System

The Advanced Adsorption Unit for Effluent Characterization and Treatment is a state-of-the-art solution designed to purify industrial wastewater by removing a wide range of compounds. Utilizing the adsorption process, this unit ensures the effective removal of non-degradable organic compounds, making it ideal for treating groundwater, drinking water, and process water. With a robust design and advanced technology, this unit is perfect for industries looking to enhance their wastewater treatment processes.

Key Feature

Application

- High-Efficiency Adsorption Process
- Versatile Adsorbents selection
- Multiple options for the flow selection (Series, Parallel, Reverse etc.)
- BOD, COD, TSS measuring advance meter for the water testing
- Dual-Column Design
- Regeneration Capability
- Durable Construction

- Groundwater Remediation
- Industrial Wastewater Treatment
- Process Water Treatment
- Academic and Industrial Research
- Absorbents Testing



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Achieve precision and efficiency in pump testing



Specification

- HMI-PLC based fully automatic system with USB data logging & Live monitoring
- Storage Tank capacity : Up to 500 Liter
- Centrifugal Pump: 0.5 - 2 HP (Up to 150 LPM)
- Gear Pump: 0.5 - 2 HP (up to 50 LPM)
- Reciprocating Pump: 0.5 - 2 HP (up to 30 LPM)
- Digital Electromagnetic Water Flow sensor and Torque Sensor compatible with PLC
- Motorized Globe Valve for flow control
- Motorized Ball Valve for process selection
- Easy Interchangeable provision of the impeller in Centrifugal pump
- Acrylic casing used for centrifugal pumps to visualize cavitation effects with various impeller types
- Energy consumptions of pumps and total system

Learning Outcome

- Understand the principles and operation of multiple pump systems.
- Learn to set up and calibrate a multi-pump test rig.
- Analyze the performance characteristics of different pump types under varying conditions (like flow, pressure etc.)
- Gain skills in measuring and interpreting flow rates, pressures, and efficiencies.
- Develop the ability to troubleshoot and diagnose issues within pump systems.
- Assess the energy consumption and efficiency of pump configurations.
- Explore the impact of different fluid properties and different impeller on pump performance.
- Enhance practical knowledge of maintenance and safety procedures for pump systems.



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Advanced Multi - Heat Exchanger Test Rig

Transforming energy efficiency through heat exchange solutions



Specification

- Manual Control Panel (Automatic panel is optional)
- Water storage tank : up to 100 Liters, Tank MOC: SS304 with insulation
- Water Heater: up to 3 kW
- Centrifugal Pumps: 0.5 or 1 HP
- Pumps flow controlled by VFD
- Digital water flow sensor
- Three types of Heat exchanger (Tube-in-Tube Heat Exchanger, Plate Heat Exchanger, Shell & Tube Heat Exchanger (all Heat exchanger MOC is SS304/316)
- Provision of other heat exchanger testing.
- Data logger with USB port for data collection
- Multiple process flow direction options for flexibility in testing configurations.

Learning Outcome

- Understand the principles and operation of heat exchangers with multiple configurations.
- Gain practical skills in setting up and calibrating a multi-heat exchanger test rig.
- Analyze thermal performance across different heat exchanger designs and materials.
- Explore the impact of flow rates, temperatures, and fluid properties on heat exchanger performance.
- Acquire knowledge of maintenance and safety protocols specific to heat exchanger systems.
- Apply experimental data to validate theoretical heat transfer models and design criteria.
- Comparison of the different types of the heat exchanger performance.

Application

- Testing and optimizing heat exchanger designs and configurations for industries
- Education and Training
- Testing and Validation
- Quality control
- Research and development for Energy and other sectors
- Product Development



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Mechanical Engineering Lab

"Where Precision Meets Innovation: Shaping the Future of Mechanical Engineering through Advanced Research and Hands-On Learning."



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Refrigeration & Air conditioning (RAC) Lab

"Chill Out with Precision: Your Go-To for Refrigeration and Air Conditioning Projects"



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Optimize cooling with our Variable VCR System's versatile parts



Learning Outcome

- Understanding the principle of vapour compression refrigeration system.
- Familiarity with controlling of flow rate and different expansion devices such as electronic expansion valves, capillary tubes, and thermostatic expansion valves.
- Ability to learn the system performance characteristics.
- Evaluation of results and calculate the C.O.P. of the system.
- Comparative study with different expansion devices and live water cooled condenser and live load evaporator.

Specification

- HMI-PLC based fully automatic system with data logging
- Ethernet and Wi-Fi enabled for remote operation
- IoT based system (optional)
- Variable speed compressor
- Two type of Condenser : Air-cooled and Water-cooled condenser
- Two type of Evaporator : PHE and Submerged coil type evaporator
- Three types of expansion valves : Thermostatic Expansion valve (TXV), Capillary, Electronic Expansion valve (EXV)
- Flow selection : Live circulation & Tank Circulation



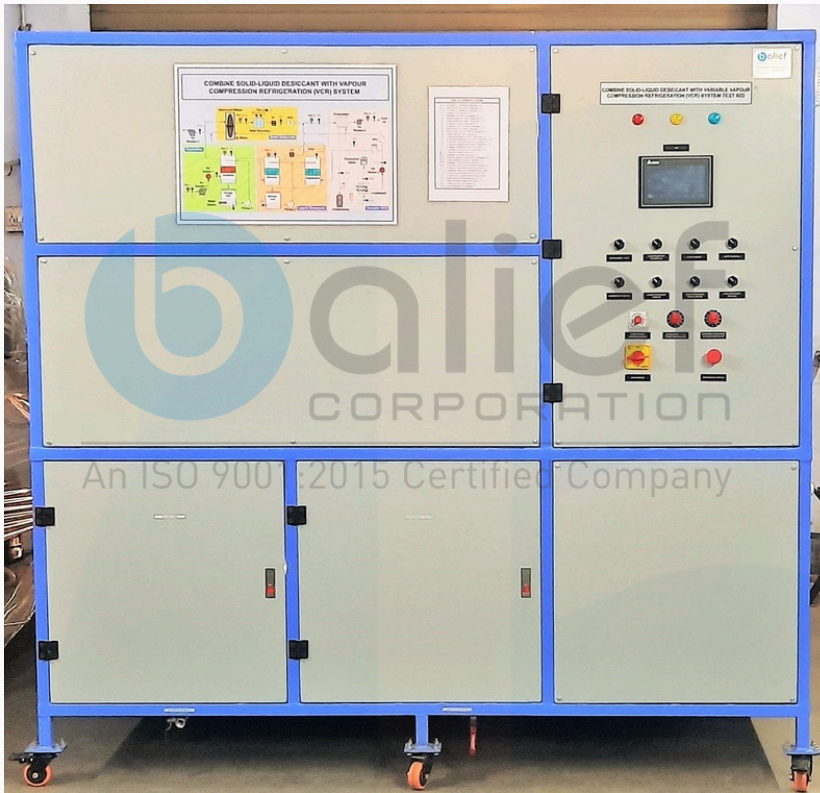
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Combine Solid-Liquid Desiccant Test Rig

Save energy with hybrid desiccant system



Learning Outcome

- Gain comprehensive knowledge of the operation of AHUs and domestic air conditioning systems.
- Understand the impact of variable speed compressors on system performance.
- Analyze the role of humidifiers, Solid and Liquid desiccant systems in creating desired ambient conditions.
- Explore the flexibility of operating different AHU features alongside a variable VCR system.
- Study and evaluate 19 combinations of psychrometric processes.
- Develop skills in configuring and operating systems at various compressor speeds.
- Master seamless data acquisition and control through HMI.

Specification

- HMI-PLC based fully automatic with data recording
- Ethernet and Wi-Fi enabled for remote operation
- IoT based system (optional)
- Variable speed compressor
- Integrated humidifier (optional)
- Two Types of combine desiccant systems: Solid & Liquid
- Four different AHU features
- Combinations: 19 possible configurations for operation
- Safety feature : HP-LP , Interlocks, Pressure cutoff, Emergency switch etc.



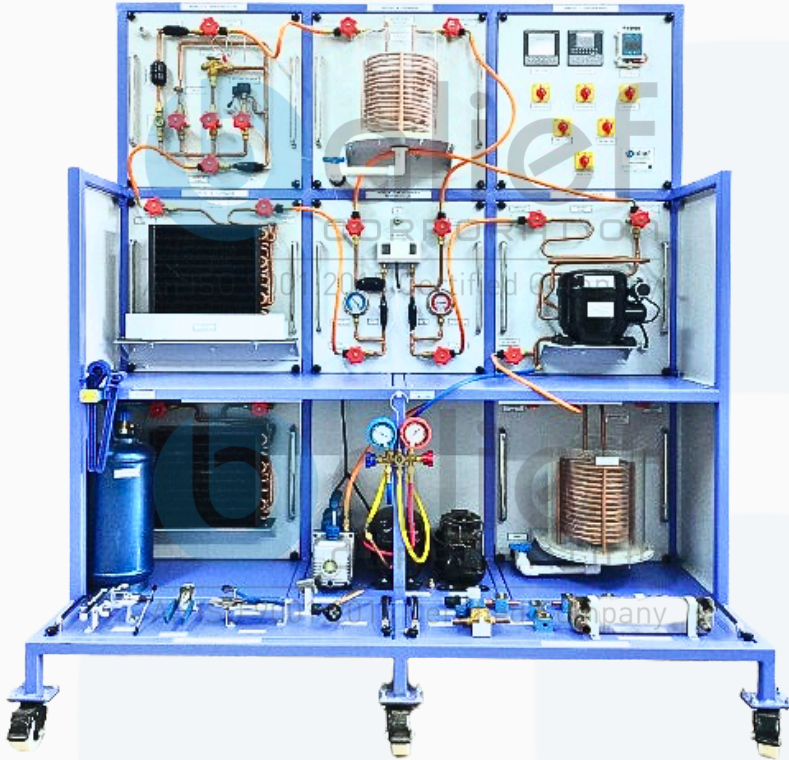
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Refrigeration System With Interchangeable Modules

Transform training with our modular refrigeration system



Specification

- Hands-On Learning system
- Air-cooled and Water-cooled condenser
- Fin & tube type and Submerged coil type evaporator
- Three types of Expansion Devices : Capillary, TXV and EXV
- Detachable and replaceable Components
- Facilitating quick module changes
- Data logging Facility
- Dashboard for the Tools & Components and their section views

Learning Outcome

- Understanding the principles of refrigeration, including heat transfer, the refrigeration cycle, and the role of different components in the system.
- Familiarity with different types of condensers and evaporators, their characteristics, and applications.
- Knowledge of expansion devices, such as expansion valves, capillary tubes, and thermostatic expansion valves.
- Skills in changing condensers and evaporators, including removing and attaching modules and tightening connections.
- Proficiency in conducting leakage tests using air filling and checking for leaks using bubbling liquid.
- Competence in evacuating air and moisture from the system using a vacuum pump.
- Ability to charge gas into the system from a gas cylinder.
- Understanding the importance of data collection and documentation for analysis and troubleshooting.

Application

- Education , Learning and hands on training in Academic institutes



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Precision redefined with nanoparticle-based VCR systems



Learning Outcome

- Understanding the Principle of Vapour Compression Refrigeration System
- Learn about the refrigeration cycle, including the processes of compression, condensation, expansion, and evaporation.
- Study and analyze the performance characteristics of the vapour compression refrigeration system using nanoparticles in the refrigerant as well as in water.
- Evaluate and compare the system's COP and efficiency with and without nanoparticles..

Specification

- Compact VCR system with nanoparticle used in refrigerant and also in water.
- Three types of Evaporation : Air cooled, submerged coil, and cooling tower spray type (humidifier type).
- Data logging through USB port
- Automatic control panel (optional)
- Variable flow rate of air and water



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Air-Conditioning Test Rig



- VCR system-based operation
- System Capacity : 0.5 to 2 TR (Customizable)
- Air Heating with control
- Humidification & Dehumidification facilities with humidity sensors embedded
- Temperature sensors & refrigerant rotameter
- Pressure Gauges for suction and discharge pressure
- Data Logger with USB port for data collection

Vapour Absorption Refrigeration (VAR) Test Rig

- Aqua - Ammonia based absorption system
- Ammonia gas detector sensor for safety
- Thermic oil tank (40 ltr) with 3 kW heater
- VFD drive for Aqua - Ammonia flow control
- Data logging via USB drive
- Automatic control Panel (Optional)
- Magnetic Pump for Hot oil circulation
- High pressure Multistage pump for Aqua-ammonia Solution
- Modular structure with wheels



VCR Based Milk Pasteurization System



- HMI-PLC based Fully automatic system
- Operated via Ethernet and Wi-fi
- Automatic Data logging in HMI collected in Pen drive via USB Port
- Digital Electromagnetic Flow meter for flow measurement
- PHE used for effective Heating
- Variable High torque motor with gear box for mixing
- 1 TR VCR system for rapid cooling
- Pressure and Temp. sensors
- Hot SS Tank with heater for heating
- Corrosion resistance SS pump
- Fully insulated SS tanks
- Safety measures : HP-LP switch, Pressure cutoff system, Emergency switch.

Humidification-Dehumidification (HDH) Water Desalination Test Rig

- HDH based water desalination system
- 1 TR VCR system (Customizable as per need)
- Blower speed and Pump flow variable
- Manual Control panel
- Fully automatic control panel (Optional)
- Variable compressor (Optional)
- Corrosion free SS pumps
- Data logger for data collection with USB port
- Sensors : Water flow meter, Pressure , Temperature, TDS sensors etc. (Customizable)
- Energy meter for energy consumption measurement



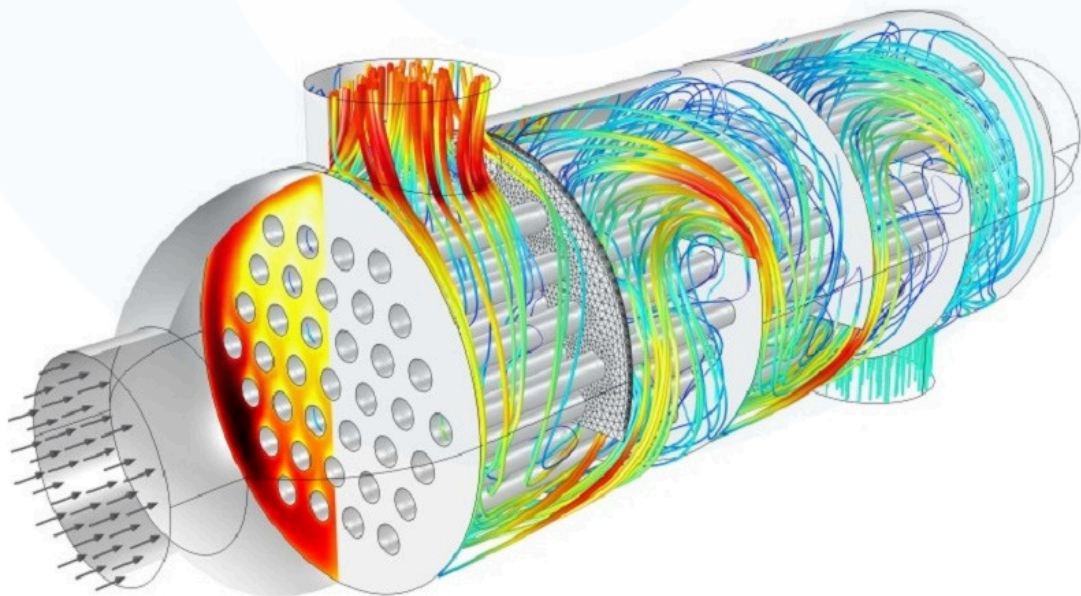
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Heat & Mass Transfer (HMT) Lab

"Unleashing Innovation through Advanced Heat and Mass Transfer: Where Cutting-Edge Research Meets Real-World Solutions."



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Advanced Multi - Heat Exchanger Test Rig

Transforming energy efficiency through heat exchange solutions



Specification

- Manual Control Panel (Automatic panel is optional)
- Water storage tank : up to 100 Liters, Tank MOC: SS304 with insulation
- Water Heater: up to 3 kW
- Centrifugal Pumps: 0.5 or 1 HP
- Pumps flow controlled by VFD
- Digital water flow sensor
- Three types of Heat exchanger (Tube-in-Tube Heat Exchanger, Plate Heat Exchanger, Shell & Tube Heat Exchanger (all Heat exchanger MOC is SS304/316)
- Provision of other heat exchanger testing.
- Data logger with USB port for data collection
- Multiple process flow direction options for flexibility in testing configurations.

Learning Outcome

- Understand the principles and operation of heat exchangers with multiple configurations.
- Gain practical skills in setting up and calibrating a multi-heat exchanger test rig.
- Analyze thermal performance across different heat exchanger designs and materials.
- Explore the impact of flow rates, temperatures, and fluid properties on heat exchanger performance.
- Acquire knowledge of maintenance and safety protocols specific to heat exchanger systems.
- Apply experimental data to validate theoretical heat transfer models and design criteria.
- Comparison of the different types of the heat exchanger performance.

Application

- Testing and optimizing heat exchanger designs and configurations for industries
- Education and Training
- Testing and Validation
- Quality control
- Research and development for Energy and other sectors
- Product Development



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Stephen Boltzmann Apparatus

- 0-5 to 1 HP water pump (as per need)
- 1/4 HP vacuum pump
- Hot water storage tank with a capacity of 20 to 50 liters (as required)
- Black-coated test plate
- Vacuum chamber to enhance radiation effect
- Hot and cold water circulation options
- Spherical-shaped dome
- Jacketed, well-insulated closed chamber for the dome
- Temperature sensors mounted at multiple locations



Emissivity Apparatus

- Matt-Black Coated Plate
- Test Plate: Grey coated
- Flat Plate Surface Heater
- Constant power regulator
- Temperature sensor: K / J / pt-100 Type
- Temp. scanner with USB Port
- Ampere and Voltage meter



Non- Conventional Energy Lab

"Fueling the Future with Innovative Energy Solutions: Embrace the Power of Non-Conventional Sources"



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Solar Air Heater



- 1 to 10 m² absorber area
- Black colored absorber plate for more efficiency
- MOC: MS / Galvanized iron / SS / Aluminum
- Air blower : 0.5 to 5 HP (as per requirement)
- Air flow controlled by valve at outlet / VFD drive (optional)
- RTD-pt100 temperature sensor and controller

Solar Still

- Customizable area: 0.5 to 3 m²
- Types: Stepped and conventional
- Pump: 0.25 to 1 HP
- Pump MOC: PP / SS
- Provision for internal reflectors
- RTD Pt-100 temperature sensors at various locations
- Data logger with USB port
- Easy provision for glass change



Solar Concentrating Collector Test Rig



- Parabolic disk type reflector
- Mirror finished SS / Aluminum sheet or reflecting mirror
- Absorber tube : SS / Copper
- Water pump: 0.25 HP to 1 HP
- Provision of Angular position change
- Optional : Secondary reflector / auto tracking / Modified version
- Rotameter for flow measurement
- Inlet flow control valve
- Modular structure



Water Treatment Lab

**"Revolutionizing Water Treatment Through
Cutting-Edge Research and Innovation"**



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Unlocking Membrane Potential



About System

Spiral-wound nano-filtration (NF) and reverse osmosis (RO) membranes represent significant advancements in water treatment technology. NF membranes selectively allow certain ions and molecules to pass through while rejecting others based on size and charge, making them suitable for applications such as partial desalination and ion removal. Both NF and RO membranes play vital roles in industries ranging from municipal water treatment to pharmaceutical manufacturing, ensuring water purity and safety.

Application

- Research and Development
- Quality Control in Water Treatment Plants
- Pilot Testing in Industries
- Training and Education
- Product Validation for Manufacturing

Key Feature

- Advance water treatment Process
- Various selection of membrane
- Comprehensive Component Set
- Adaptive Membrane Technology
- Modular Scalability
- Sustainable Efficiency
- Monitoring Instruments



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Advanced Adsorption For Effluent Treatment

Efficient and eco-friendly solutions for industrial wastewater



About System

The Advanced Adsorption Unit for Effluent Characterization and Treatment is a state-of-the-art solution designed to purify industrial wastewater by removing a wide range of compounds. Utilizing the adsorption process, this unit ensures the effective removal of non-degradable organic compounds, making it ideal for treating groundwater, drinking water, and process water. With a robust design and advanced technology, this unit is perfect for industries looking to enhance their wastewater treatment processes.

Mini - adsorption System

Key Feature

- High-Efficiency Adsorption Process
- Versatile Adsorbents selection
- Multiple options for the flow selection (Series, Parallel, Reverse etc.)
- BOD, COD, TSS measuring advance meter for the water testing
- Dual-Column Design
- Regeneration Capability
- Durable Construction

Application

- Groundwater Remediation
- Industrial Wastewater Treatment
- Process Water Treatment
- Academic and Industrial Research
- Adsorbents Testing



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Flat Sheet Reverse Osmosis (RO) System

Water is the driving force of all nature



Key Feature

- New concept for water treatment
- High Efficiency Water Filtration
- Less energy consumption
- High pressure leakproof system
- Reliable Performance
- Easy Installation and Maintenance
- Versatile Application
- Environmental sustainability
- Long-lasting Durability

Application

- Research and Development
- Membrane Performance
- Water Quality Analysis
- Process Optimization
- Contaminant Removal Studies
- Energy Efficiency
- Water desalination

About System

The Flat Sheet Reverse Osmosis (RO) System is a state-of-the-art water purification technology designed to provide high-quality drinking water by effectively removing impurities and contaminants. With its advanced Flat Sheet Membrane Technology, this system ensures efficient and reliable performance, making it suitable for research studies. Easy to install and maintain, the Flat Sheet RO System offers superior water purification, long-lasting durability, and user-friendly operation. Experience the difference in water quality with this innovative system.



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HDH based Water Desalination Test Rig

- HDH based water desalination system
- 1 TR VCR system (Customizable as per need)
- Blower speed and Pump flow variable
- Manual Control panel
- Fully automatic control panel (Optional)
- Variable compressor (Optional)
- Corrosion free SS pumps
- Data logger for data collection with USB port
- Sensors : Water flow meter, Pressure , Temperature, TDS sensors etc. (Customizable)
- Energy meter for energy consumption measurement

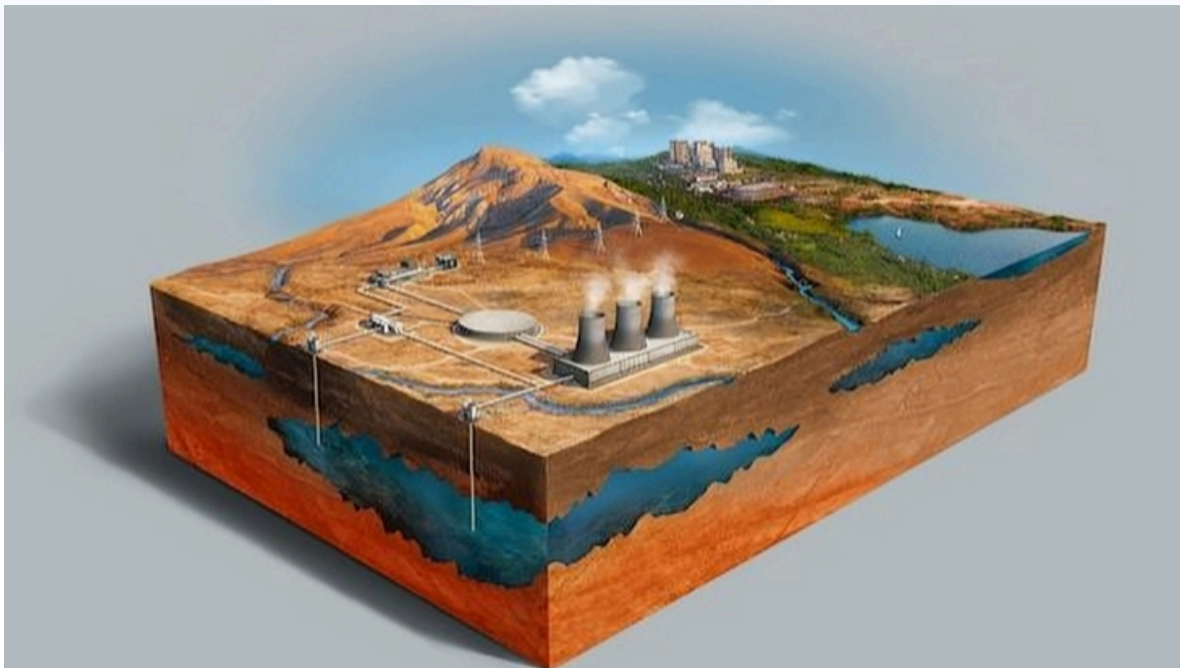
Water Cavitation Test Rig

- Water storage tank: 50 to 500 Liter
- Water tank MOC : SS
- Water Pump : 0.5 Hp to 2 Hp
- Water pump MOC : SS
- Heater for water heating
- Orifice & Venturi
- Parallel and Series both connection
- Flow control valves
- Pressure control / flow control options
- Pressure gauges / Pressure Transmitter
- Control Panel : Manual / HMI
- Flow measurement: Rotameter / Digital flow meter (optional)
- Modular Sturdy Structure with wheels
- Fully customizable as per requirements



Geothermal Energy Lab

"Geothermal Energy: Harness the Earth's Heat for Sustainable, Reliable, and Efficient Power."



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Geothermal Based Milk Pasteurization System

- HMI-PLC based Fully automatic control system with data logging
- Manual control system (optional)
- Operated via Ethernet and Wi-fi
- Digital Electromagnetic Flow meter for flow measurement
- Variable High torque motor with gear box
- 1 TR VCR system for rapid cooling
- Pressure and Temp. sensors
- Hot SS Tank with heater for heating
- Corrosion resistance SS pump
- Fully insulated SS tanks
- Safety measures : HP-LP switch, Pressure cutoff system, Emergency switch.

Geothermal Energy Assisted Water Desalination System

- Feed water : Geothermal water
- Storage Ware tank MOC : PVC / PP
- Storage tank capacity : 100 to 1000 Ltr
- Fresh water tank MOC : Food grade pure virgin plastic
- Filtration process includes: Bag filters, Sand filter, Carbon filter , water softener, Commercial RO
- RO capacity : 100 to 1000 LPH (Customizable)
- Water cooler: Up to 100 liter (optional)
- Level switch for auto cutoff and auto start the pumps based on water level
- Semi automatic Control system
- Modular structure with wheels



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Geothermal Energy Assisted Air Food Dryer

- Geo-Thermal Hot Water Utilization for the heating the air
- Geothermal water Flow control valve and rotameter for flow measurement
- Air blower speed control by regulator
- Temperature controller for air heating
- Insulated air tight Food drying chamber with door locking
- Drying chamber internal and Trays MOC : SS / Aluminum
- Flexible insulated air duct
- Modular Design Structure with movable wheels
- Fully Customized based on Application



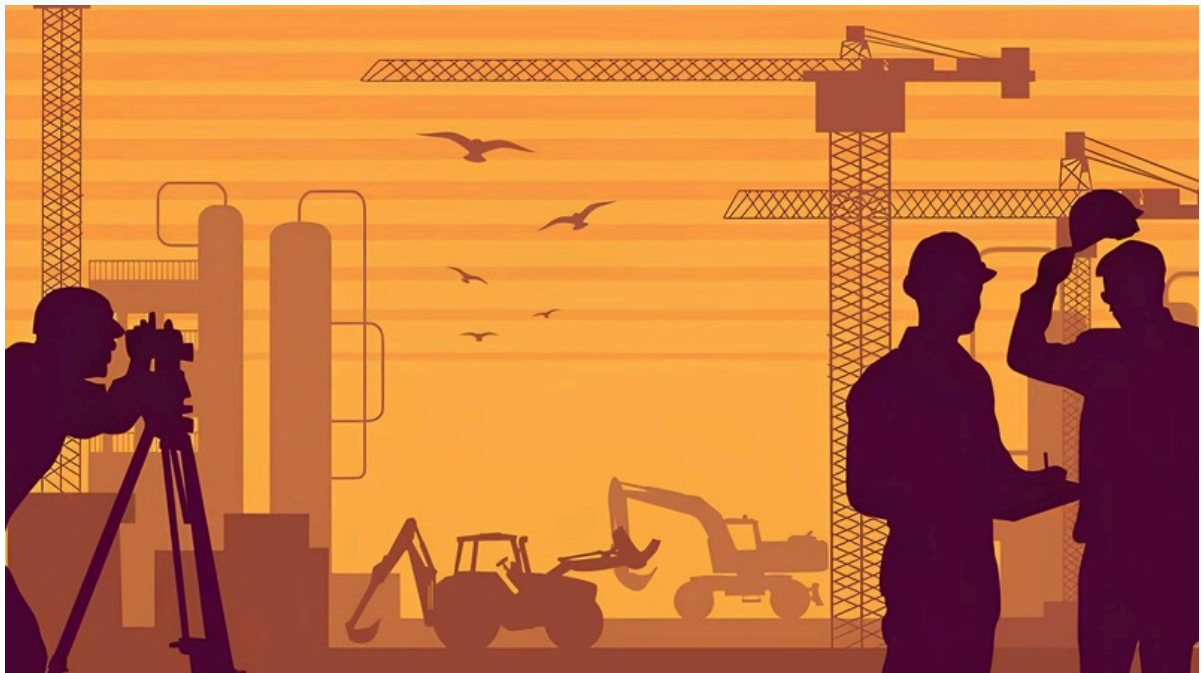
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Civil Engineering Lab

**"Shaping the Future of Infrastructure:
Excellence in Civil Engineering Lab Solutions."**



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Learning Outcome

- Investigate rainfall/runoff for catchments of various slopes
- Demonstrate erosion from water flow
- Study interflow impact on hydrographs
- Observe sediment transport and river meanders
- Measure and compare cone of depression for wells
- Examine de-watering of excavation sites.
- Analyze confined aquifer well flow.
- Demonstrate island watersheds with rainfall and wells
- Investigate scour around bridge piers

Specification

- Catchment Area for rain flow and river flow simulator : 2 m length * 1 m width (customizable)
- Water pump : 0.5 HP to 5 HP
- Water storage tank : 100 L to 1000 L
- Water flow totalizer
- Water rotameter
- Manometric tubes arrangement
- Acrylic doors for visualization rain
- Screw jack mechanism for tilting bed
- Manual control panel
- Different types of obstacles and convergent-divergent modules
- Fully automatic system (optional)



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Planetary Ball Mill

- Fine grinding, mixing, and mechanical alloying of materials
- Grinding jars : 2 to 4
- Volume of each jar : 50 / 100 / 500 ml
- Working mode : 2 or 4 jar used at a time
- MOC Jar & balls : SS 304 / 316L
- Volume capacity: 50 ml to 2 Liter
- Speed Range: 0 to 500 RPM
- Speed control mode : Frequency
- Transmission mode : Gear drive
- Grinding Ball: Based on Applications
- Control Panel : Manual
- Input size : soft & crispy material < 10 mm, other material < 3mm
- Output granularity : maximum 0.1 micron



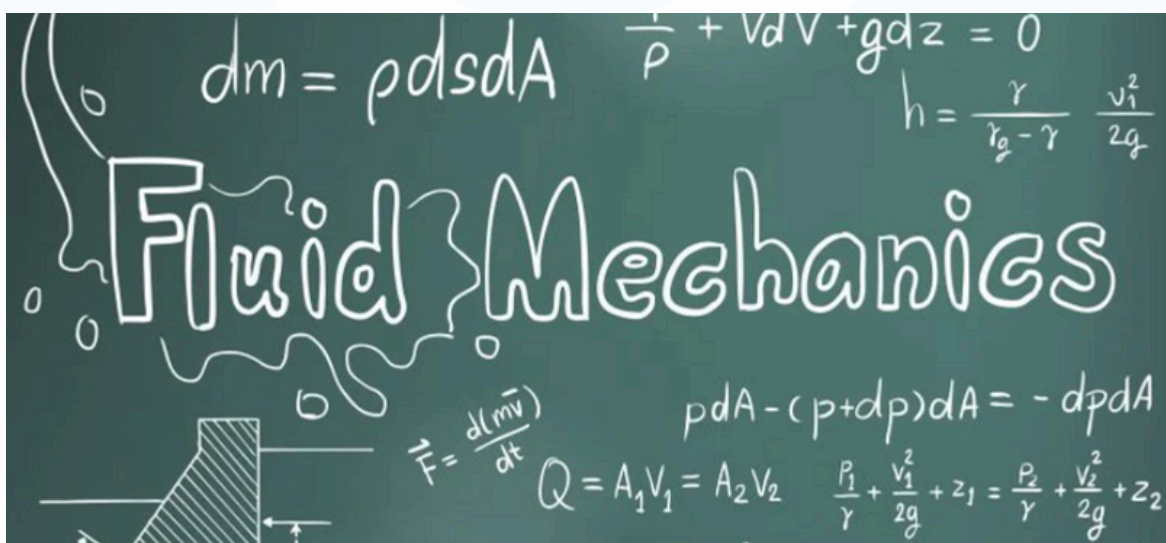
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Fluid Mechanics Lab

**"Where Precision Meets Creativity—
Transforming Complex Fluid Dynamics into
Practical Solutions and Innovative Designs."**



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Bernoulli's Theorem Apparatus



- Pump capacity : 0.25 to 1 Hp
- Single piece Transparent Acrylic Bernoulli's Test Section
- Piezometric Transparent tubes at different locations of Bernoulli's test section for pressure difference measurement
- Acrylic tanks at inlet and outlet of Bernoulli's test section for maintaining pressure head
- Measuring Scales for each piezometric tubes
- SS Measuring Tank
- Level Indicator
- Storage Reservoir Tank
- MS powder coated Structure
- Modular Structure with wheels

Flow Characteristics Apparatus (Bernoulli's, Venturi, Orifice and Rotameter) (Customizable)

- Pump capacity : 0.25 to 1 Hp
- Single piece Transparent Acrylic Bernoulli's and orifice Test Section
- Piezometric Transparent for pressure difference measurement
- CWC type Rotameter (available in different capacity)
- Venturi & orifice (Customizable size)
- Mercury (Hg) filled U-tube manometer
- SS Measuring Tank
- 50 Ltr water Storage Reservoir Tank
- MS powder coated Structure
- Modular Structure with wheels



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Major And Minor Losses In Pipes



- Pump capacity : 0.25 to 1 Hp (as per need)
- Different Pipes : 1" GI, 1/2" GI , 1" UPVC , 1/2" UPVC (Customizable)
- Different connections : Sudden expansion, Sudden contraction, Elbow, Bend, Valve (Customizable)
- By-pass for Flow control
- All in one connections Mercury (Hg) filled U-tube manometer
- SS Measuring Tank with level indicator
- 50 Ltr water Storage Reservoir Tank
- MS powder coated Structure
- Modular Structure with wheels

Centrifugal Pump Test Rig

- Centrifugal pump capacity : 0.5 to 2 Hp
- Transparent casing of pump for visualize cavitation and impeller
- Easy provision of impeller change
- Torque sensor, flow sensor, pressure sensor, temp. sensors
- Manual Control panel
- Fully automatic panel (optional)
- Data logging Via USB



Reciprocating Pump Test Rig

- Reciprocating pump capacity : 0.5 to 5 Hp (customizable)
- Pressure regulating Gate valve
- Pressure gauges and Rotameter
- 50 Ltr Water storage tank
- Bypass valve for flow control
- Manual Control panel
- RPM indicator
- Energy Meter
- Modular structure with wheels



Francis Turbine Test Rig



- Pump capacity : 1 to 10 Hp (as per need)
- Venturi section for flow measurement
- Rope brake Dynamometer with scalable load indicator
- Manual control panel
- Automatic control panel (optional)
- Digital flow meter (optional)
- VFD provision for water flow rate change
- Pressure gauges
- Digital pressure transmitter (optional)
- Safety measures: HP switch, Emergency switch
- Provision of guide vane angle change in turbine
- Tank with epoxy / PU / marine coating to reduce corrosion

Propeller Type Water Current Meter

- The rotation of the Water Current Meter is sensed by sensor & gives pulsed output signal.
- Operating Range: 0.3 to 3.5 Meters per second
- Accuracy: For velocities >0.3 m/s, 0.5% Full scale
- Velocity Indicator: Digital Water Velocity Indicator



Hydrokinetic Turbine Test Rig



- Easily replaceable turbine section.
- Turbine smoothly guided by pedestal bearings on both sides.
- Generator capacity: 50 W to 500 W (customizable).
- Generator and turbine coupled with a coupling for easy engagement and disengagement.
- Corrosion-resistant epoxy or PU color coating on the structure.
- Guide vane provision for inward flow (customizable)



Petroleum Engineering Lab

"Fueling the Future with Innovative Energy Solutions: Embrace the Power of Non-Conventional Sources"



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Tri-Axial Core Fracturing Test Unit

Precision meets reliability in every fracture



Specification

- Triaxial Pressure/force (Confining, Axial and Lateral)
- Core Holder MOC : SS 316L
- Customizable to fit core samples of various sizes Up to 6 Inches
- Air Driven Gas Booster Pump working Up to 15,000 psi
- Working Pressure Range: Up to 10,000 psi
- Water bath temperature Range: Up to 80 °C
- Hydraulic pumps working pressure Up to 10,000 psi (Servo operated Optional)
- Modular Design
- Consist of Vacuum Pump, Air Compressor
- Safety : Pressure Safety Valve, Overflow Point, Auto Pressure cutoff system & Air compressor

Learning Outcome

- Understand the core testing process.
- Comprehend the principles of core fracturing using a triaxial system.
- Analyze the effects of supercritical CO₂ (SC-CO₂) on rock fracture behavior.
- Learn to control and adjust pressure in a triaxial core system.
- Assess the impact of temperature variations on core fracturing.
- Utilize acoustic emission sensors to detect and analyze fracture events.
- Understand the significance of pressure variations in fracturing.
- Collect and analyze experimental data.

Application

- Academic and industrial research for geological studies and core testing.
- Applied in petroleum engineering for reservoir characterization and hydraulic fracturing.
- Geothermal energy, seismology & environment engineering research
- Integral to rock mechanics for fracture analysis and strength testing.



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Proppant Transport Test Rig

- Fully transparent acrylic/glass test section for visualization and analysis of experiments
- Used in hydraulic fracturing to transport and place proppants into fractures in subterranean formations.
- Agitator with motor for proper mixing
- Heater with Temperature Control
- Up to 100 Liter Insulated tank
- Manual Control valves
- Electro-magnetic flow meter
- Centrifugal pump
- Manual control panel



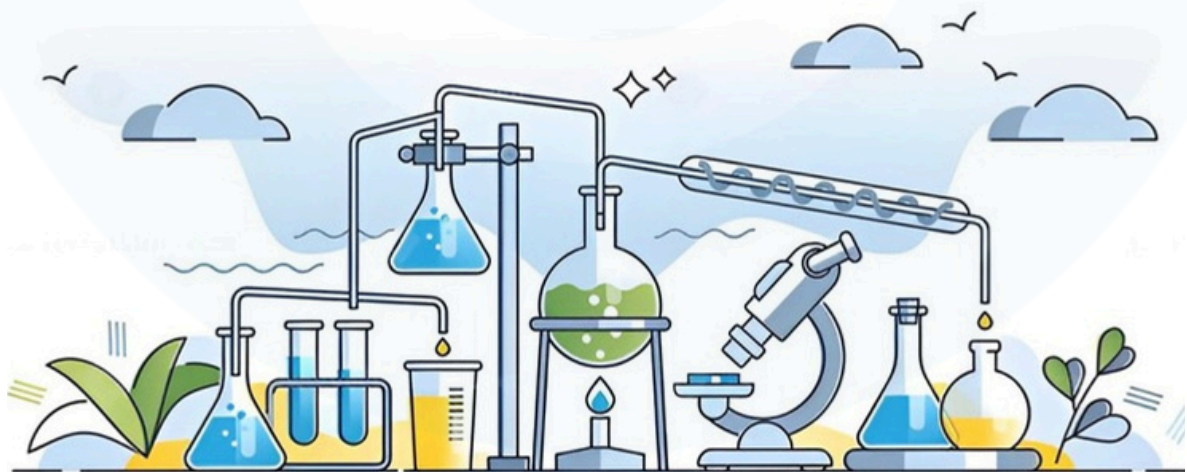
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Chemical / Chemistry Lab

**"Innovating at the Intersection of Chemistry
and Engineering to Create Sustainable
Solutions for Tomorrow's Challenges."**

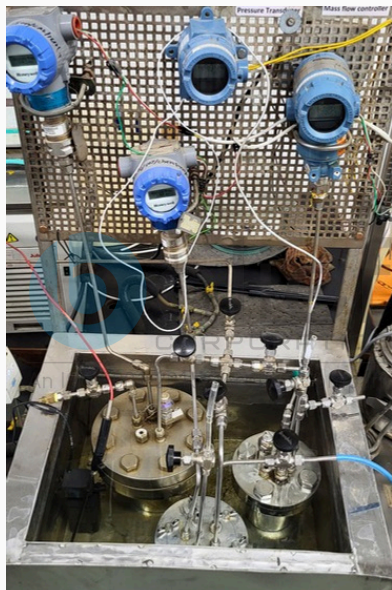


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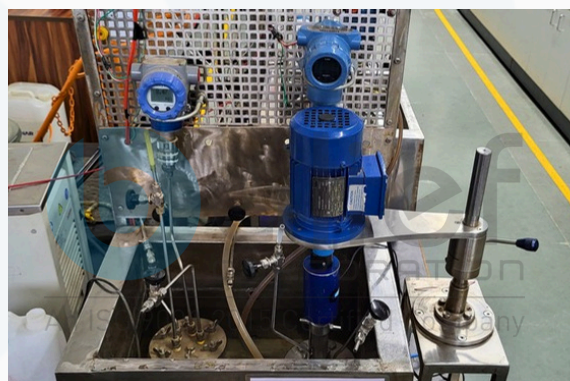
Vapour Liquid Equilibrium (VLE) Setup



- Temperature-controlled water bath
- Working Temperature Range: Up to 80 degree C
- Working Pressure Range: -1 to 140 Bar (customizable)
- MOC : SS 316L
- Volume: 50 ml to 2 Liter
- Equilibrium cell, buffer cell
- Pressure sensor with display , HART-type
- PT-100 Temperature sensor
- Manual control panel includes Data logger for pressure and temperature vis USB port

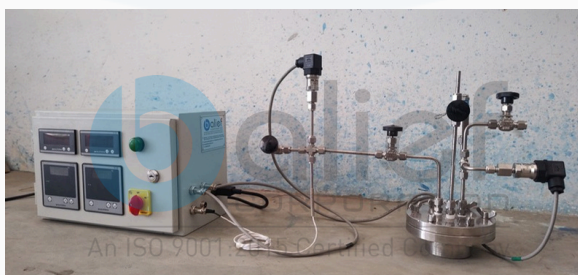
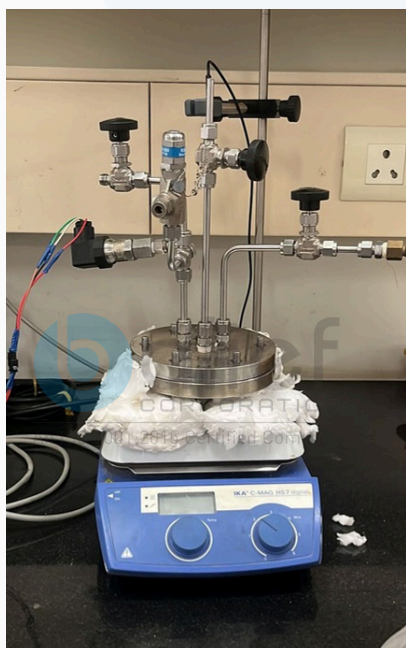
VLE Setup (Kinetic Reaction)

- Temperature-controlled water bath
- MOC: SS316L
- Kinetic reaction cell
- Twin blade Liquid / Gas stirring
- Magnetic seal
- High torque motor



Catalytic Reactor / Autoclave

- Hot Plate Magnetic stirrer reactor
- Reactor volume capacity: 40 - 150 ml (customizable)
- Reactor MOC: SS316L
- Gas inlet Needle valve
- Temperature and Pressure Monitoring
- Easy to Operate



High Temperature Reactor (Kinetic)



- Mechanical stirring
- Volume: 50 - 1 Ltr (Customizable)
- Motor speed controlled by VFD drive
- Temperature and Pressure Monitoring Display
- MOC of reactor : SS316L
- Jacketed reactor
- Circulator for High temperature
- Programmable controller
- High Torque Motor: 0.5 to 1 Hp



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Others Projects

**“Commitment to Excellence in Research:
Bridging Gaps Between Theoretical
Knowledge and Practical Applications for a
Better Future.”**



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Vacuum Curing Oven



Vibration Based Crack Detection In Pipe Test Rig



Customized Magnetic Stirrer



Smart Steam Disinfection Tunnel



Multi Purpose Control Panel (Customizable)



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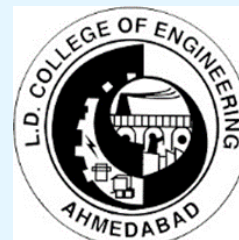
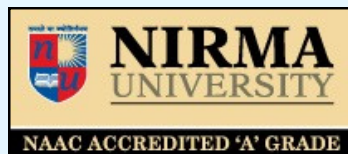
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Air Purifier



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