About Us

Analytical Equipment Solutions is a Mumbai-based company specializing in the manufacturing and supply of high-quality analytical equipment across India. As a trusted manufacturer, we produce ultrasonic baths and Probe sonicator, and supply a wide range of advanced laboratory tools including Orbital Shakers, Vortex Mixer, Hydraulic pressure, KBR die-sets/Pallet holders, DTC-controller oven/ Dry box, HPLC column pump, HPLC column oven, Digital liquid flow meter, Digital gas flow, meter, HPLC / GC and more.

We are also leaders in providing gas generation solutions, offering nitrogen gas generators, hydrogen gas generators, zero air generators, gas detectors, and complete operating systems.

Our commitment to quality, integrity, and customer satisfaction is at the core of everything we do. We strive to deliver innovative solutions that meet the highest standards of precision, performance, and reliability, ensuring our clients achieve excellence in their research and industrial applications.

1. **About Sonicator**

A sonicator is a laboratory instrument that uses ultrasonic energy to agitate particles in liquids. Sonicators are used for a variety of applications, including:

Cleaning: Loosens particles from surfaces

Mixing: Breaks molecular bonds to increase dissolution rate

Chemical reactions: Catalyzes certain chemical reactions

Biological experiments: Disrupts cell membranes to increase permeability

Degassing: Removes gases from liquids

Crystallization: Triggers crystallization processes

Sonicators work by creating vibrations in solutions, which leads to cavitation, or the formation of vacuum bubbles. These bubbles implode when they contact the samples, causing them to disperse and dissolve.

Sonicators are high-frequency tools that operate at frequencies above the range of human hearing to protect users. They are extremely loud devices and can be uncomfortable for the user and anyone nearby. To reduce noise, sonicators can be used with a sound enclosure that lines the interior with acoustical foam.

1. **HPLC**

HPLC (High-Performance Liquid Chromatography) is a powerful analytical technique used to separate, identify, and quantify the components of a mixture.

What is HPLC?

HPLC is a type of liquid chromatography that uses high pressure to push a solvent through a column filled with a stationary phase, allowing for the separation of compounds based on their chemical properties.

How does HPLC work?

1. Injection: A sample is injected into the HPLC system.

2. Separation: The sample is carried through the column by a solvent (mobile phase) and separated into its individual components based on interactions with the stationary phase.

3. Detection: The separated components are detected by a detector, which measures their absorbance or fluorescence.

4. Data analysis: The detector output is plotted as a chromatogram, showing the retention time and intensity of each component.

Types of HPLC:

1. Reverse Phase HPLC (RP-HPLC): Separates non-polar compounds.

2. Normal Phase HPLC (NP-HPLC): Separates polar compounds.

3. Size Exclusion Chromatography (SEC): Separates compounds based on size.

4. Ion Exchange Chromatography (IEC): Separates compounds based on charge.

Applications of HPLC:

1. Pharmaceutical analysis (e.g., purity testing)

2. Biotechnology (e.g., protein purification)

3. Food and beverage analysis (e.g., contaminants, nutrients)

4. Environmental monitoring (e.g., pesticide residues)

5. Forensic analysis (e.g., toxicology testing)

Advantages of HPLC:

1. High sensitivity and specificity

2. Ability to separate complex mixtures

3. Quantitative analysis

4. Fast analysis times

Limitations of HPLC:

1. Requires specialized equipment and training

2. Can be expensive

3. Limited to liquid samples

Common HPLC detectors:

1. UV-Vis detector

2. Fluorescence detector

3. Mass spectrometry (MS) detector

4. Evaporative Light Scattering (ELSD) detector

Common HPLC columns:

1. C18 (reverse phase)

2. C8 (reverse phase)

3. Silica (normal phase)

4. Ion exchange resins

1. **GC**

GC (Gas Chromatography) is an analytical technique used to separate, identify, and quantify the components of a mixture based on their boiling points and affinity for a stationary phase.

How GC Works:

1. Injection: A sample is injected into the GC system.

2. Vaporization: The sample is vaporized in the injection port.

3. Separation: The vaporized sample is carried through a column by an inert gas (mobile phase).

4. Stationary Phase: The column is coated with a stationary phase that interacts with the sample components.

5. Detection: The separated components are detected by a detector.

Components of GC:

1. Injector

2. Column (capillary or packed)

3. Detector (e.g., FID, ECD, MS)

4. Oven (temperature control)

5. Data system (chromatogram display)

Types of GC:

1. Gas-Liquid Chromatography (GLC)

2. Gas-Solid Chromatography (GSC)

3. Capillary GC

4. Fast GC

5. Two-Dimensional GC (GCxGC)

GC Applications:

1. Environmental monitoring (air, water, soil)

2. Pharmaceutical analysis (purity, potency)

3. Food and beverage analysis (contaminants, additives)

4. Forensic analysis (toxicology, explosives)

5. Petrochemical analysis (fuel, oil)

GC Detectors:

1. Flame Ionization Detector (FID)

2. Electron Capture Detector (ECD)

3. Mass Spectrometry (MS) Detector

4. Thermal Conductivity Detector (TCD)

5. Nitrogen-Phosphorus Detector (NPD)

Advantages of GC:

1. High sensitivity and specificity

2. Fast analysis times

3. Ability to separate complex mixtures

4. Quantitative analysis

5. Low operational costs

Limitations of GC:

1. Requires volatile samples

2. Limited to thermal stability

3. Requires specialized equipment and training

4. Column bleed and contamination

Common GC Columns:

1. Non-polar columns (e.g., DB-1)

2. Polar columns (e.g., DB-WAX)

3. Chiral columns (for enantiomer separation)

4. Packed columns

GC vs. HPLC:

1. GC: Suitable for volatile, thermally stable compounds.

2. HPLC: Suitable for non-volatile, thermally labile compounds.

1. Liquid flow Meter (LFM)

A Liquid Flow Meter for HPLC measures the flow rate of the mobile phase (solvent) through the HPLC system.

Types of Liquid Flow Meters for HPLC:

1. Mass Flow Meters

2. Volumetric Flow Meters

3. Differential Pressure Flow Meters

4. Ultrasonic Flow Meters

5. Coriolis Flow Meters

Principles of Operation:

1. Measure the volume or mass of liquid passing through the meter

2. Detect changes in pressure, temperature, or density

3. Use sensors to detect flow rates

Key Features:

1. High accuracy and precision

2. Low flow rates (typically 0.01-10 mL/min)

3. Compatibility with various solvents and chemicals

4. Compact design for integration into HPLC systems

5. Digital or analog output for data acquisition

Applications in HPLC:

1. Flow rate monitoring and control

2. Pump calibration and validation

3. System optimization and troubleshooting

4. Method development and validation

5. Quality control and regulatory compliance

Benefits:

1. Improved chromatographic resolution and separation

2. Enhanced system stability and reliability

3. Increased accuracy and precision in quantitation

4. Reduced downtime and maintenance

5. Compliance with regulatory requirements

Common Brands:

1. Analytical Equipment Solutions
2. Vkit

Specifications to Consider:

1. Flow rate range

2. Accuracy and precision

3. Repeatability

4. Response time

5. Compatibility with solvents and chemicals

6. Operating temperature and pressure range

Installation and Maintenance:

1. Install in-line with the HPLC system

2. Calibrate and validate regularly

3. Clean and maintain according to manufacturer's instructions

4. Replace worn or damaged parts

1. **Gas Flow meter**

A Gas Flow Meter measures the flow rate of gases, typically in industrial, scientific, and medical applications.

Types of Gas Flow Meters:

1. Differential Pressure Flow Meters

2. Thermal Mass Flow Meters

3. Vortex Flow Meters

4. Ultrasonic Flow Meters

5. Coriolis Flow Meters

6. Rotameters

7. Gas Mass Flow Controllers

Principles of Operation:

1. Measure pressure drop across a constriction

2. Detect temperature changes

3. Use ultrasonic waves to measure velocity

4. Measure Coriolis force

5. Detect changes in vortex shedding frequency

Key Features:

1. High accuracy and precision

2. Low flow rates (typically 0-100 SLPM)

3. Compatibility with various gases

4. Compact design

5. Digital or analog output

Applications:

1. Industrial processes (e.g., manufacturing, chemical processing)

2. Scientific research (e.g., laboratory, environmental monitoring)

3. Medical devices (e.g., anesthesia machines, ventilators)

4. Aerospace and defense

5. Energy and utilities

Uses:

1. Flow rate monitoring and control

2. Leak detection

3. Gas mixing and blending

4. Calibration and validation

5. Quality control and regulatory compliance

6. Energy management

7. Process optimization

Benefits:

1. Improved process efficiency

2. Increased accuracy and precision

3. Enhanced safety

4. Reduced waste and costs

5. Compliance with regulatory requirements

Common Brands:

1. Analytical Equipment Solutions
2. VKit

Specifications to Consider:

1. Flow rate range

2. Accuracy and precision

3. Repeatability

4. Response time

5. Gas compatibility

6. Operating temperature and pressure range

Installation and Maintenance:

1. Install in-line with the process

2. Calibrate and validate regularly

3. Clean and maintain according to manufacturer's instructions

4. Replace worn or damaged parts

1. **probe Sonicator**

**A Probe Sonicator, also known as an Ultrasonic Probe or Sonication Probe, is a laboratory device used to disrupt, emulsify, or homogenize materials using high-frequency sound waves.**

**How it Works:**

**1. Generates ultrasonic waves (typically 20-40 kHz)**

**2. Creates cavitation bubbles in the sample**

**3. Bubble collapse produces intense mechanical and thermal effects**

**4. Disrupts cellular structures, DNA, or protein complexes**

**Types of Probe Sonicators:**

**1. Direct Probe Sonicators: Immersed in the sample**

**2. Indirect Probe Sonicators: Use a water bath or coupling medium**

**3. Microtip Probe Sonicators: For small sample volumes**

**4. High-Intensity Probe Sonicators: For tough or viscous samples**

**Uses:**

**1. Cell lysis and disruption (e.g., protein extraction)**

**2. DNA/RNA shearing and fragmentation**

**3. Protein denaturation and unfolding**

**4. Emulsification and homogenization**

**5. Nanoparticle synthesis and dispersion**

**6. Tissue homogenization**

**7. Sample preparation for chromatography or PCR**

**8. Cleaning and degassing surfaces**

**Applications:**

**1. Molecular biology and genetics**

**2. Biochemistry and proteomics**

**3. Pharmaceutical research and development**

**4. Biotechnology and cell culture**

**5. Food and beverage processing**

**6. Environmental monitoring and remediation**

**7. Materials science and nanotechnology**

**Benefits:**

**1. Efficient sample preparation**

**2. Reduced processing time**

**3. Improved yield and quality**

**4. Enhanced reproducibility**

**5. Gentle and non-thermal processing**

**Common Brands:**

**1. QSonica**

**2. Misonix**

**3. Hielscher**

**4. Sonics & Materials**

**5. BioSpec Products**

**Specifications to Consider:**

**1. Frequency and power output**

**2. Probe size and material**

**3. Sample volume capacity**

**4. Temperature control**

**5. Pulser or continuous operation**

**Safety Precautions:**

**1. Wear protective gloves and eyewear**

**2. Avoid direct contact with the probe**

**3. Use in a well-ventilated area**

**4. Follow manufacturer's guidelines**

1. **Hplc coloum washing pump**

**A High-Performance Liquid Chromatography (HPLC) column washing pump is a device used to clean and maintain HPLC columns.**

**Purpose:**

**The primary function of an HPLC column washing pump is to:**

**1. Remove contaminants and impurities from the column.**

**2. Regenerate the column's stationary phase.**

**3. Maintain column performance and extend its lifespan.**

**Working Principle:**

**The pump works by:**

**1. Circulating a washing solvent through the column.**

**2. Forcing the solvent through the column at high pressure.**

**3. Removing impurities and contaminants from the column.**

**Types of Washing Pumps:**

**1. Isocratic pumps: Deliver a constant flow rate.**

**2. Gradient pumps: Deliver varying flow rates and solvent compositions.**

**Applications:**

**HPLC column washing pumps are used in:**

**1. Pharmaceutical analysis**

**2. Biotechnology**

**3. Food and beverage testing**

**4. Environmental monitoring**

**5. Research and development**

**Benefits:**

**1. Improved column performance**

**2. Increased column lifespan**

**3. Enhanced chromatographic resolution**

**4. Reduced maintenance costs**

**5. Increased laboratory productivity**

**Common Washing Solvents:**

**1. Acetonitrile**

**2. Methanol**

**3. Water**

**4. Buffer solutions**

**5. Detergents**

1. **Orbital Shaker**

**An Orbital Shaker is a laboratory device used to mix, blend, or aerate samples in various containers, such as tubes, flasks, or plates.**

**How it Works:**

**1. Circular motion (orbital shaking) creates turbulence**

**2. Mixes samples thoroughly and evenly**

**3. Adjustable speed and amplitude**

**Types of Orbital Shakers:**

**1. Analog Orbital Shakers**

**2. Digital Orbital Shakers**

**3. Incubated Orbital Shakers**

**4. Refrigerated Orbital Shakers**

**5. Microplate Orbital Shakers**

**Uses:**

**1. Cell culture and microbiology**

**2. Molecular biology and PCR**

**3. Biochemistry and protein assays**

**4. Immunology and ELISA**

**5. Pharmaceutical research and development**

**6. Food and beverage testing**

**7. Environmental monitoring**

**Applications:**

**1. Mixing and blending samples**

**2. Aeration and oxygenation**

**3. Incubation and temperature control**

**4. Cell growth and cultivation**

**5. Solubilization and extraction**

**6. Homogenization and emulsification**

**Benefits:**

**1. Efficient mixing and aeration**

**2. Improved sample uniformity**

**3. Reduced processing time**

**4. Increased accuracy and reproducibility**

**5. Compact and space-saving design**

**Specifications to Consider:**

**1. Shaking speed (RPM)**

**2. Orbital diameter (mm)**

**3. Temperature range (°C)**

**4. Capacity (number of samples)**

**5. Noise level and vibration**

**Safety Precautions:**

**1. Secure containers and samples**

**2. Avoid overloading**

**3. Use protective gloves and eyewear**

**4. Follow manufacturer's guidelines**

1. **Hydraulic press**

**A hydraulic press machine for pharmaceutical applications is a device used to compress, form, or shape various materials, such as powders, granules, or tablets, in the pharmaceutical industry.**

**In pharma, hydraulic press machines are commonly used for:**

**1. Tablet compression: Forming tablets from powder or granule mixtures.**

**2. Capsule filling: Compressing powder or granules into capsule shells.**

**3. Pellet production: Creating uniform pellets for controlled release formulations.**

**Key features of hydraulic press machines for pharma:**

**1. High compression force**

**2. Precise control over pressure and compression**

**3. Sanitary design for easy cleaning**

**4. Compliance with regulatory standards (e.g., cGMP, FDA)**

**Types of hydraulic press machines used in pharma:**

**1. Single-station presses**

**2. Multi-station presses**

**3. Rotary presses**

**4. Laboratory-scale presses**

**Some notable manufacturers of hydraulic press machines for pharma include:**

**1. Fette Compacting**

**2. Kilian**

**3. Manesty**

**4. Thomas Engineering**

1. **Vortex mixer**

**A vortex mixer, also known as a vortex shaker or vortexer, is a laboratory equipment used to mix and blend substances thoroughly, particularly in small volumes. Here's how it works and its uses:**

**Working Principle:**

**1. The device has a motor that creates a rapid rotational motion.**

**2. When a test tube or other container is placed on the mixer, the motor's rotation creates a vortex, which is a spinning motion of the liquid.**

**3. This vortex action thoroughly mixes the contents of the container.**

**Uses:**

**1. Mixing small volumes of liquids, such as samples, reagents, or solutions.**

**2. Blending cells, tissues, or biological samples with solvents or buffers.**

**3. Resuspending pellets or precipitates.**

**4. Emulsifying or homogenizing mixtures.**

**5. Preparing solutions, suspensions, or emulsions.**

**Vortex mixers are essential tools in various laboratories, including:**

**1. Biological research**

**2. Chemistry**

**3. Biochemistry**

**4. Molecular biology**

**5. Pharmaceutical research**

**They're also used in educational institutions, hospitals, and industrial settings.**

1. **nitrogen generator**

**A nitrogen generator is a device designed to produce nitrogen gas (N2) from compressed air. Here's how it works and its common applications:**

**How it works:**

**1. Air is compressed and filtered to remove impurities.**

**2. The compressed air is then separated into nitrogen and oxygen through one of two methods:**

**- Pressure Swing Adsorption (PSA): Uses carbon molecular sieves or zeolites to selectively adsorb oxygen.**

**- Membrane Separation: Uses semi-permeable membranes to separate nitrogen from oxygen.**

**3. The resulting nitrogen gas is then collected and stored for use.**

**Uses:**

**1. Food packaging and storage: To remove oxygen and preserve food freshness.**

**2. Laser cutting: As a assist gas to improve cutting quality.**

**3. Pharmaceuticals: To blanket sensitive materials and prevent degradation.**

**4. Chemical processing: As a inert gas for reactions and storage.**

**5. Oil and gas industry: For enhanced oil recovery and pipeline purging.**

**6. Aerospace: To purge fuel tanks and pipelines.**

**7. Wine and beverage industry: To preserve wine and beverages.**

1. **Hydrogen generator**

**A hydrogen generator is a device that produces hydrogen gas (H2) through various methods. Here's how it works and its applications:**

**Working Principle:**

**Hydrogen generators typically employ one of the following methods to produce hydrogen:**

**1. Electrolysis: Water (H2O) is split into hydrogen and oxygen using electricity. This process involves passing an electric current through water, causing hydrogen ions to be released at the cathode (negative electrode) and oxygen at the anode (positive electrode).**

**2. Steam Methane Reforming: High-temperature steam reacts with methane (CH4) or other hydrocarbons to produce hydrogen and carbon dioxide.**

**3. Partial Oxidation: Hydrocarbons are reacted with oxygen to produce hydrogen and carbon monoxide.**

**4. Biological Methods: Microorganisms break down organic matter to produce hydrogen.**

**Types of Hydrogen Generators:**

**1. Alkaline Electrolyzers: Use potassium hydroxide (KOH) or sodium hydroxide (NaOH) as an electrolyte.**

**2. Proton Exchange Membrane (PEM) Electrolyzers: Use a special membrane to separate hydrogen and oxygen.**

**3. Solid Oxide Electrolyzers: Use a solid oxide material as the electrolyte.**

**Applications:**

**Hydrogen generators are used in various industries and applications:**

**1. Fuel Cells: Hydrogen is used as a clean energy source for fuel cells, powering electric vehicles, backup power systems, and portable electronics.**

**2. Power Generation: Hydrogen can be used to generate electricity in gas turbines, internal combustion engines, or fuel cells.**

**3. Industrial Processes: Hydrogen is used in chemical synthesis, petroleum refining, and metal production.**

**4. Transportation: Hydrogen fuel cell electric vehicles (FCEVs) offer a zero-emission alternative to traditional vehicles.**

**5. Energy Storage: Hydrogen can be stored and used as a buffer for intermittent renewable energy sources.**

**6. Laboratory and Medical Applications: Hydrogen generators provide a reliable source of high-purity hydrogen for laboratory equipment, such as gas chromatography.**

**7. Welding and Cutting: Hydrogen is used as a shielding gas in welding and cutting processes.**

**Benefits:**

**1. Zero Emissions: Hydrogen production and combustion produce only water vapor and heat as byproducts.**

**2. Renewable Energy Source: Hydrogen can be produced from renewable energy sources, reducing dependence on fossil fuels.**

**3. Energy Efficiency: Hydrogen fuel cells offer higher efficiency than traditional power generation methods.**

1. **Zero air generator**

**A Zero Air Generator (ZAG) is a device used to produce high-purity air, essentially free from impurities and contaminants, particularly hydrocarbons and other volatile organic compounds (VOCs). Here's how it works and its uses:**

**Working Principle:**

**A Zero Air Generator typically employs a combination of technologies to remove impurities from compressed air:**

**1. Catalytic oxidation: Converts hydrocarbons and VOCs into carbon dioxide and water.**

**2. Adsorption: Removes remaining impurities through activated carbon, molecular sieves, or other adsorbent materials.**

**3. Filtration: Uses high-efficiency filters to remove particulates and remaining contaminants.**

**Uses:**

**Zero Air Generators are commonly used in:**

**1. Gas Chromatography (GC): Provides carrier gas and makeup gas for GC instruments.**

**2. Mass Spectrometry (MS): Supplies clean air for MS instruments.**

**3. Laboratories: Supports various analytical instruments and experiments requiring ultra-pure air.**

**4. Industrial processes: Provides clean air for manufacturing, food processing, and pharmaceutical applications.**

**5. Environmental monitoring: Helps in air quality monitoring and sampling.**

**6. Calibration and testing: Used to calibrate air quality monitoring instruments and test equipment.**

**Zero Air Generators ensure accurate analytical results, reduce instrument maintenance, and minimize contamination risks in various industries and applications.**