



UGC RECOGNIZED

**PDEU** PANDIT  
DEENDAYAL  
ENERGY  
UNIVERSITY

Formerly Pandit Deendayal Petroleum University (PDPU)



# SCHOOL OF ENERGY TECHNOLOGY

## Department of Chemical Engineering

### Name of Center of Excellence : Centre for Biofuel and Bioenergy Studies

[www.pdeu.ac.in](http://www.pdeu.ac.in)

## NAME OF EQUIPMENT :

Ultrasound Reactor

### Specifications

- **Power:** 750 W
- **Frequency:** 20 KHz
- Energy and temperature set-point control
- Digital wattmeter
- Automatic tuning
- 10 hour process timer
- Independent on/off pulser
- Variable power output control
- 13 mm (1/2") Probe

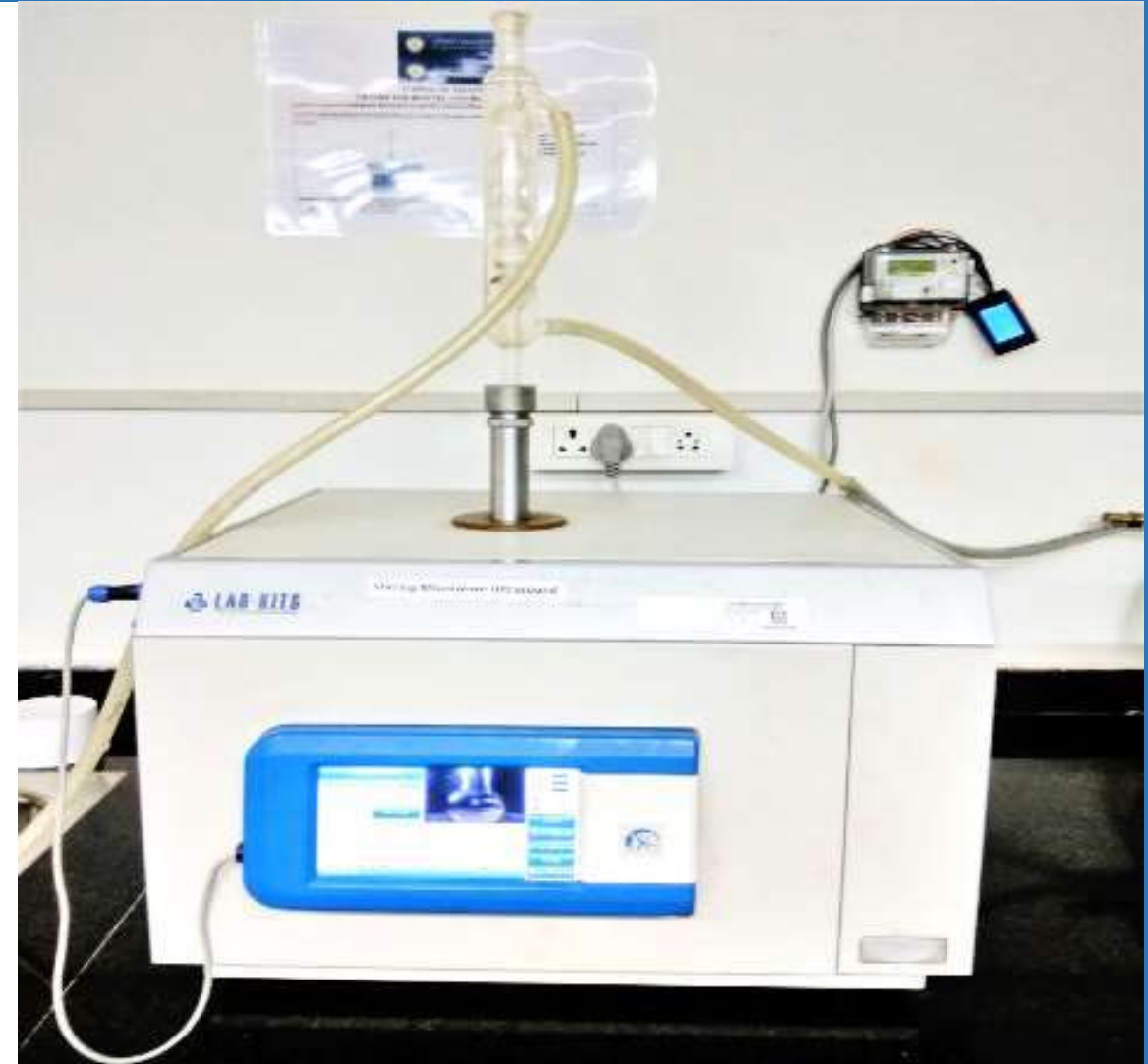


## NAME OF EQUIPMENT :

Hybrid (US+MW) Reactor

### Specifications

- **Microwave Power:** 10-800 W (adjustable)
- **Microwave Frequency:** 2450 MHz
- **Ultrasonic Power:** 50W
- **Ultrasonic Frequency:** 40kHz
- **Reactor chamber:** 27 L
- **Dimensions of chamber:** 0.43 m × 0.51 m × 0.51 m
- **Temperature sensor**



## NAME OF EQUIPMENT :

Microwave (MW) Reactor

### Specifications

- **Model:** CE102VD
- **Capacity:** 28L
- **Output Power:** 900 Watts
- **Power Level:** 6 (100,180,300,450,600, 900 Watts)



## NAME OF EQUIPMENT :

Hydrodynamic Cavitation (HC) Reactor

### Specifications

- **Capacity:** 10 L/Batch
- **Pressure:** Upto 4 bar
- **Pump:** 0.5 hp
- **Cavitation device:** Nozzle
- **Nozzle dia.:** 1 mm
- **Electric heater:** 1 kW
- **Height:** 2.5 m
- **Floor area:** 0.8×0.4 m<sup>2</sup>
- **Control Panel:** Comprehensive control and monitoring.
- **Temperature Sensors:** Multiple sensor locations for accurate data



## NAME OF EQUIPMENT :

Sequential Reactor

### Specifications

- **Capacity:** 20 L/Batch
- **Ultrasonic Generator**
- **Ultrasound (Frequency:** 20 kHz and 40 kHz;  
**Power:** 600 W)
- **Microwave (Power:** 1000 W)
- **Mechanical Stirrer (Speed range:** 0-5000 RPM)
- **Water tank:** 20 L
- **Floor area:** 1.5×0.5 m<sup>2</sup>
- **Control Panel:** Comprehensive control and monitoring.
- **Temperature Sensors:** Multiple sensor locations for accurate data

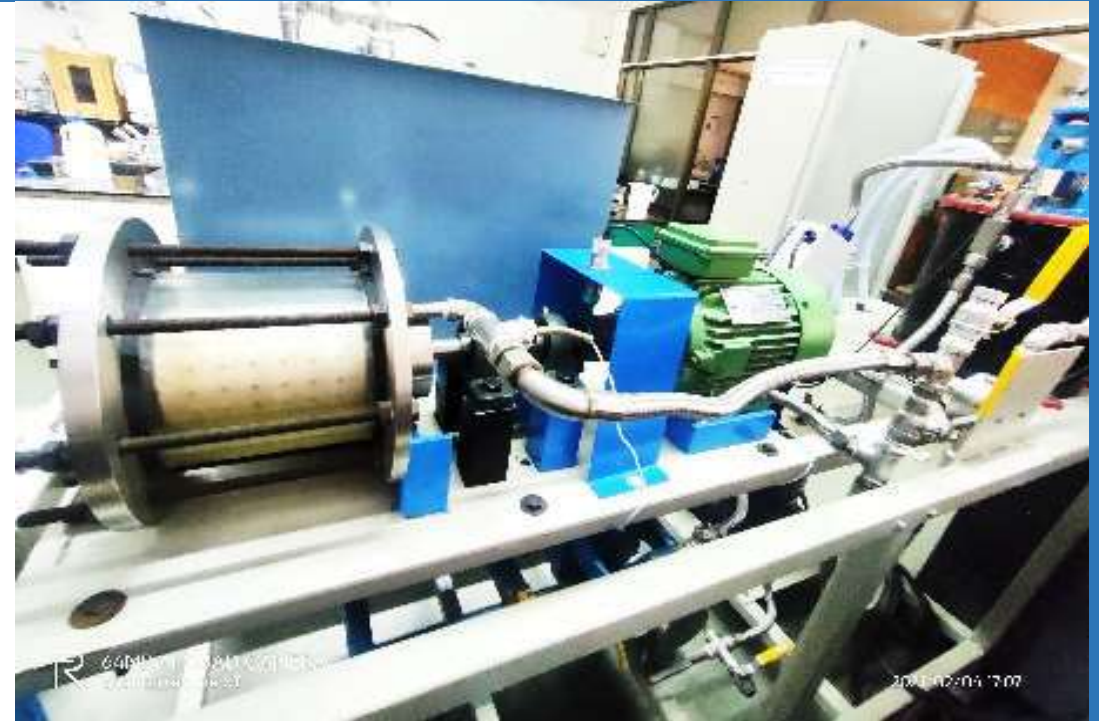


## NAME OF EQUIPMENT :

Shockwave Power Reactor

### Specifications

- **Capacity:** 15 L/Batch
- **Shockwave power reactor motor:** Power: 1 hp/0.75 Kw; Motor speed: 2845 RPM
- **Stirrer motor:** Power: 0.5 hp; Motor speed: 1440 RPM
- **Orifice device:** 1 mm hole dia., 25 number of holes
- **Main pump:** Power: 3 hp; Motor speed: 1425 rpm
- **Control Panel:** Comprehensive control and monitoring
- **Temperature Sensors:** Multiple sensor locations for accurate data



## NAME OF EQUIPMENT :

High speed Grinder

### Specifications

- **Make:** Balief corporation
- **Grinder make:** Celfrost blender
- **Speed range:** 6000-28000 RPM
- **Capacity:** 2 L/batch
- **Power:** 1.6 kW
- **Number of speed:** 7
- **Digital non-contact tachometer:** Range: 60 to 100000 RPM; Accuracy:  $\pm 0.05$  %
- **Temperature sensor**
- **Cooling Fan:** Power: 1/7 hp; Motor speed: 1425 RPM



## NAME OF EQUIPMENT :

Hydrodynamic cavitation reactor (Shell project)

### Specifications

- **Capacity:** 100 L/Batch
- **Pressure:** Upto 7 bar
- **Cavitation device:** Orifice & Venturi
- **Hole dia. of orifice:** 1 mm
- **Throat dia. of venturi:** 3 mm
- **MOC of two tanks, piping, agitator (most parts):** SS 316
- **MOC of frame:** Mild Steel
- **Insulation thickness & material:** 1" & fibreglass
- **Jacket fluid:** Thermic oil
- **Pumps:** Double diaphragm pump & centrifugal pump
- **Control Panel:** Comprehensive control and monitoring.
- **Temperature Sensors:** Multiple sensor locations for accurate data



## NAME OF EQUIPMENT :

Autoclave reactor

### Specifications

- **Capacity:** 250 ml
- **Vessel design pressure:** 300 bar
- **Vessel design temperature:** 400 °C
- **Stirrer:** 4 bladed turbine with 100-1450 RPM
- **Supply voltage:** 1 Phase, 220 V AC
- **Floor area:** 0.8× 0.4 m<sup>2</sup>
- **Control Panel:** Comprehensive control and monitoring.



**NAME OF EQUIPMENT :**  
Oil Press Machine)

**Specifications**

- **Model number:** EPS TC 602
- **Capacity:** 4-8 kg/hr
- **Voltage:** 220 V
- **Motor Power:** 250 W
- **Wattage:** 600 W
- **Heater Power:** 350 W
- **Net weight:** 11.5 kg



## NAME OF EQUIPMENT : High Speed Homogenizer)

### Specifications

- **Model:** IKA T25 ULTRA TURAX
- **Homogenizer capacity:** 2 Litre
- **3 neck jacketed reactor capacity:** 800 ml
- **Power input:** 800 W
- **Speed range:** 3000-25000 RPM
- **Temperature sensor:** One temperature sensor for mixture
- **Reflux Condenser (water cooled):** 300 mm size
- **Dimensions:** 87 x 271 x 106 mm
- **Speed deviation:** 1%



## NAME OF EQUIPMENT :

Flash Point Tester

### Specifications

- **Model:** PMA5
- **ASTM Standard:** ASTM D93
- **Application range:** up to 405 °C
- **Ignition:** Gas and electric (interchangeable)
- **Cooling:** forced air (fan)
- **Flash detection:** Thermocouple
- **Barometric pressure correction:** Automatic correction
- **Safety:** Overheat protection, automatic shut-off, fire-extinguishing system, password
- **Interfaces:** 3x USB, 1x RS232, 1x LAN
- **Gas supply:** 50 mbar of propane or butane



## NAME OF EQUIPMENT :

Water Purification System

### Specifications

- **Make:** Elga, England
- **Source quality:** Portable mains water supply
- **TDS maximum:** 1400  $\mu\text{S}/\text{cm}$
- **Free chlorine maximum:** 0.5 ppm
- **Heavy metals maximum:** 0.05 ppm
- **Silica maximum:** 30 ppm
- **Temperature:** 1-35 °C
- **Flowrate (max. requirement):** 78 l/hr
- **Height xWidth xDepth:** 460x550x270 mm



## NAME OF EQUIPMENT :

Remi Research Centrifuge

### Specifications

- **Make:** Remi Elektrotechnik LTD
- **Model:** R-23
- **Maximum speed:** 6900 rpm
- **Speed meter:** 0-9900 rpm
- **Power supply:** 230 V, 1 Phase
- **Maximum tube size:** 200 ml
- **Maximum capacity:** 1200 ml
- **Width ×Depth ×Height:** 400×500×455 mm



## NAME OF EQUIPMENT :

Bomb Calorimeter

### Specifications

- **Permissible ambient temperature:** 20 - 25 °C
- **Permissible relative humidity:** 80 %
- **Power input:** 120 W
- **Sample size:** 1 gm
- **ASTM standard:** ASTM D4868



## NAME OF EQUIPMENT :

Oxidative Stability Test Unit

### Specifications

- **ASTM Standards:** ASTM D 7467
- **Two individually heated aluminum heating blocks**
- **Temperature range:** 50 - 150 °C, can be set in steps of 1 °C
- **Gas flow range:** 1 - 25 L/h
- **Conductivity measurement:** 0 - 400  $\mu\text{S}/\text{cm}$
- **Interface:** USB



## NAME OF EQUIPMENT :

Potentiometric Auto Titration

### Specifications

- **Model number:**  $\mu$ 848 Titrino Plus
- **Brand:** Metrohm
- **Measuring cycle:** 100 ms
- **Dosing drive:** 10,000 Steps per cylinder volume
- **Aqueous and non-aqueous acid/base titrations**
- **Measuring temperature range:** -150 to 250 °C



## NAME OF EQUIPMENT :

Brookfield Viscometer

### Specifications

- **Model:** DV2LT
- **5-inch full color, touch screen display supports multiple languages**
- **Displayed info includes**
  - Viscosity (cP/mP·s)
  - Temp. (°C/°F), (Range: max. 100 °C)
  - Shear rate/stress, % torque, spindle/speed, Step program status
- **Viscosity rpm:** 0.1-200 RPM
- **Accuracy:** ±1% range
- **Repeatability:** ±0.2%
- **USB PC interface**



## NAME OF EQUIPMENT :

Karl Fischer Titrator

### Specifications

- **Model number:**  $\mu$ AquaCal100
- **Make:** Analab
- **HSN Code:** 90278990
- Suitable for any type of fuel
- **Method of detection:** Conductometric/ Volumetric
- **Display of reading:** Moisture in ppm & percentage (%)
- **Range of moisture detection:** More than 100 ppm
- **ASTM Standard:** ASTM D6304

