



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 : Carbon Capture, Utilization and Sequestration (CCUS)

www.pdeu.ac.in

NAME OF EQUIPMENT :

Multi Batch Equilibrium Reactor

Specifications

- **Application:** CO₂ equilibrium solubility (Vapour –Liquid equilibrium) measurement at absorber condition
- **Pressure:** 0.01- 100 kPa,
- **Pressure transmitter Make:** Honeywell
- **Temperature transmitter Make:** Honeywell
- **Temperature:** 20 – 60 °C
- **Stirring:** Magnetic stirrer
- **Solution:** any liquid or liquid mixture.
- **Design patent granted:** Patent No: 580705



NAME OF EQUIPMENT :

High temperature VLE reactor

Specifications

- CO₂ equilibrium solubility measurement at regulator (high temperature VLE) condition
- **Pressure:** 1- 50 kPa,
- **Temperature:** 100 – 150 °C.
- **Solution:** any liquid
- **Reactor Volume:** 750 ml
- **Circulation fluid:** Silicone oil
- **Rotor RPM:** Up to 1000 rpm



NAME OF EQUIPMENT :

Kinetic reactor

Specifications

- **Determination:** temperature dependency of the reaction rate.
- **Physical solubility** of N_2O in amine solvents.
- **Temperature:** 30-60°C
- **Pressure:** 0-5 bar
- **Reactor Volume:** 500 ml
- **RPM:** Up to 1000



NAME OF EQUIPMENT :

CO₂ capture pilot plant and its components

Specifications

- **Plant Capacity:** 1 ton per day
- **Gas Flow rate:** 1500-3500 lpm
- **Liquid Flow rate:** 4-50 lpm
- **L/G ratio:** 1-3
- **Reboiler temperature:** 110-130°C
- **Height of absorber:** 4m
- **Height of regenerator:** 2m
- This pilot plant having a liquid handling system with feed tanks, Absorbers, Strippers, Lean-rich heat exchangers, condensers, Liquid and Gas handling system : pilot plant



NAME OF EQUIPMENT :
Oxidative Degradation reactor

Specifications

- **Reactor Volume:** 750 ml
- **Impringer Volume:** 100 ml
- **Condenser Type:** Double Helix
- **Temperature Range:** 30 to 80 °C
- **Heating system:** Magnetic stirrer with hot plate
- **Humidizer Reactor Capacity:** 1 lit
- **Air Pump capacity:** 5-50 lpm



NAME OF EQUIPMENT : Thermal Degradation reactors

Specifications

- **Determination:** Thermal stability of solvent systems
- **Temperature Range:** 50-250 °C
- **Pressure:** Up to 10 bar
- **Volume:** 30 ml



NAME OF EQUIPMENT :

Digital Density and Concentration meter

Specifications

- **Instrument Name:** Anton Paar DMA 4500M
- **Density Range:** 0 to 3000 kg/m³
- **Temperature Range:** 0 to 100 °C
- **Accuracy:** 0.05 kg/m³
- **Temperature Accuracy:** 0.1 °C



NAME OF EQUIPMENT :

Cannon Fenske Viscometers and Viscosity bath

Specifications

- **Instrument Name:** Cannon Fenske Viscometer and viscometer bath
- **Viscosity Range:** 0.5 to 30 cP
- **Temperature Range:** 20 to 80 °C
- **Accuracy of viscometer constant:** 2%
- **Temperature Accuracy:** 0.1 °C



NAME OF EQUIPMENT :

Digital Surface Tensiometer

Specifications

- **Make:** Kyowa
- **Model:** DY-300
- **Measuring Method:** Whilhelmy Plate method (Surface tension)
- **Range:** 1 to 1000 mN/m
- **Accuracy:** 0.2mN/m
- **Temperature Range:** Room temperature to 80 °C



NAME OF EQUIPMENT :

Digital Viscometer

Specifications

- **Make:** Thermo Scientific
- **Model:** Haake Viscotester IQ
- **Type:** Ball Bearing
- **Viscosity Range:** 0.001 Pa s to 600000 Pa s
- **Measuring Geometries:** Coaxial Cylinders, Double gap
- **Measuring mode:** Controlled Rate (CR), Controlled Stress (CS)



NAME OF EQUIPMENT :

Specifications

- **Make:** Thermo Scientific
- **Model:** Orion Star T940
- **Type:** Acid/base, redox and ion titrator
- **Description:** Orion Star T940 all-in-one titrator without electrode
- **Application:** Acid-base titrations, redox titrations, ion concentration titrations
- **Function Available:** Sample titration, titrant standardization, calibration and direct measure
- **Titration Technique:** Equivalence point or preset endpoint



NAME OF EQUIPMENT :
Precision weighing balance

Specifications

- **Make:** Mettler Toledo
- **Model:** ME204/A04
- **Maximum Capacity:** 220 gm
- **Readability:** 0.1 mg
- **Repeatability, typical:** 0.8 mg
- **Weighing Pan Diameter:** 90 mm



NAME OF EQUIPMENT : CO₂ Gas Storage, Handling And Measurement System

Specifications

- CO₂ Gas Storage, Handling And Measurement System
- HORIBA NDIR CO₂ Analyzer
- **Flow rate:** Approx. 0.5 lpm
- **Sample Condition:** At ambient temperature, water saturated, Pressure 490 Pa
- **Gas Connection:** ¼ F NPT except exhaust is ¼ tube
- **Gas Tubing:** Teflon



NAME OF EQUIPMENT :

Portable flue gas analyzer.

Specifications

- **Model:** Optima MRU
- **Type:** CO₂ NDIR analyzer
- **Sensors:** O₂, CO₂, CO, and N₂ from calculation
- **Temperature Range:** 0 to 100 C
- **Range:** 0 to 40.00 Vol%
- **Accuracy:** 0.01%



NAME OF EQUIPMENT : Process Intensified Rotating Packed Bed Absorber for CO₂ Capture

Specifications

- **Plant Capacity:** 1 ton per day CO₂ removal
- **RPM:** 400-1200
- **Gas flow rate:** 1500-3500 lpm
- **Liquid Flow rate:** 5-15 lpm
- **Rotor Cover Plate Dimensions:** OD 1000* ID 180*Th 10 mm
- **L/G Ratio:** 1-5
- **Control system:** HMI
- **Storage Tank Capacity:** 500 lit

