

Prioritized Equipment List - CEPT Department

| S.No. (Year) | Name of the equipment | Estimated Cost (INR) | Justification (in two points) | Number of expected PIs | Expected ECF generation, if any |
|-----------------|--|----------------------|---|---|---|
| 1. (Year 1) | QGA bench top gas analysis system | 1.5 crores | <ul style="list-style-type: none"> The Quadrupole Gas Analyzer is an essential instrument for evaluating absorption dynamics and kinetics, key data required for absorber design and scale-up studies. It enables high-resolution, real-time monitoring of up to 32 gas species, which is critical for flue gas analysis, allowing precise tracking of CO₂ and by-product dynamics, which are critical for the scale-up of absorption/adsorption-based capture systems. Its rapid response and ppm-level sensitivity make it ideal for kinetic and breakthrough studies essential to optimising CO₂ absorption and regeneration processes. | 4 Scientists working in CCUS, it is an essential facility for the execution of on-going and upcoming CCU projects | ~20L/ annum from industry projects |
| 2. (Year 1) | Reaction Calorimeter (Ambient) | 1.5 Cr | <ul style="list-style-type: none"> Reaction Calorimeter provides detailed and precise information, such as the complete heat of reaction, a large number of process parameters as well as process safety information under all operating conditions. CSIR-IICT has a large group of Chemical Engineers and Process Chemists working on variety of development of chemical processes from lab to commercial scale. There are lot of queries from other industries and institutions for RC studies | More than 5 (Scientists working in Process Development / Intensification / Process scale-up) | More than 10 Lakhs per year. (Industry queries and Skill development) |
| 3. (Year 2) | High Pressure VLE system with on-line analysis | 1.3 Cr | <ul style="list-style-type: none"> High Pressure Vapour Liquid Equilibria measuring equipment is of prime importance in generating design data, especially for multiphase reactors and for separations involving high pressures. An integrated system including on-line analysis will provide composition data accurately. There is no such unit | More than 5 (Scientists working in Process Development / Process Design/ Process scale-up) | At least 2 Lakhs per year |

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| | | | <p>available at CSIR-IICT.</p> <ul style="list-style-type: none"> Moreover, there have been requests from clients like INVENSYS (presently Schneider-Electric) for data generated in such equipment for use in their commercial process design software. Therefore, purchase of such a unit will be beneficial for CSIR-IICT for use in sponsored projects as well as for attracting new projects. | | |
| 4. (Year 2) | In-situ DRIFTS (Diffuse Reflectance Infrared Fourier Transform Spectroscopy) | 1.5 crores | <ul style="list-style-type: none"> In-situ DRIFTS is an essential instrument used to evaluate reaction intermediates, active sites, and surface species directly during catalytic processes. This helps fine-tune reaction conditions, such as temperature, pressure, and reactant concentrations, to maximize efficiency and yield. Furthermore, catalyst behaviour under realistic operating conditions, including deactivation mechanisms (e.g., coke formation or sintering), can also be explored The instrument is very useful for Chemical Engineers and Process Chemists at CSIR-IICT working on various vapor-phase catalytic processes, as it provides critical data to design robust catalysts and processes and evaluate reaction kinetics, which are essential for process development, design, and scale-up activities. | More than 6 (Scientists working in Process Development, design and scale-up of vapor phase catalytic processes) | ~5-10 Lakhs / annum (Industry queries) |
| 5. (Year 3) | Hastelloy autoclaves (2 Nos.) 500 ml and 1 lt capacities; Inconel autoclave (1 No.) 500 ml capacity. | 70 Lakhs | <ul style="list-style-type: none"> To conduct high pressure and high temperature reactions involving corrosive homogeneous catalysts. CE&PT is involved in process development activity for transfer of process know-hows which requires high pressure and high temperature reactors. | 5 (Scientists working in Process Development / Process Design/ Process scale-up) | 10 Lakhs per year |
| 6. (Year 3) | Commercial ASPEN Plus Software | 100 Lakhs for 3 years (Annual subscription basis) | <ul style="list-style-type: none"> Commercial software essential and is used for several sponsored (industrial)/ technology transfer related projects where process simulation, and design studies necessary for process scaleup and commercial plant design based on bench scale and pilot scale | More than 10 Scientists working in Process Development, Design, | ~10-20 Lakhs / annum (from multiple Industry queries) |

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| | | | experimental trails. | Intensification / Process scale-up | |
| 7. (Year 4) | Multipurpose membrane pilot plant with RO/NF/UF/MF of 1 m ² area each with analytical technique used to separate, identify, and quantify components and pressure based liquid/solid separation accessories | 45 Lakhs | <ul style="list-style-type: none"> Will be used for water recycling, Wastewater treatment, Recovery of value-added products for food processing applications. The analytical accessories will be useful for quantitative and qualitative study of liquid samples | 03 | 10 Lakhs |
| 8. (Year 4) | Customized Continuous High Pressure (Reactive) Distillation Column (1Kg/hr) | 100 Lakhs | <ul style="list-style-type: none"> This facility is required to conduct high-pressure distillation and reactive distillation in both batch and continuous mode for separation as well-as hybrid reactive separation. Established facility will be useful for process development and scaleup activity relevant to CEPT & IICT where intensified processes and downstream continuous processes are requires with high temperature and pressures. | More than 5 (Scientists working in Process Development / Intensification / Process scale-up) | ~5-10 Lakhs / annum (from multiple Industry queries) |