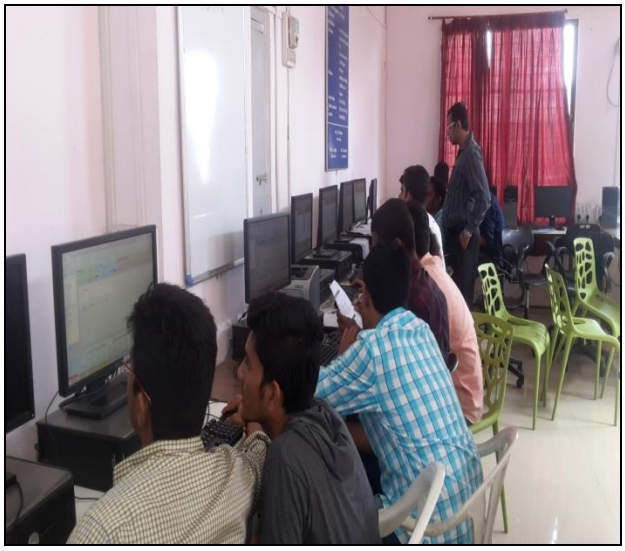



Training Sessions of Aspen Plus Software

Aspen Plus software is one of the popular software used in the industry for the process design and mechanical design of Chemical Engineering process and operations. The latest version 9.0 used by industries is available with the department. The cost of the software is $ 2000 per year.

The applications of the software are:

1) Design Stage

- It allows designer to check various design options in minimum time.

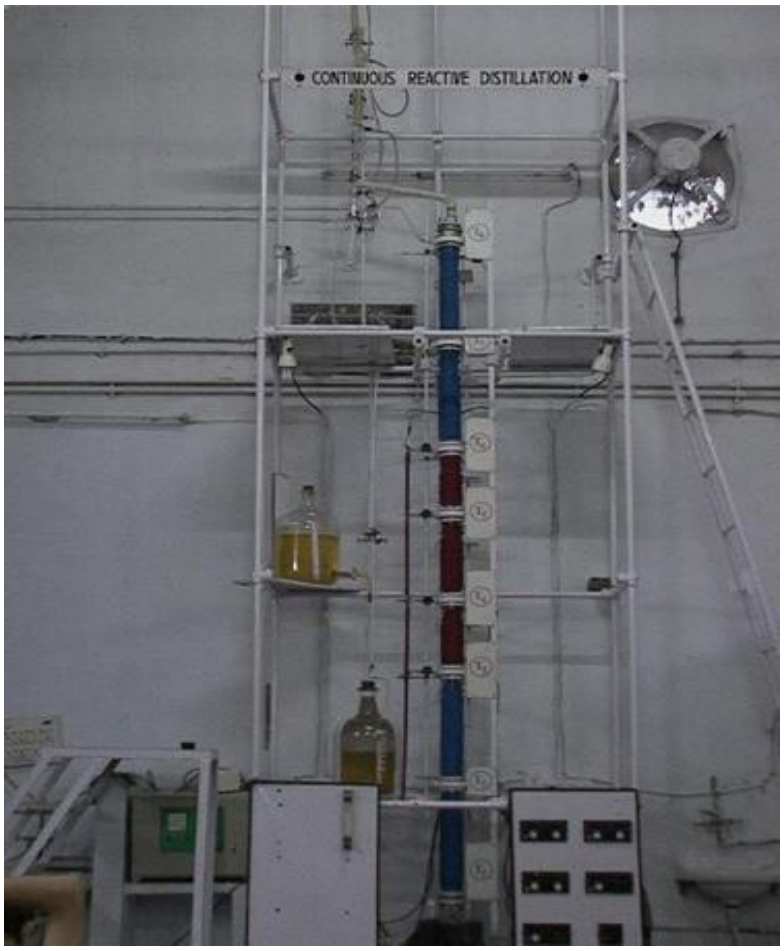
2) Operation Stage

- Performance improvement

- Capacity increase
- To identify bottlenecks in the process
- Duty Change

The certified training program is conducted for final year students. The topics covered during the program are introduction to software, flow sheeting, physical properties selection and workshops on distillation, heat exchanger etc.

Students get good exposure to Aspen Plus software which is used in industry for designing the plant.



Set up of Reactive Distillation

Reactive distillation is potentially attractive whenever a liquid phase reaction must be carried out with a large excess of one reactant. Under such circumstances, conventional processes incur large recycle costs for excess reactant. Reactive distillation, on the other hand can be carried out closer to stoichiometric feed conditions, thereby eliminating recycle costs. Both homogeneous and heterogeneous catalyzed chemical reactions can be carried out in a reactive distillation column. In this report we use the generic name reactive distillation, with the acronym RD, to cover both catalyzed and uncatalyzed reactions systems.

Reactive Distillation involves simultaneous chemical reaction and distillation. The chemical reaction usually takes place in liquid phase or at the surface of solid catalyst in contact with liquid phase. RD is a combination of reaction and distillation in a single vessel owing to which it enjoys a number of specific advantages over conventional sequential approach of reaction followed by distillation or other separation techniques. Increased conversion, improved selectivity, better heat control, effective utilization of reaction heat, scope for difficult separations are a few of the advantages that reactive distillation offers.The suitability of RD for a particular reaction depends on various factors such as volatilities of reactants and products, reaction and distillation temperatures etc. The technique offers a key opportunity for improving the structure of a process. It is a so-called hybrid process, i.e. it merges two different unit operations in a single apparatus, namely reaction and distillation.But the combination of distillation and reaction is possible only if the conditions of both unit operations can be combined.

Principle:

The RD column consists of a reactive section in the middle with non-reactive rectifying and stripping sections at the top and bottom as shown in figure .The task of the rectifying section is to recover reactant from the product stream. In the stripping section, the reactant is stripped from the product stream. In the reactive section the products are separated in-situ, driving the equilibrium to the right and preventing any undesired side reactions between the reactants with the products. For a properly designed RD column, virtually 100% conversion can be achieved.

Advantages of Reactive Distillation:

The benefits of RD can be summarized as follows

(a) **Simplification** or elimination of the separation system can lead to significant capital savings.

(b) **Improved conversion** of reactant approaching 100%. This increase in conversion gives benefits in reduced recycle costs.

(c) **Improved selectivity:** Removing one of the products from the reaction mixture or maintaining a low concentration of one of the reagents can lead to reduction of the rates of side reactions and hence improved selectivity for the desired products.

(d) Significantly reduced catalyst requirement for the same degree of conversion.

(e) **Avoidance of azeotropes:** RD is particularly advantageous when the reactor product is a mixture of species that can form several azeotropes with each other. RD conditions can allow the azeotropes to be `reacted away in a single vessel.

(f) Reduced by-product formation.

(g) **Heat integration benefits:** If the reaction is exothermic, the heat of reaction can be used to provide the heat of vaporizations and reduce the reboiler duty.

(h) Avoidance of hot spots and runaways using liquid vaporizations as thermal flywheel.

Applications Reactive Distillation set up in Department:

1) Practicals of Mass Transfer Subject for T.E. Chemical Engineering subjects
2) Project work of B.E. Chemical Engineering Students
3) Research and Consultancy work for Faculties

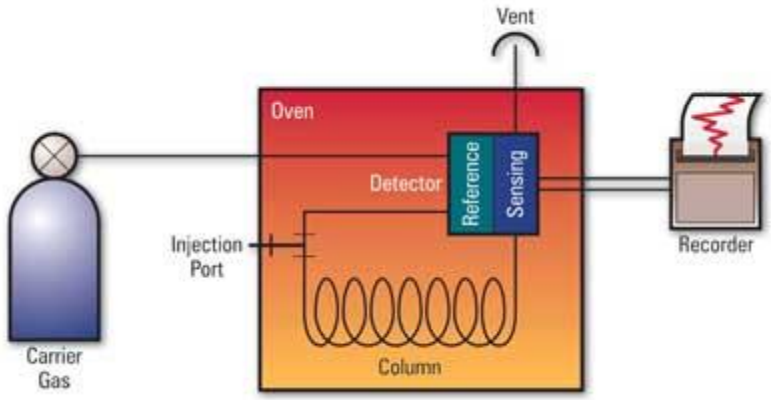
The Cost of Reactive Distillation is Rs. 5,10,000/-.

Set up of Gas-Liquid Chromatography

Gas chromatography (GC) is one of the most widely used techniques in modern analytical chemistry. In its basic form, GC is used to separate complex mixtures of different molecules based on their physical properties, such as polarity and boiling point. It is an ideal tool to analyze gas and liquid samples containing many hundreds or even thousands of different molecules, allowing the analyst to identify both the types of molecular species present and their concentrations.

In gas-liquid chromatography, it is the interaction between the gaseous sample (the mobile phase) and a standard liquid (the stationary phase), which causes the separation of different molecular constituents. The stationary phase is either a polar or nonpolar liquid, which, in the case of capillary column, coats the inside of the column, or is impregnated onto an inert solid that is then packed into the GC column.

The certified workshop is conducted for final year students. Students will get knowledge of doing analysis of the chemical products. The cost of the Gas-Liquid Chromatography is Rs. 4,93,000/-.



Gas-Liquid Chromatography

Department Library

- No. of Text books & Reference books: **990**
- Investment on Books: **Rs. 1,65,000/-**
- Books related to **RC Volume Series, Design of Distillation Column Control System, Design of Chemical & Petrochemical Plant, Modeling & Simulation in Chemical Engg.,GATE, GRE, MBA, Interview Techniques etc.**
- News Paper: **Times of India, The Hindu, Pudhari, Employment News.**