

# Lecture

**Course Code: Chem-461(Cr:03)**  
**Course Title: Industrial Chemistry**

## Difference between Unit operation and Unit process

- The chemical process is a combination of unit processes and Unit operation. Hence the Difference between Unit operation and Unit process as follows.

### Unit process

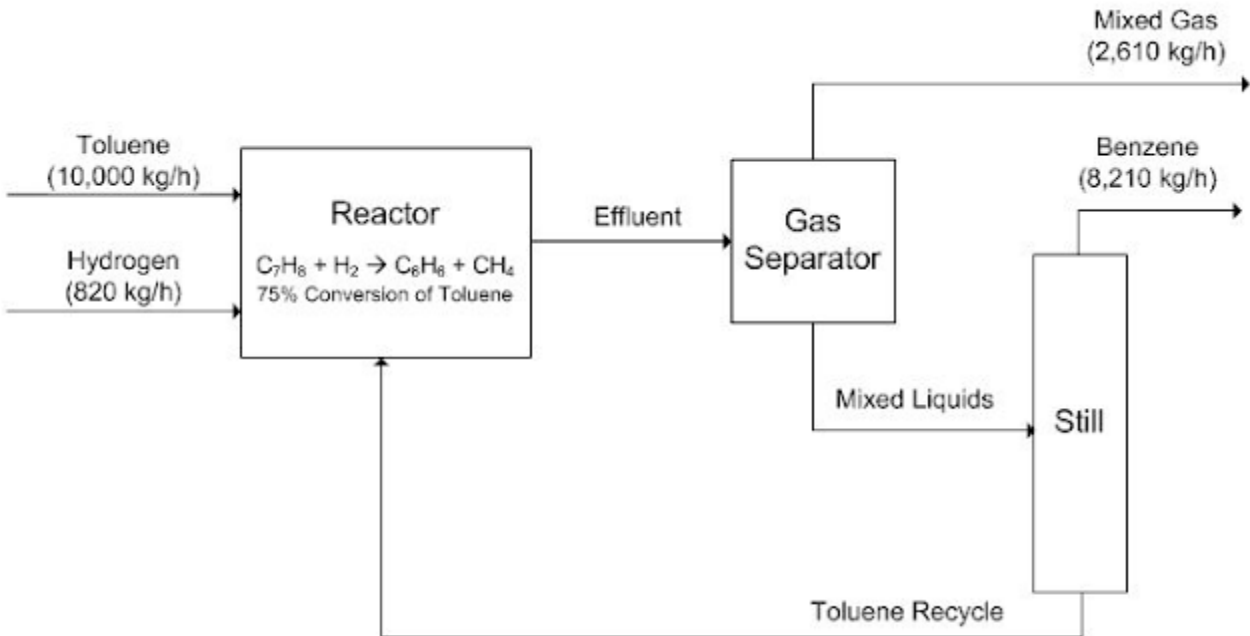
*The unit process involves a chemical change or sometimes it referred to as chemical changes along with physical change leading to the synthesis of various useful product*

- It also provides basic information regarding the reaction temperature and pressure, the extent of chemical conversions and yield of product of the reaction, nature of reaction whether endothermic or exothermic, type of catalyst used.
- Example: hydrogenation, oxidation, nitration, etc

### Unit operations

*The operations carried out in the chemical process industry involving physical changes in the materials handled or in the system under consideration are called Unit operations*

- Hence unit operations involve the physical separation of the products obtained during various unit processes.
- It is very important in chemical industries for separation of various products formed during the reaction.
- Individual operations have common techniques and are based on the same principles.



Above figure shows the unit process flow diagram for the production of benzene from toluene via various unit operations which are carried out in reactor, gas separator and still

Types of unit operations are as follows

1. **Mechanical operations:-Example:- size reduction, conveying, filtration**
2. **Fluid flow operations:- In these operations, pressure difference act as a driving force.**
3. **Heat transfer:- In these operations, temperature difference act as a driving force. Example:- Evaporation**
4. **Mass transfer:- In these operations, the concentration difference act as a driving force. Example:-Distillation**

Depending on the transferred properties, foods undergo transformation due to mass, energy or velocity differences. So, the unit operations are also grouped into following categories.

- Fluid flow processes: fluidization, filtration, sedimentation, liquid transportation etc.
- Heat transfer processes: evaporation, drying, concentration etc.
- Mass transfer processes: absorption, distillation, adsorption, extraction etc.
- Thermodynamic processes: gas liquefaction, refrigeration etc.
- Mechanical processes: crushing, pulverization, solid transportation, sieving etc.

