

## PLANT LAYOUT

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### SITE LAYOUT

The location of the plant can have a turning effect on the overall viability of a process plant, and the scope for future expansion. Many factors must be considered when selecting a suitable plant site. The most important factors are as follows :

- Location, with respect to the marketing area
- Raw material supply
- Transport facilities
- Availability of labor
- Availability of suitable land
- Environmental impact and effluent disposal
- Local community consideration
- Climate
- Political and strategic consideration

In addition to the main plant , we also have to consider the associated services which have to be amalgamated within a particular plant site. Canteens, parks, general utilities, emergency medical services and places for storage must also be taken into consideration while deciding on a particular site.

## PLANT LAYOUT

The economic construction and operation of a process unit will depend on how well the plant equipment specified on the process flow sheet and laid out.

The principal factors to be considered are:

1. Economic consideration: construction and operation cost.
2. The process requirement
3. Convenience of operation
4. convenience of maintenance
5. Safety
6. Future expansion

## COSTS:

The cost of construction can be minimized by adopting a layout that gives shortest run of connecting pipes between equipment, and adopting the least amount of structural steel work. However, this will not necessarily be the best arrangement for operation and maintenance.

## PROCESS REQUIREMENT:

All the required equipments have to be placed properly within process. Even the installation of the auxiliaries should be done in such a way that it will occupy the least space.

## OPERATION

Equipment that needs to have frequent operation should be located convenient to the control room. Valves, sample points, and instruments should be located at convenient position and height. Sufficient working space and headroom must be provided to allow easy access to equipment.

## MAINTENANCE

Heat exchangers need to be sited so that the tube bundles can be easily withdrawn for cleaning and tube replacement. Vessels that require frequent replacement of catalyst or packing should be located on the outside of buildings. Equipment that requires dismantling for maintenance, such as compressors and large pumps, should be placed under cover.

## SAFETY

Blast walls may be needed to isolate potentially hazardous equipment, and confine the effects of an explosion. At least two escape routes for operator must be provided from each level in the process building.

## ENVIRONMENTAL ASPECTS

In the manufacturing of ammonia, there arises a need to vent gases and to remove condensates. These liquid and gaseous effluents and the chemicals used in the process may tend to pollute the environment.

The main source of gaseous ammonia emission are from the inert gas purge and from the ammonia storage section of the ammonia plant. In the case of non functioning or breakdown of the equipment large quantity of ammonia emission increases ammonia concentration in the atmosphere.

The liquid effluents contain dissolved ammonia and dissolved Carbon dioxide. The toxic effect of ammonia depends upon the concentration of free ammonia. Its presence in water leads to suffocation of aquatic life forms.

Also there is the possibility of emission of particulate matter like Carbon oxides of Sulfur etc. These may removed by electrostatic precipitation or vacuum filtration.

### Pollution Control

This may be achieved by

- 1 . Segregation of effluent streams
- 2 . Control of particulate matter by
  - a) Mechanical separators
  - b) Wet Scrubbers
  - c) Fabric filters and electrostatic precipitators.

Ammonia may be removed by any of the following methods

<b>Ammonia removal technique</b>	<b>Concentration</b>
Steam stripping	3.4 wt %
Air stripping	>1500 ppm
Simple lagooning after PH adjustment	1500 ppm
Biological treatment	About 700 ppm