

PLANT LOCATION

The location of chemical plant can have a very marked effect on the success or otherwise of a commercial venture. The guiding principle is that the plant should be located where the cost of production and distribution of products are a minimum bearing in mind factors such as space for future expansion and general amenities of the district. It is convenient to list the more important factors influencing plant location as follows.

- Market Area
- Raw Materials Supply
- Transport facilities
- Availability of labour
- Availability of utilities (water, Power, etc.)
- Availability of land
- Effluent disposal
- Climate
- Political & Strategic considerations

Marketing Area:

The location of the plant can be suitably selected depending on the availability of the product in that area. If the market is close by the plant the transportation costs can be reduced to a large extent. Since the product is a solid the cost of transportation has to be done using trucks. If the customer is very close to the plant the product can be transported using conveyers.

Raw Material Supply:

The availability and price of the raw material is also a key component to determine the plant location. Here in this process since p-Xylene is a raw material which is a by-product of the petrochemical industry and the price of which fluctuates to a large extent it is preferable to locate the plant close to a refinery which deals with the petrochemical products.

Transport:

The transport of material to and from the plant will be a prime factor to determine the location of the plant. It is always preferred that the plant has all the facilities of all the three modes of transport (Rail, road and waterway).

Availability of labour:

Labour is necessary from the construction phase of the plant to the production phase. The location of the plant should be such that there is availability of human resources around the area. Usually the skilled labourers are picked up from outside the site area. But the unskilled labourers are also in need.

Availability of Utilities:

The process requires a large quantity of water for cooling and also for the emergency requirements of the plant. Therefore it is always essential that there is a source of water near the plant. Rivers are generally preferred as a source of water.

Power is another major utility. The power supply to the plant should be undisturbed. Almost all the equipments require power to work. It is always preferable to generate the power required to run the plant.

Effluent Disposal:

The waste that is produced is generally in the form of liquid. The effluents are disposed generally to the sea. Therefore there should be a provision for this kind of disposal.

Land:

Sufficient suitable land must be available for the proposed plant for future expansion. The land should be ideally flat, well drained and have suitable load bearing characteristics.

Climate:

Adverse climate conditions at a site will increase costs. Abnormally low temperatures will require the provision of additional insulation and special heating for equipments and pipe runs. Stronger structure is necessary in locations subject to high winds.

Political and Strategic Considerations:

Capital grants concessions and other inducements are often given by governments to direct new investment to preferred locations such as areas of high unemployment. The availability of such grants can be the overriding consideration in site selection.

The ideal location for the plant will be any port city in the state of Gujarat or Mumbai. The site is selected on the basis of availability of raw materials and a demanding market.

PLANT LAYOUT

A chemical plant should essentially contain the following units.

- Storage area for raw materials and products.
- Maintenance workshop
- Stores for maintenance and operating supplies
- Laboratories
- Fire Station and Security
- Utilities (Distillation column, boiler, reactor, etc)
- Effluent Disposal plant
- Offices for general administration
- Canteens, medical center, etc.
- Parking Lot

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

The principle factors that have to be considered are:

- Economic Considerations
- The Process Requirements
- Convenience of operation
- Convenience of maintenance
- Safety
- Future Expansion

Costs:

The Cost of construction can be minimized by adopting a layout that gives the shortest run of connecting pipe between equipment and the least amount of structural steel work.

Process Requirements:

The height and the distance between the equipments are sometimes dictated by the process taking place. For example it is necessary to elevate the base of columns to provide the necessary net positive suction head to the pump. Gravity can be used in some cases. By elevating a component the service of a pump can be avoided.

Operation:

Equipment that needs to have frequent operator attention should be located convenient to the control room. Valves, sample points and instruments should be located at convenient positions and heights.

Maintenance:

Heat exchangers need to be sited so that the tube bundle can be easily withdrawn for cleaning and tube replacement. Vessels that require replacement of catalyst or packing should be located on the outside the building. Equipments that require constant dismantling should be under cover.

Safety:

Cooling towers should be situated so that under the prevailing wind conditions the plume of condensate spray drifts away from the plant area and adjacent properties. The hazardous chemicals should be handled away from the place where relatively large number of people work.

Plant expansion:

Equipment should be located so that it can be conveniently tied in with any future expansion of the process. Space should be left on pipe alleys for future needs and service pipes oversized to allow future requirements.

After considering all the factors the plant layout is designed as shown in Figure(iii)