Fine chemicals-Reactor selection

- Multipurpose plants are plants where a fixed set of products are produced through similar series of steps
- Usually only one product is manufactured at a time.
- Features of Multipurpose plant
- Structural flexibility
- Jacketed reactor :- a stirred tank reactor immersed in another container
- Outside container is sealed with one inlet and one outlet
- Purpose is to flow hot fluid in outside container to heat the reaction mixture (heat exchanger)
- Why we can’t have electrical heating?
- One of the reason is cost
- Second is quality of energy (efficiency)
- Electricity can’t be controlled (Temperature control can be difficult)
- Suppose we are using a fluidized fuel furnace
- We have two heat sources one at 400 and another at 125
- After cooling 400 one cools to 200 and 125 to 80
- So which one to use
- 125 one because less amount of heat is wasted in 400 one
- Suppose we scale a pilot plant to 1000l without looking the effect of dimensional similarity

- One thing that can be done is external heat exchanger
- Reaction mixture is taken out passed through a heat exchanger and put it back in the reactor
- This is called structural flexibility :- cater to multiple reaction
- These are largely batch processes

Scheduling batch process

- The maximum time between two stages is called cycle time of the process
- In general batch process involves running production campaigns in which either a single product or a set of products are produced.
- A campaign consists of batch processes in which products are produced according to a particular schedule
- Operation in non-overlapping mode: - Production of second batch starts only when production of previous batch is completed.
- The cycle time is the time interval between completion of two batches
- Overlapping mode of operation :- First stage of second batch is finished before the second stage of first batch is started
- The cycle time t_s is the time interval of longest stage process