

Fine Chemicals vs. Specialty chemical

- Most of the bulk chemicals are based on specifications
- Fine chemicals are sold based on specifications **PURITY**
- Specialty chemicals are based on functionality
- Costs are higher for specialty chemicals than for fine chemicals.
- One of the challenges for fine chemicals is Waste Management
- E-factor = kg waste produced/kg product produced
- For Fine chemicals we have multipurpose/multiproduct plants
- But they are not efficient, cost is more
- For multiproduct plants, we need to have flexibility
- One such flexibility is Structural flexibility
- We could easily reconfigure equipments if we want to have different reaction
- Second one is Product assortment process variety of chemicals
- Third one is capacity flexibility
- Waste generation
- Atom efficiency: $MW(C)/MW(C)+MW(D)$
- $A+B \rightarrow C+D$ Do not consider water
- If we use heterogeneous catalyst
- Atom efficiency can be close to 1

Selection of reactors for multipurpose plants

- One of the main difference between bulk chemicals and fine chemicals is that the reaction mixture is in liquid phase for fine chemicals

- If we have a gas liquid system, transfer of gas to liquid can be very challenging
- Mixing is not uniform
- One option is sparging
- Multiple outlets for gas
- One alternative is hollow impeller
- Gas-liquid-solid: E.g. Hydrotreating
- We use slurry columns where solid is suspended in liquid and gas is bubbled through it.