|  |  |  |  |
| --- | --- | --- | --- |
|  | BSTR | CSTR | PFR |
| MB |  |  |  |
| r |  |  |  |
| t/ |  |  |  |
| V |  |  |  |
|  |   |

for first order, liquid CSTR

for first order, reversible liquid CSTR, not f(CA0)

general EB:

**adiabatic**

PFR non-equimolar gas reaction:

CSTR non-equimolar gas reaction

**Nonadiabatic**



|  |  |
| --- | --- |
|  | G(T)=R(T) = Maximum X occurs at maximum G(T) |

Unsteady operation of nonisothermal reactors

MSS are possible with **exothermic wall-cooled CSTR and adiabatic PFR with large recycle ratio**

|  |  |  |  |
| --- | --- | --- | --- |
| Parallel reactionsA 🡪 DA 🡪 U | Series reactionsA🡪D🡪U | Parallel series reactionA+B 🡪 DA+D 🡪 U | Definition of selectivity  |
|  maximize CA CB by PFR at high P (no diluents) or batch |  minimize CA CB by CSTR or large recycle in PFR, dilute with inert |
|  maximize CA minimize CB, add B constantly in semibatch or in PFR along the axial length, recycle with excess A |  maximize CB minimize CA, add A constantly in semibatch or in PFR along the axial length, recycle with excess B |
| A🡪D A🡪U high T favors the reaction with higher Ea | High R gives high SD but low throughputLow R gives low SD but high throughput |