UNITS

Variables	Units
temperature	kelvin
activation energy	joules
volume	1 dm^3 = 1 liter
concentration	moles/liter

Design Equations (liquid phase)

PBR	BR
dFj/dw=rj'	dNa/dt=raV
w=Fjo->Fj ∫ dFj/rj'	Na(t)=Nao(1--X(t))
w=(Fjo-Fj)/-rj'	Nao(dX/dt)=-raV
	t=Nao*(0->X) ∫ dX/-raV

Random Shit I need to Know

PV=nRT => n/V=Ct-o=P/RT	-ra=k(Ca^2Cb-(Cc/Kc))
Cjo = yjo*Cto	kc=Cc/(Ca^2Cb)
Ca=(Cao(1-X)/(1+εX)	-ra=0 @ equili-brium
Cb=(Cao(θb-(b/a)X))/(1+εX)	
Cc=(Cao(θc+(c/a)X))/(1+εX)	
Ci=Cio/(1+εX)	

Design Equations (gas phase)

CSTR	PFR
V=(Fao*X)/-ra	dFa/dV=ra
Fao=Cao*vo	Fa=Fao(1-X)
V=(Cao *vo*X)/-ra	dFa=d(-Fao(1-X))-=-Fao*-dX=>Fa-o(dX/d-V)=-ra-
Cao=Nao/v-=Pao/R *To=(yao*Po)/R*To	dV=Fao-(dX/-ra)=-->0->V ∫ dV=V
V=(yao*Povo X)/(R*To*-ra)	0->X ∫ Fao(dX/-r-a)=-->V=Fao 0->X ∫ dX/-ra
	PBR
	Fao*(d-X/dw)=-ra'
	W=Fao 0->X ∫ dX/-ra'

Conversion

X=Xa=moles of A reacted/moles of A fed in=(Nao-Na)/Nao
Na=Nao(1-X)
Fa=Fao(1-X)
Ca=Cao(1-X)

Design Equations (liquid phase)

CSTR	PFR
V=(Fjo-Fj)/-rj	rj=dFj/dV
V=(voCjo-vCj)/-rj	V=Fjo->Fj ∫ dFj/rj
V^{isom}=vo(Cao-Ca)/kCa	ra=dFa/dV , Fa=VCa
V=(FaoX)/-ra	ra=(d(vo*-Ca))/dV
V=(Cao *vo*X)/(k*Ca)	$V^{first\ order}$=Cao *vo 0->X ∫ 1/(k*Cao*(1-X)) dX
V=(vo*X)/(k(1-X))	

Activation Energy

$k=Ae^{-Ea/RT}$
ln k = ln A (-Ea/RT)
Ea = (Rln(k2/k1))/(1/T1-1/T2)