Kollokvie uke 4, Vegard Gjervell

Oppg 1a)

$$S_{DU_1} = \frac{r_D}{r_U} = \frac{800 \exp\left(\frac{-2000}{T}\right) C_A^{0,5} C_C}{10 \exp\left(\frac{-300}{T}\right) C_A C_C}$$

$$S_{DU_1} = 80 \exp\left(\frac{-1700}{T}\right) C_A^{-0,5}$$

S_{DU_1} er høy ved høy T og lav C_A

Oppg 2a)

$$r_{1A} = -k_{1A} C_A = -0,07 \frac{mol}{L\,min}$$

$$r_{2A} = -\frac{1}{3} r_{2D} = -2,6 \cdot 10^{-3} \frac{mol}{L\,min}$$

$$r_{3A} = 0$$

$$r_{1B} = -\frac{1}{3} r_{1A} = 0,023 \frac{mol}{L\,min}$$

$$r_{2B} = r_{3B} = 0$$

$$r_{1C} = r_{1B} = 0,023 \frac{mol}{L\,min}$$

$$r_{2C} = 2 r_{2A} = -5,2 \cdot 10^{-3} \frac{mol}{L\,min}$$

$$r_{3C} = -r_{3E} = -5 \cdot 10^{-4} \frac{mol}{L\,min}$$

$$r_A = \sum r_{iA} = -0,0726 \frac{mol}{L\,min}$$

$$r_B = 0,023 \frac{mol}{L\,min}$$

$$r_C = 0,0173 \frac{mol}{L\,min}$$

Oppg 2e)

$$r_A = -0{,}0726 \frac{mol}{L\,min}$$

UT = INN + DANNET } → Forut. Stasjonært

$$F_A - F_{A0} - r_A V = 0$$

$$V = \frac{F_A - F_{A0}}{r_A} \overset{*}{=} \frac{\Phi_V (C_A - C_{A0})}{r_A}$$

* for væskefase

er $\Phi_V = \Phi_{V0}$

$$V = 3995\,L \approx 4\,m^3$$

Oppg 3a)

$$C_{A0} = 3{,}2 \frac{mol}{L}\,, \quad F_{B0} = 5F_{A0}$$

$$k(31°C) = 150 \cdot 10^{-3} \frac{L}{mol \cdot h}$$

$$A + B \rightarrow C + D$$

	Tilsatt	dannet	etter reaksjon
A:	$\Phi_V C_{A0}$	$-r_A V$	$\Phi_V C_{A0} - r_A V$
B:	$5\Phi_V C_{A0}$	$-r_A V$	$5\Phi_V C_{A0} - r_A V$
C:	0	$r_A V$	$r_A V$
D:	0	$r_A V$	$r_A V$

3b) $r_C V = 20 \frac{kmol}{h}$, $V_{rx} = 4000\,L$, $T = 31°C$

I) $r_A = -r_C$

II) $-r_A = k C_A C_B$

III) $C_A = \frac{\Phi_V C_{A0} - r_A V}{\Phi_V}$

IV) $C_B = \frac{5\Phi_V C_{A0} - r_A V}{\Phi_V}$

V) $X_A = \frac{F_{A0} - F_A}{F_{A0}} \overset{*}{=} \frac{C_{A0} - C_A}{C_{A0}}$

*) For væskefase/stasjonært

$\tau = \frac{V}{\Phi_V}$

(III, IV) → II → I : VI) $r_C = k(C_{A0} - r_A \tau)(5C_{A0} - r_A \tau)$

$\tau = 3{,}16\,min$

↳ $C_A = 0{,}04 \frac{mol}{L}$ → $X = 0{,}98$