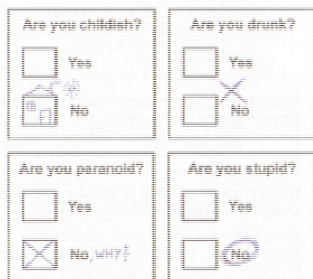


HOW NOT TO ANSWER TEST QUESTIONS



Exam 1 Reminder

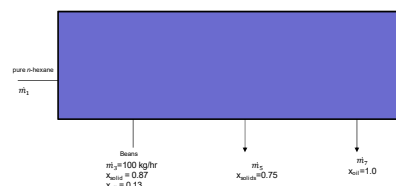
- Closed Book, closed notes and HW
- Calculator required
- 2 hour time limit
- Wednesday through Monday (Testing Center)
- TA help sessions
- No class on Friday (I will be available)

Class 9 Practice Multi-Unit DOF

- Questions?
- 3 Worksheets
- Problem 4.31

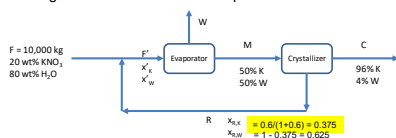


Notes on Multi-unit DOF (using problem from Exam 1, W17)



- When deciding unknowns for entire process, draw opaque box around process, with the recycle inside the box
- Unknown variables are those entering or exiting the box
- Unknowns here are m_1 , m_5 , m_7 , and $x_{\text{Benz},5}$
– Also $x_{\text{Hex},5}$, but this can be computed by summing the mass fractions to 1.0

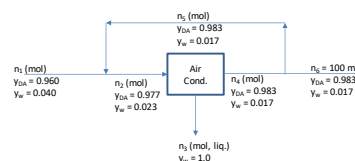
1. Fresh feed containing 20% by weight KNO_3 in H_2O is combined with a recycle stream and fed to an evaporator where the water content is reduced. The concentrated solution leaving the evaporator, containing 50% KNO_3 , is fed to a crystallizer. The crystals obtained from the crystallizer are 96% KNO_3 and 4% water. The supernatant liquid (liquid in equilibrium with crystals) from the crystallizer constitutes the recycle stream and contains **0.6 kg KNO_3 per 1.0 kg of H_2O** . The objective is to complete the mass balance showing all stream values and compositions.



	Unknowns	# of U	BE	OE	DOF
Evap	F, x_w, W, M	4	2	0	2
Cryst	M, R, C	3	2	0	1
Mixer	R, x_w, F	3	2	0	1
Overall	W, C	2	2	0	0

How do you start?

2.



	Unknowns	# of U	BE	OE	DOF
Air cond	n_1, n_2, n_3	3	2	0	1
Splitter	n_4, n_5	2	1	0	1
Mixer	n_6, n_7, n_8	3	2	0	1
Overall	n_1, n_3	2	2	0	0

