

CHE 201
HW 5

Q1. Ethanol enters a 4 m^3 tank at a rate of 12 kg/s and is withdrawn at a rate of 6 kg/s . The tank is initially half full.

- a) Is this process continuous, batch or semibatch? Is it steady state?
- b) Write a balance for the process.
- c) How long will the tank take to overflow?

Q2. A 5 weight percent formaldehyde in water solution is fed to a concentrating unit that produces two product streams. One is 37 % by weight formaldehyde, the other 99.5 % by weight water.

- a) Draw a sketch for this unit with inlet and outlet streams
- b) How much of the two streams is produced per 100 kg of feed.

Q3. A stream of humid air containing 1 mol % $\text{H}_2\text{O}(\text{v})$ and the balance dry air is to be humidified to a water content of 10 mol % H_2O . Liquid water is fed through a flowmeter and evaporated into the air stream. The flowmeter reading, R , is 95. The only available calibration data for the flow meter are two points, indicating that readings $R=30$ and $R=100$ correspond to flowrates $V=80 \text{ ft}^3/\text{hr}$ and $V=193.8 \text{ ft}^3/\text{hr}$.

- a) Draw and label the flowchart, do the degree of freedom and estimate the molar flow rate (lb.mol/hr) of the outlet air.