

10.213 Fall 1999

Problem 22 (due Monday 11/15)

Consider a two stage separation of an ideal solution of components 1 and 2 which operates at constant temperature. The inlet to stage I has a flow rate of 100 mol/s and is 50 mol % in each component. Both a vapor stream and a liquid stream exit the first stage, each having a flow rate of 50 mol/s. The liquid stream out the first stage is directed into to stage II. A second pair of vapor and liquid streams exit stage II, each having a flow rate of 25 mol/s.

When the saturation pressures of pure 1 and pure 2 at the temperature of interest are

- a) 10 kPa and 20 kPa, respectively.
- b) 10 kPa and 100 kPa, respectively.
- c) 10 kPa and 5000 kPa, respectively.

find the compositions of all streams in the process, calculate the pressure in each stage. Also, plot the Pxy diagram for all three cases, showing the saturated liquid and vapor curves and points representing each stream.