Homework problem

A gas permeation module is separating air with cross-current flow arrangement. Feed is 80 mol% N_2, the rest being O_2. Feed pressure is 10 bar and a permeate pressure is 1 bar. O_2 permeance is 100 gas permeance units, and O_2/N_2 selectivity is 1000. Q_{feed} is 0.056 mol/s.

Calculate the outlet recovery and purity when membrane area is 10 m^2.

What is the area needed to achieve 50% recovery?

(Please use a smaller discretization element, e.g., 0.1 m^2)