CH3030 Tutorial 8

1. Acetone from an aqueous mixture is to be extracted from a stream with flow rate of 1300 kg/h in a continuous counter current extraction system using trichloroethane as the solvent. The stream which initially contains 35% (mass) acetone is to contain only 10% acetone after the treatment. Find
a) The minimum solvent flow rate required for the extraction
b) The number of stages required if the actual solvent flow rate to be used is 1.5 times of the minimum solvent flow rate.
c) Flow rates and compositions of the exit streams of each stage

The equilibrium data for the system is given below in weight fractions

Raffinate			Extract		
Acetone	Water	TCE	Acetone	Water	TCE
0.55	0.35	0.1	0.6	0.13	0.27
0.5	0.43	0.07	0.5	0.04	0.46
0.4	0.57	0.03	0.4	0.03	0.57
0.3	0.68	0.02	0.3	0.02	0.68
0.2	0.79	0.01	0.2	0.015	0.785
0.1	0.895	0.005	0.1	0.01	0.89

The tie line data is as below in weight fraction

Acetone in raffinate	Acetone in extract
0.44	0.56
0.29	0.4
012	0.18

Solve using both equilateral triangle diagram and right angle triangle diagram.