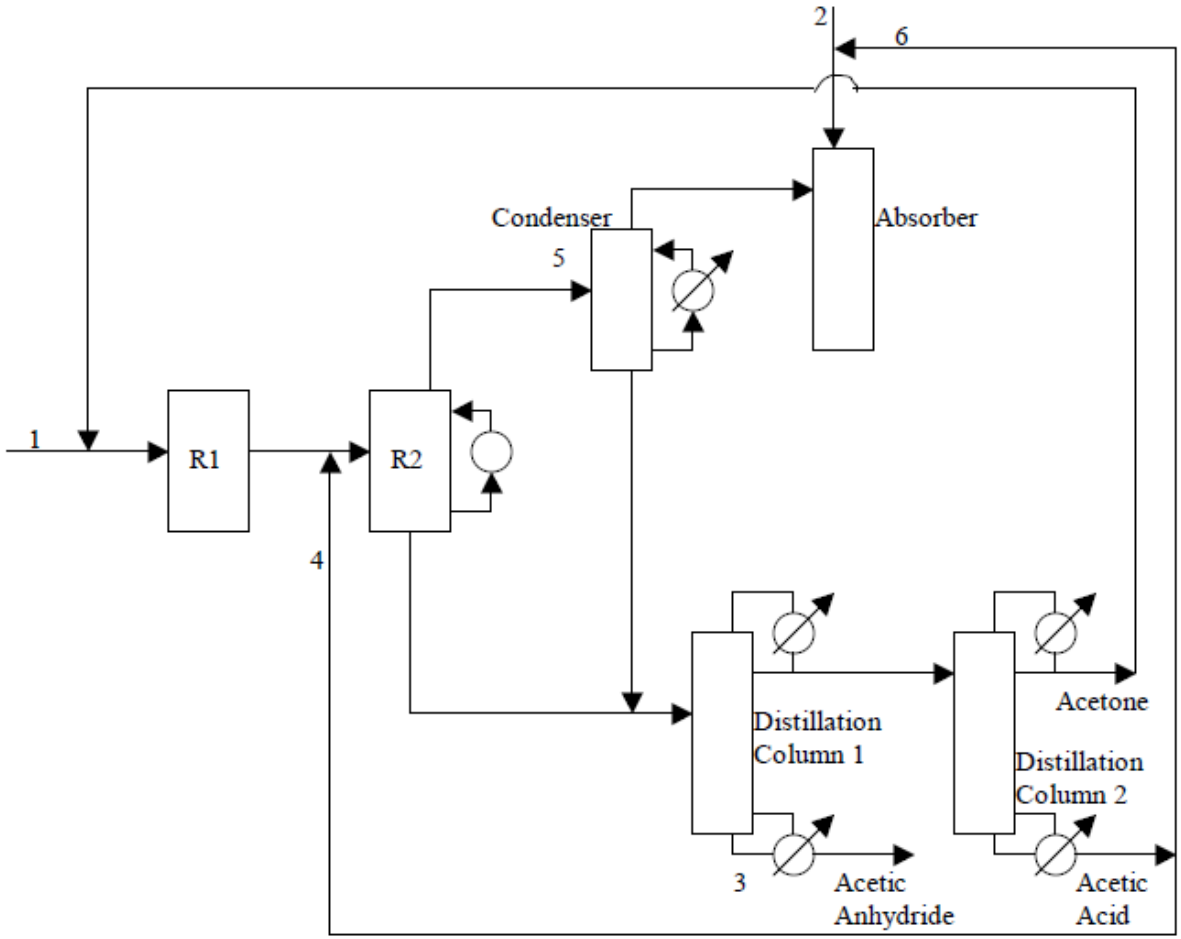
PROCESS INTEGRATION
Part 1: Heat Integration

Exercise Session

Chapter 4-5

- Refer to: Smith, 2005


2
6
Condenser
5
Absorber
1
R1
R2
4
Distillation
Column 1
Acetone
Distillation
Column 2
3
Acetic
Anhydride
Acetic
Acid

Stream	Description
1	Fresh acetone going in the system.
2	Fresh acetic acid going in the system.
3	Distillation column 1 reboiler.
4	Recycle acetic acid going to reactor 2.
5	Flash/condenser
6	Recycle acetic acid going to absorber

Stream No.	Condition	FCp (Btu/hr°F)	T_{in} (°F)	T_{out} (°F)	Q available 10^5 Btu/hr
1	Cold.	4893	77	133	-2.74
2	Cold	2173	77	129	-1.13
3	Cold	5.0×10^5	156	196	-205
4	Hot	1.23×10^4	244	77	21.0
5	Hot	2.75×10^5	176	128	132
6	Hot	1046	244	129	1.2
				Total =	-50.25

From the case study above with $\Delta T=10^{o}F$, answer all the questions below:

1. Propose a new heat exchanger network (HEN) for energy savings
2. Estimate the maximum energy recovery (MER), hot utility, and cold utility based on the proposed design
3. Redraw a new schematic diagram by including the heat exchangers based on the proposed design
4. If the hot utility available is from $350^{o}F$ saturated steam, what can you further propose to reduce the cost?
5. Describe the answer of No. 8 on a grand composite curve

Thank you