

PROCESS INTEGRATION

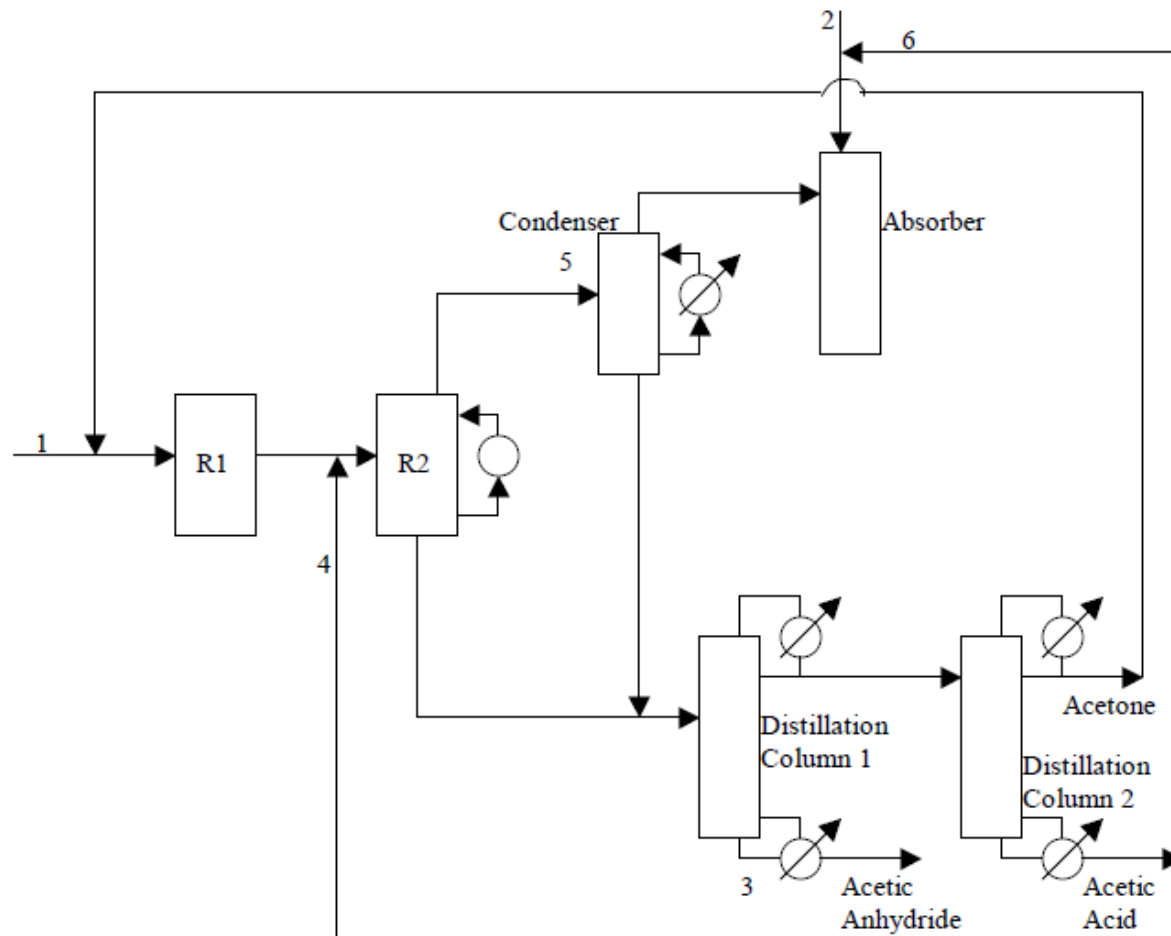
Part 1: Heat Integration

Exercise Session
Chapter 4-5



- Refer to: Smith, 2005





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	5.0x10 ⁵	156	196	-205
4	Hot	1.23x10 ⁴	244	77	21.0
5	Hot	2.75x10 ⁵	176	128	132
6	Hot	1046	244	129	<u>1.2</u>
Total =					-50.25

From the case study above with $\Delta T=10^{\circ}\text{F}$, 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°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

