Decomposition of MTBE in a Reactive distillation column

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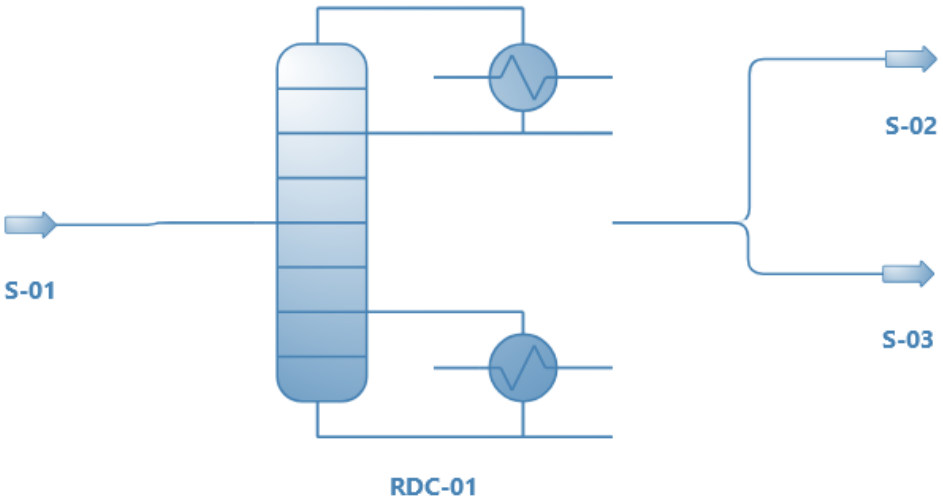
Background & Description:

In production processes involving chemical transformations, reaction and separation are usually handled in distinct devices. A simpler design integrating reaction and separation by distillation or distillation/liquid extraction in the same unit is in many instances possible and realized in one piece of equipment, a reactive distillation setup. The standard configuration of a reactive distillation column includes a rectification section, a reaction section and a stripping section. A set of reactive trays or reactive packing is used as a reaction section.

In this simulation, a reactive distillation column has been used that produced isobutene and methanol from the decomposition of methyl tert-butyl ether (MTBE). The reactive distillation column has 16 stages, a partial reboiler, and a total condenser. The column fed is with pure MTBE. The reactive stages range from 6 to 11. After simulation; Isobutene is a top product in this column and Methanol is a bottom product of this column. Whose molar composition are 0.850056 and 1.0000 as respectively get in this simulation.

Flowsheet:



Results:

RESULT TABLE				
Object	**S-01(FEED)** (MTBE)	**S-03(BOTTOM PRODUCT)** (METHANOL)	**S-02 (TOP PRODUCT)** (ISOBUTENE)	
Temperature	154.1	141.166	73.6497	°C
Pressure	11.15	11.15	11.15	bar
Molar Flow	10.00	9.13162	10.8684	kmol/h
Molar Fraction (Overall Liquid) / Methanol	-	1	0.0799	
Molar Fraction (Overall Liquid) / Isobutene	-	1.02513E-12	0.9201	