Extractive-Distillation Methods for Methanol-Recovery Systems in the TAME Reactive-Distillation Process

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Background & Description:

TAME (tert-Amyl methyl ether) is an ether used as a fuel oxygenate. Three main uses of TAME are:

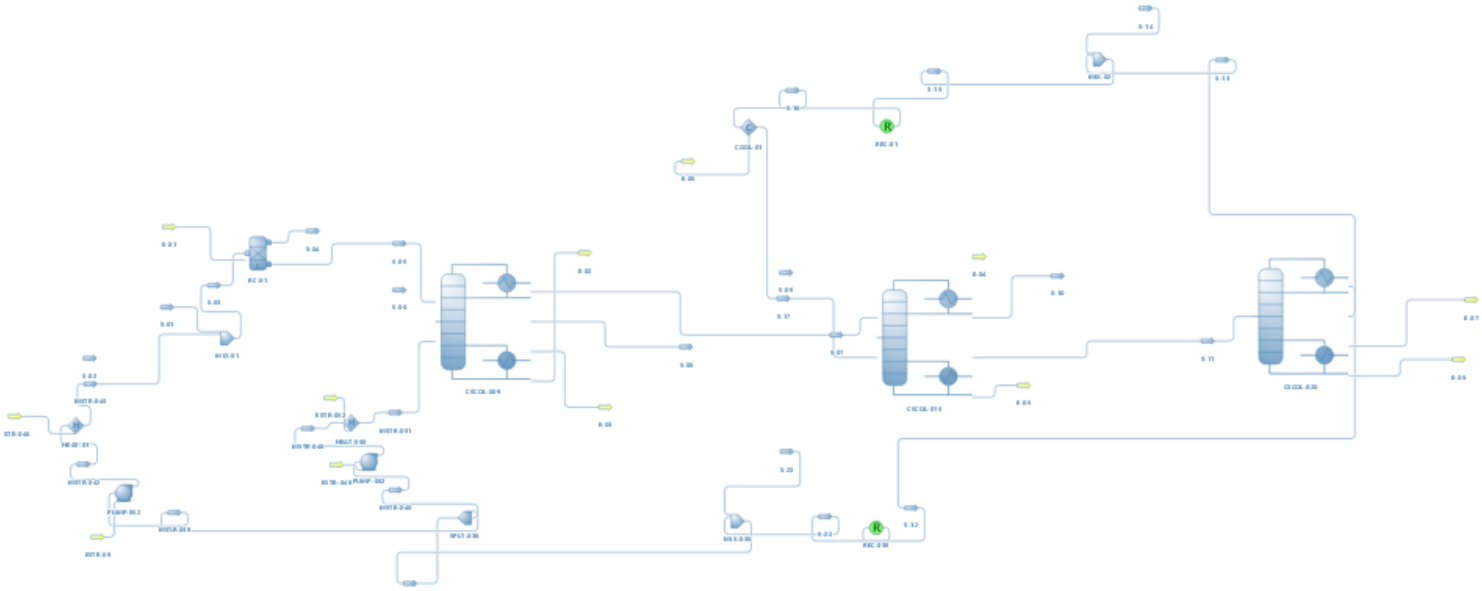
1. To raise the oxygen content in gasoline
2. Increase octane enhancement
3. It reduces exhaust emissions of volatile organic compounds

In terms of steady-state economics **extractive distillation** is much more attractive than the pressure swing method as far as capital investment and energy costs are concerned. Hence we design a flow sheet for an extractive distillation method.

Process:

The design consists mainly of four components namely a conversion reactor and three separate distillation columns. Fresh feed combined with methanol is fed to reactor. The reactor effluent with methanol stream is then fed to the first column (stage 28, 23), the bottom product of which gives majorly TAME. The distillate from the first column is then fed to the second column along with recycled water stream (stage 6, 2).The bottom product of the second column is then sent to the third column which gives majorly methanol and water as distillate and bottom respectively. The distillate and the bottom product is then recycled.

Flowsheet:



Results:

Thus according to this flow sheet, we get majorly TAME as our desired product.

Conclusions:

Hence, the method of extractive distillation is more advantageous as far as steady state economics as considered (40 % lower capital investment and 60% lower energy cost). However, the plant wide dynamic controllability is equivalent.