

Design of an industrial 1,4- Dioxane Dehydration process with light feed impurity

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A. Process Flow Sheet Description

The process involves a feed stream (S-1) comprising of aqueous 1,4-Dioxane and water with small amounts of light impurity Tri-Ethylamine (TEA) fed to a pre-concentrator column in order to remove the impure TEA. The bottom product of DC-1 (S-3) is recycled along with the distillate stream (S-7) of DC-3 and feed to DC-2. Thus, with a low-pressure column (DC-2) operating at 1 atm and a high-pressure column operating at 8 atm (DC-3), 1,4-Dioxane and water can be separated using a two column sequence. Streams S-6 and S-8 are rich in water and 1,4 -Dioxane appropriately.

B. Results and Discussion

A rigorous column (DC-1) was simulated for the separation of Tri-Ethylamine with number of stages set to 7 and a bottoms rate of 1177.16 kg/h . Two rigorous columns (DC-2 and DC-3) were implemented to separate 1,4-Dioxane and water. The number of stages and product mass flowrates were provided as specifications. The results are tabulated below

Block-Name	Property Package	Number of Stages
DC-1	Modified UNIFAC (Dortmund)	7
DC-2	NRTL	14
DC-3	Modified UNIFAC (Dortmund)	11

Stream Number	Component	Mass-Fraction
S-6	Water	0.99177
S-8	1,4-Dioxane	0.99946