

Distillation Apparatus Fitness for Purpose Review

Background and Current Situation

In the commercial world it is not uncommon to repurpose a process unit for a different service than current operations. The process unit to be assessed in this study is the trayed distillation column and all supporting facilities such as heat exchangers, feed and product drums, pumps, distillation trays and measurement and control devices.

Proposed New Operation

We have been asked to assess the capability of this apparatus to recover azeotropic methanol from a waste stream containing 5% methanol in water. At present the company pays a disposal fee for this solution equal to fifty cents per gallon. If they can purify the aqueous stream to a methanol content to below 0.1% by volume, then it can be disposed of through the local sewer system saving the disposal fee.

A two-mode operation is proposed. First operate the system as a stripper and remove sufficient methanol from the bottoms product to produce a stream of low enough methanol content for disposal to sewer, thus eliminating the waste disposal cost for that stream.

The overhead from the stripper will be accumulated and run through the column in rectifying mode to produce the desired overhead product. Any methanol recovered represents fresh methanol that does not have to be purchased. The column bottoms can either be disposed of to the sewer if of sufficiently low methanol content, or returned to stripper feed for further methanol removal.

Task

Evaluate the hydraulic capacity of the distillation column and its ancillaries to determine the feasible operating capacity in each mode. Attention should be paid to how close each of the ancillary items is operating to its capacity limit in both modes of operation.

A statement of work describing all tasks to be performed and a timeline for each task deliverable is due on November 19. Execution of the work described will be the task for the Spring semester. The complete report is due in draft for comment form on April 29. The final report will be due close of business May 9, 2022.

Work Team

A minimum of two people and a maximum of three. Work to start no later than September 20, 2021.

Project Sponsor

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