

METHOD OF DESIGN FOR PACKED COLUMN TYPE HIDiC

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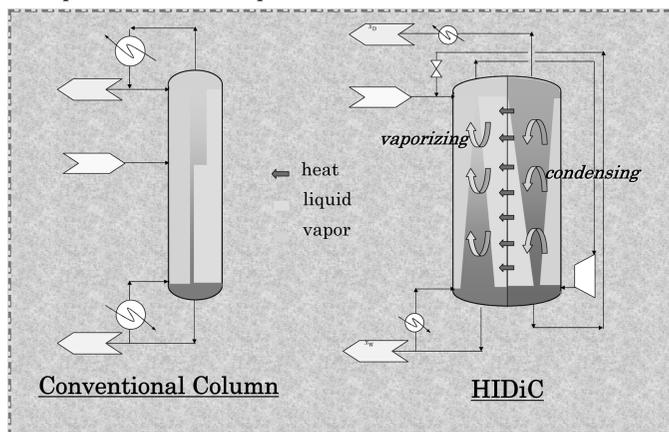
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INTRODUCTION

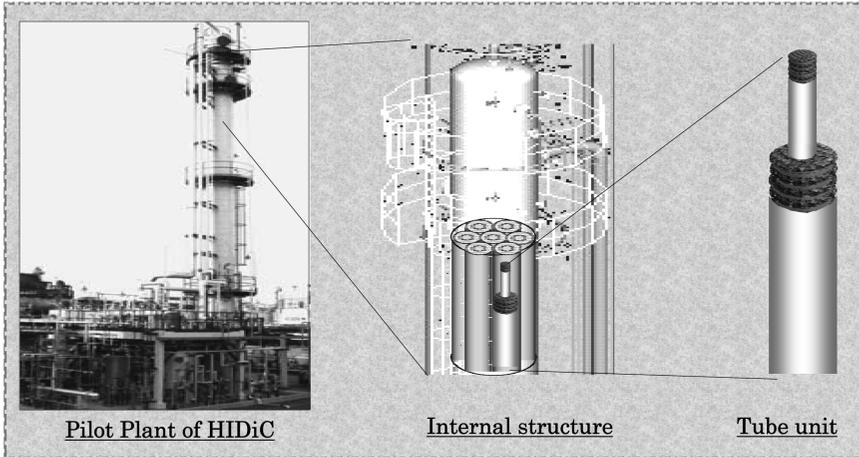
In Japan, Pilot Plant of the HIDiC was built in 2005. It was commercial base scale and already achieved the consecutive distillation for 1000 hours. The energy consumption of the pilot HIDiC was only about 70% of that of a conventional distillation column. The HIDiC can lower reboiler and condenser load by heat exchange between rectifying section and stripping section. Therefore, it was a distillation column of an energy saving model. In this study, we design to the HIDiC with structured packing, and examined separation performances used to experimental and simulation, and finally discussed the relationship between tower specification and design procedure.

Principle of the HIDiC compared with conventional column

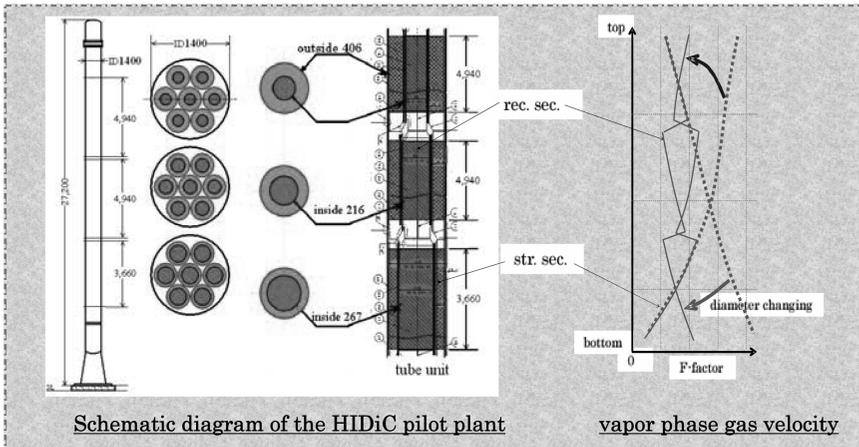


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Configuration of the pilot scale HiDiC



Internal structure of the pilot HiDiC



The diameter of tube side section changed to three stages from the top to the bottom. The gas velocity change to vertical direction in the column. Therefore, the Cross-sectional area of the rectifying section has to be reduced to the top of column, and the stripping section has the reverse. In the result, the gas velocities become constant in column, that is making capacity high.

CONCLUSIONS

Process design by the heat integrated distillation column (HIDiC) for binary system was discussed with Benzene-Toluene. In this work, the following results were obtained. It clarified importance of rigor evaluating heat capacity between rectifying and stripping section to design a HIDiC. Authors decided structure of a concentric HIDiC with structured packing and had been found the design procedure.

In this design procedure, the pilot HIDiC succeeded in consecutive run for 1000 hours in Japan.

ACKNOWLEDGEMENT

This work was supported by New Energy and Industrial Technology Development Organization (NEDO) in Japan.

REFERENCES

- M. Nakaiwa, *et al.*, Chem. Eng. Res. Des., *81*, 162–177 (2003).
- K. Iwakabe, *et al.*, Applied Thermal Engineering, *26*, 1362–1368 (2006).
- T. Nakanishi, *et al.*, Comput. Chem. Eng., *S23*, 855–858 (1999).