

Life Cycle Assessment of Na-Y Zeolite Membrane for Water/IPA Separation in Japan

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(A) Technical research proposal to solve concrete problems

SDGs Targets/Indicators:

- 7. Affordable and clean energy
- 9. Industrial innovation and infrastructure
- 13. Climate action

Abstract:

In general, distillation has a large energy consumption rate in crude oil refining process. The separation of water and alcohols is difficult due to the azeotropic distillation and the large specific heat of water, and the energy consumption is remarkable. The separation of water / IPA taken up in this proposal is also accompanied by azeotropic distillation, and energy saving by dehydration process using membrane separation method is expected. However, the effectiveness of the energy reduction effect and environmental load reducing effect including the manufacturing cost and durability of the zeolite membrane has not been examined yet. In this research, the hybrid process with membrane separation including conventional distillation process and heat and products. We propose further refinement of energy cost and environmental load estimation for co-production system. As a preliminary survey, we surveyed the current water / IPA separation process and energy consumption. In addition, in this survey, we calculated and compared the evaluation on the membrane with reference to the resources and energy consumption necessary for membrane synthesis in our own laboratory. In addition, the environmental impact of the process combining the distillation and membrane separation and the conventional process was compared and discussed.