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LETTERS TO THE EDITOR

Comments on Special Distillation Processes

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The purpose of this letter is to offer some comments regarding the topic of special distillation processes.

Distillation, with its unique advantages in operation and control, becomes a very powerful separation tool in laboratory and industry. Although many promising separation methods are constantly put forward by engineers and scientists, most of them cannot become alternatives of distillation on a large product scale. Among all distillation processes, special distillation processes possess an important position. Herein, a new term, "special distillation processes," is proposed, that is, the distillation processes by means of which the mixtures with close boiling point or forming an azeotrope can be separated into their pure constituents. The other distillation processes are, therefore, called ordinary distillation processes. We are interested in the field of special distillation processes, and have been working on them for many years [Lei et al., 2003, 2005; Li et al., 2005].

Table 1 gives a distribution of 20 articles except one comment [Lei et al., 2003] with respect to ordinary distillation and special distillation processes in the Korean Journal of Chemical Engineering from 1984 to 2005 (April) by the title "distillation" search. The parenthesis denotes the number of articles.

It can be seen that except for only four articles [Assabumrungrat et al., 2004; Kim et al., 1996; Seo et al., 1999; Ko et al., 2002] with respect to special distillation processes, the others are concerned with ordinary distillation processes. However, the situation is different in the regional journal, AIChE Journal, where just in the year 2004 there are up to nine articles with respect to special distillation processes.

Table 1. Article distribution among distillation processes

	Contents	Total
Ordinary distillation	1. Heat integration (4)	16
	2. Batch distillation (1)	
	3. Control (4)	
	4. Thermal coupled distillation (5)	
	5. Mathematical model (2)	
Special distillation	1. Extractive distillation (1)	4
	2. Reactive distillation (2)	
	3. Molecular (diffusion) distillation (1)	

We feel that the future research hotspot in the field of distillation may be the special distillation processes. Special distillation processes can be divided into two types: one with mass separating agent (i.e., the third component or solvent added) and the other without mass separating agent. The former involves azeotropic distillation (liquid solvent as the separating agent), extractive distillation (liquid

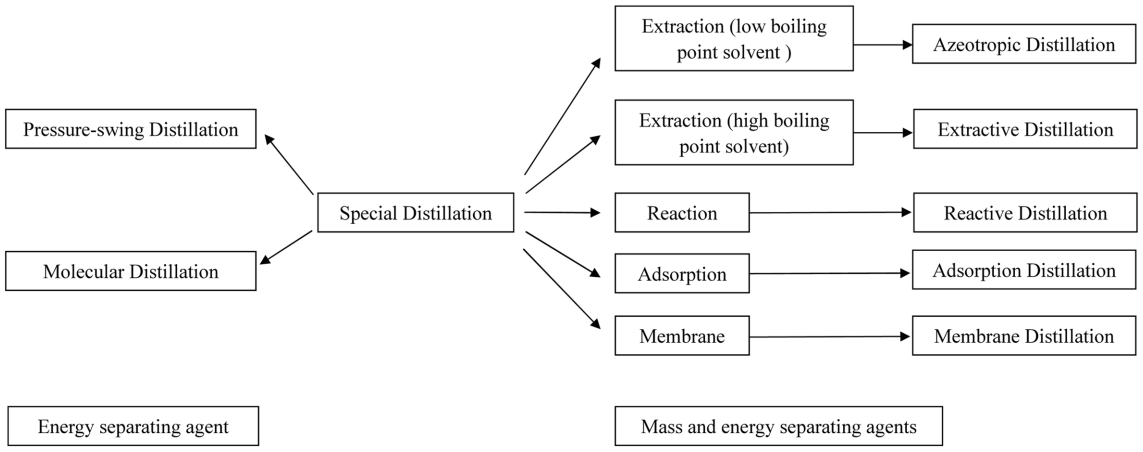

Fig. 1. Categories of special distillation processes.

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and/or solid solvents as the separating agent), catalytic distillation (catalyst as the separating agent by reaction to promote the separation of reactants and products), adsorption distillation (solid particle as the separating agent) and membrane distillation (membrane as the separating agent); the latter involves pressure-swing distillation and molecular distillation. But molecular distillation is special in that its originality does not come from the purpose for separating the mixtures with close boiling point or forming an azeotrope, but for separating heat-sensitive mixtures in medicine and biology.

Fig. 1 shows the categories of special distillation processes according to the types of separating agents. Process integration is brought out in the ones with mass and energy separating agents, which has the advantages of energy savings, reduction of equipment investment, and so on. For instance, in reactive distillation, reaction and separation take place in the same device; for exothermic reactions, the reaction heat can be used for vaporization of liquid; for equilibrium-controlled reactions the limitation of equilibrium conversion is eliminated by continuous removal of products from the reaction zone. Compared with ordinary distillation processes, special distillation processes are a recent development and original thoughts may be relatively easily sought in the academic research.

Undoubtedly, special distillation processes are a very broad topic, and are always being updated. We hope that more excellent articles with respect to special distillation processes would appear in the Korean Journal of Chemical Engineering. In recent years, the impact factor of the Korean Journal of Chemical Engineering in the Science Citation Index (SCI) is the highest among the Asian journals of chemical engineering. We always attend to the development of this journal and believe that it will play a more important role as an international journal in tracing the trend of research and development in chemical engineering. This work is financially supported by the National Nature Science Foundation of China under Grant No. (20406001).

REFERENCES

Assabumrungrat, S., Wongwattanasate, D., Pavarajarn, V., Praserthdam, P., Arpornwichanop, A. and Goto, S., "Production of Ethyl *tert*-Butyl Ether from *tert*-Butyl Alcohol and Ethanol Catalyzed by *β*-Zeolite in Reactive Distillation," *Korean J. Chem. Eng.*, **21**, 1139 (2004).

Kim, S. C., Lee, D. W. and Hong, W. H., "Modeling of Ethanol Dehydration by Diffusion Distillation in Consideration of the Sensible Heat Transfer," *Korean J. Chem. Eng.*, **13**, 275 (1996).

Ko, M. S., Na, S., Cho, J. and Kim, H., "Simulation of the Aromatic Recovery Process by Extractive Distillation," *Korean J. Chem. Eng.*, **19**, 996 (2002).

Lei, Z. G, Li, C. Y. and Chen, B. H., "Extractive Distillation: a Review," *Sep. Purif. Rev.*, **32**, 121 (2003).

Lei, Z. G, Li, C. Y. and Chen, B. H., "Comments on the Paper 'Simulation of the Aromatic Recovery Process by Extractive Distillation' (Ko, M., Na, S., Cho, J. and Kim, H., *Korean J. Chem. Eng.*, **19**, 996 (2002)," *Korean J. Chem. Eng.*, **20**, 1077 (2003).

Lei, Z. G, Chen, B. H. and Ding, Z. W., *Special Distillation Processes*, Elsevier, Amsterdam, 1 (2005).

Li, J. W., Lei, Z. G, Ding, Z. W., Li, C. Y. and Chen, B. H., "Azeotropic Distillation: A Review of Mathematical Models," *Sep. Purif. Rev.*, **34**, 87 (2005).

Seo, Y., Hong, W. H. and Hong, T. H., "Effects of Operation Variables on the Recovery of Lactic Acid in a Batch Distillation Process with Chemical Reactions," *Korean J. Chem. Eng.*, **16**, 556 (1999).