

243k Investigating Reduce-Reuse-Recycle Strategies for Condensation Reactions

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Reduce-Reuse-Recycle strategies are important to industry for a number of reasons. Lower treatment, raw material, and energy costs can provide the competitive edge that companies need in order to gain market share in highly competitive markets. Production facilities planned for construction in developing countries benefit by minimizing utility demands and infrastructure costs. Companies certified to ISO14000 standards may implement such strategies to reduce the environmental impact of their operations.

Application of Reduce-Reuse-Recycle strategies to condensation reactions minimizes the fresh water requirements of a process by substituting water generated by reaction for fresh water. Internal recycling and reuse also decreases the expense of water treatment by lowering the volume of water that must be treated. This frees up capacity at treatment facilities allowing them to support new business.

An existing condensation reaction wastewater stream is considered in this research. The research goal was to develop a process which reclaimed an entrained catalyst from the wastewater stream and provided a minimum amount of treatment to facilitate the reuse of the reaction water as a substitute for fresh water. To meet this goal, process data was collected regarding the wastewater stream. The feed water requirements of onsite water consumers was then determined and compared. Several catalyst reclamation and water treatment technologies were investigated to determine which available technologies would meet the goal. The energy requirements of each technology were determined and compared to energy available for recovery from the production process. The investment and operating cost of each treatment option was subsequently compared. Finally, a recommendation was made based on the results of the cost comparison.

Keywords: Reduce-Reuse-Recycle, condensation reaction, modeling