

Technological prospects for reducing water consumption in oil refineries

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Due to the large water consumption in petroleum refineries, it is very important to study methods to minimize the need for water at refineries, including reuse and other rationalization techniques. Water conservation requires the least effort and investment costs. Recycling (with regeneration) refers to the use of treated wastewater in place of water obtained from outside sources. Water reuse can be direct, when the level of contamination does not interfere in the next process, and after regeneration, when the wastewater must be treated before use in another process. This paper aims to assess these forms of reducing water consumption in refineries, also analyzing the economic feasibility of their implementation. Regarding water reuse, there are promising new technologies that can replace those most commonly used at present (e.g., passage through a membrane bioreactor followed by reverse osmosis or reverse electrodialysis), such as nanofiltration, ion exchange and advanced oxidative processes. Several refineries in the world use treated household wastewater. Water conservation and recycling initiatives also hold promise, including replacement of cooling towers with smaller units and recycling of blowdown into cooling towers and steam generation systems. The pinch technique reduces the need for water withdrawal and its associated costs. In Brazil, the application of water pinch in some current refineries reduces their water consumption by 53.8 to 79.1% for reuse with regeneration. Thus, it is technically and economically feasible to reduce water consumption in refineries by applying the best available techniques for rationalization of water use.

Biography

Felipe Ramalho Pombo completed his doctorate in 2011 at Federal University of Rio de Janeiro and works with optimization of water use in industries. He has published a number of papers in journals and serves as a reviewer for several publications. The most common themes in his research are wastewater treatment, conservation and reuse of water, electrochemistry and environmental management.

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