

Assessing the removal of heavy metals in wastewater treatment plants by means of chemical exergy

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The inherent characteristics of heavy metals are such that even in low concentrations may have a significant polluting effect. Thus, controlling the concentration of heavy metals in the effluent water from wastewater treatment plant is of high interest not only for industrial wastewater facilities but also for municipal wastewater. High heavy metals concentrations result to higher toxicity of the effluent and to notable environmental impact. Therefore, several methods have been incorporated for the reduction of heavy metals from absorbents to membrane filtration systems. Some of these methods have been proved to be effective on some extend. Nonetheless, the degree of effectiveness can only be quantified on an individual basis for each heavy metal substance. There is a lack of evaluation methods of mass fluxes in terms of quality assessment. In addition, an integrated method that would provide one single efficiency of the removal process for all the heavy metal substances that are contained in a flow is a tool that would assist the management and optimization of wastewater treatment plants.

The present study introduces a method that utilizes the chemical exergy of heavy metal substances and their respective concentrations in order to return a single efficiency of heavy metal removal. The method utilizes case studies from Greek wastewater treatment plants in order to provide numerical examples.