

INCREASING THE CONCENTRATION OF PRODUCTS FROM ELECTRODIALYSIS WITH HETEROGENEOUS BIPOLAR MEMBRANE

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Abstract

The process of electrodialysis with bipolar membranes allows producing acid and hydroxide from the corresponding salt. The integration of this process into the technology of treatment of overbalanced wastewater from uranium ore processing in o.z. GEAM DIAMO s.p. in Dolní Rožínka (ČR) has already been described in our previous work. We have identified sub processes of the technology in which sulfuric acid and sodium hydroxide of various concentrations and purities are used. It was also found that the main limitation for greater use of sulfuric acid as well sodium hydroxide produced by means of electrodialysis with bipolar membranes is particularly maximum attainable concentration of both products. For the standard three-chamber arrangement of membrane stack it acquires values which does not exceed 5 wt%. This paper focuses on the description and evaluation of laboratory experiments aimed at searching ways to increase the maximum achievable concentrations of sulfuric acid and sodium hydroxide produced. Experiments were performed using a laboratory test unit EDR-Z/10-0.8 (MemBrain, Czech Republic) operated in a standard configuration with monopolar membranes as well as in the arrangement with bipolar membranes. In doing so, the acid and hydroxide solution produced in the three-chamber arrangement were further concentrated using standard electrodialysis and alternatively was tested a four-chamber arrangement with bipolar and protective membrane. Both studied methods allow obtaining products of higher concentration. As shown particularly preferable is to use classical electrodialysis with monopolar membranes. This method allowed up to a twofold increase in the maximum achievable concentrations of both acid and base.

Key words:

Electrodialysis, Bipolar Membrane, Sulfuric Acid, Sodium Sulfate, Sodium Hydroxide