Continuous H_2SO_4 recovery by diffusion dialysis.

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Abstract

Electroplating wastewater drainage presents severe ecological pollution challenges because of its acidity and heavy metals contents. Diffusion Dialysis (DD) is considered one of the most efficient techniques for the valorisation of acid solutions. Recycling sulphuric acid has advantages in terms of reducing environmental pollution as well as saving disposal costs and raw material supply. Diffusion Dialysis (DD) is an innovative membrane technology proposed for the treatment of acidic wastewater due to its clean nature, operational simplicity, low installation and low energy consumption [1, 2].

In the present work, a large scale DD module operated at continuous mode was evaluated for the separation of sulphuric acid from copper salt reproducing the conditions of acidic wastewater obtained in a real electroplating plant. The module was composed of 18 Fumasep FAD membranes (80 cm length, 10 cm width and 0.03 cm thickness) and 19 spacers leading to 10 diffusate channels and 9 retentate channels. A high acid recovery higher than 75 % and a large copper rejection of at least 90 % were reached with a channel velocity between 3 and 6 mm/s. Therefore, Fumasep FAD was suitable to the purification of this particular electroplating wastewater. Moreover, a mathematical model has been developed based on a previous model already developed and validated for a batch operation. The permeabilities correlations obtained for the acid, water and copper were suitable to theoretically reproduce the behaviour of the DD for this type of solution.

Keywords: Diffusion Dialysis; Electroplating wastewater treatment; Continuous operation.

Acknowledgments

This work has been funded by EU within the ReWaCEM project (Resource recovery from industrial waste water by cutting edge membrane technologies) – Horizon 2020 program, Grant Agreement no. 723729.

References

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