Electrodialytic extraction of heavy metals from Greenlandic MSWI fly ash as a function of remediation time and L/S ratio

The management of Greenlandic municipal solid waste incineration (MSWI) fly ash could be improved. Presently, the fly ash is disposed of in Norway as the fly ash is classified as hazardous waste. Fly ash contains high amounts of leachable heavy metals, but also resources that could be beneficial for reuse. In electrodialytic remediation a direct current is applied to a contaminated particulate material to remove heavy metals from the material. In this study, electrodialytic remediation was applied to a Greenlandic MSWI fly ash from a small waste incinerator in Ilulissat. The fly ash was characterized before and after the electrodialytic remediation experiments for heavy metals content, amount of soluble heavy metals and pH. Before the electrodialytic experiments the water solubility of Ba, Cr and Pb was high from the alkaline fly ash. Six electrodialytic remediation experiments were made, where the fly ash was suspended in distilled water in different liquid to solid (L/S) ratios. Remediation times of 7 and 14 days were tested and the current strength was 50 mA in all experiments. The highest removal was seen when an acidic pH in the fly ash suspension was obtained. In an experiment lasting 14 days with L/S 10, up to 60 % Cd, 45 % Zn, 20 % Ni and Ba was removed. Regardless of the remediation time and L/S ratio, the fraction of soluble Ba, Cr and Pb decreased due to the electrodialytic remediation. The electrodialytic remediation method showed potential as a treatment method for the Greenlandic fly ash.

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