Electrodialytic treatment of Greenlandic municipal solid waste incineration fly ash

In Greenland, fly ash could contribute as a local resource in construction as a substitute for cement in concrete or clay in bricks, if the toxicity of the ash is reduced. In this study, fly ash from three different Greenlandic waste incinerators were collected and subjected to electrodialytic treatment for removal of heavy metals with the aim of enabling reuse of the fly ashes. Seven electrodialytic experiments treating up to 2.5 kg of fly ash in a 10 L suspension were made. The heavy metal removal was mostly dependent on the initial concentration in the fly ash. Heavy metal leaching was examined before and after treatment and revealed overall a significant reduction in leaching of Cd, Cr, Cu, Pb and Zn; however, Cr and Pb leaching were above Danish guideline levels for reuse purposes. Hg leaching was also reduced to below Danish guideline levels, although only investigated for one fly ash. Hexavalent Cr was not the dominant speciation of Cr in the fly ashes. Ettringite formed during electrodialytic treatment in the fly ash suspensions at pH above 12. The total concentration of eligible components for reuse such as CaO, SiO2 and Al2O3, increased during the electrodialytic treatment.

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