CHARLOTTE NILSSON has a Master of Science degree in Chemical Engineering from Mälardalen University in Eskilstuna, Sweden, as well as a Technology Licentiate degree in Land and Water Resources Engineering from the Royal Institute of Technology (KTH) in Stockholm, Sweden. She been enrolled as an industrial doctoral student in chemistry at the Man-Technology-Environment (MTM) Research Centre at Örebro University since 2013, through collaboration with Fortum Waste Solutions AB (former Sakab). Her research has been focused on recovery of phosphorus from ashes rendering from incineration of municipal sewage sludge, and the potential to use these ashes to retain ions from water.

Phosphorus is an essential element for all living, and is one of the key components of commercial fertilizers. These resources are, however, limited and phosphorus recycling is a necessity to produce enough food to the growing population. One thoroughly studied resource is sewage sludge, which contain high concentration of phosphorus. The annual production of sewage sludge produced in Sweden amounts to 200 000 metric tonnes, which is sufficient to cover 40% of the fertilizer need. Direct application of the sludge on arable land is increasingly questioned because of the associated risk for spreading of contaminants, and the use of incineration as means to dispose of the sludge is increasing. This causes the organic contaminants to decompose, while also altering the chemical speciation of the phosphorus to a more desired form.

The work presented in this thesis is based on sludge rendering from 10 different municipal wastewater treatment plants, all located within the area of Mälardalen, Sweden. The major findings indicate that thermal treatment alters the chemical speciation of iron phosphate to calcium associated species. This effect was not as pronounced for aluminum phosphate, and statistical evaluation of the data suggest that the total concentration of aluminum hampers this transformation. Moreover, the produced ashes were successfully used to remove both metal and phosphate ions from solution, which was attributed to crystalline iron oxides formed during the incineration process.

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