## Abstract

Layered double hydroxides (LDHs) are a subgroup of clay minerals. The general formula $M(II)_{1-x}M(III)_x(OH)_2A_{x/n}$, with $0.16 \leq x \leq 0.33$, M(II) and M(III) are di and trivalent cations, A is the intercalated anion and n is the charge of the anion. LDHs are interesting due to their potential applications in many areas spanning from environmental remediation to steam reforming. The work presented in this thesis can roughly be divide into 3 sections. The first section focus on the intercalation of para-aminosalicylate (PAS) into LDHs. PAS is used in the treatment of tuberculosis and it is found that PAS can be intercalated into LDHs structure. However large quantities (20 % to 41 %) of amorphous Al was discovered by $^{27}Al$ SSNMR. In the second part the structure of $ZnAl_4$-LDHs is studied. A larges synthesis optimization study was required to obtain a sample of sufficient purity to perform structural characterization on. It was found that it is absolute essential that these materials are characterized using techniques spanning over multiple length scales. In the third section is the Mg and Ni distributions in $Mg_{2-x}Ni_xAl$-LDHs is studied. It was documented that Mg, Ni distributions in LDHs can be described using a binomial distribution. The overall conclusions of this dissertation is that it is essential to combine the standard characterization techniques (PXRD and elemental analysis) with atomic characterization techniques such as SSNMR and EXAFS. It is epically important to use these techniques to validate LDHs structure and not only to study the intercalated anion.