Use of mineral fertilizer for agricultural leached samples from landfill

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Abstract
The aim of this study was to determine the mineral formed in the chemical precipitation of ammonia in landfill leachate by X-ray diffraction (XRD), and assess its possible use as an agricultural fertilizer. The main mineral struvite ($\text{NH}_4\text{MgPO}_4 \cdot 6\text{H}_2\text{O}$) was found followed by carnallite ($\text{KMgCl}_3 \cdot 6\text{H}_2\text{O}$). The latter is a mineral from which it extracts the potassium chloride starting material for the production of fertilizers.

Key words: Struvite, carnallite, agriculture

Introduction
Currently, Brazil imports about 90% of the potash it uses in agriculture. Finding solutions to meet this demand becomes increasingly necessary. Furthermore, precipitates of landfill leachate can contain significant amounts of minerals that contains in its structure elements used as agricultural fertilizers (nitrogen, phosphorus and potassium). They were analyzed by X-ray diffraction and XRD method in the Geosciences Institute - UNICAMP. Previous experiments using magnesium and sodium phosphate hydrogen chloride resulted in the presence of salt (NaCl), which is bad for agriculture.$^2$ With the reagents used in this test, there was the presence of salt. All diffraction showed the presence of struvite and carnallite. In Figure 1 the characteristic peaks of the two minerals are observed (top) and PDF-2 standards (bottom) used in the analysis.

Results and Discussion
The analysis experiment was conducted with factorial design with two levels and three factors (pH, molar concentration of magnesium and phosphate) ($2^3 = 8$), totaling eight treatments. The assay was performed with phosphoric acid reactants and magnesium oxide. With the precipitated material were performed by powder XRD method in the Geosciences Institute - UNICAMP. Previous experiments using magnesium and sodium phosphate hydrogen chloride resulted in the presence of salt (NaCl), which is bad for agriculture.$^2$ With the reagents used in this test, there was the presence of salt. All diffraction showed the presence of struvite and carnallite. In Figure 1 the characteristic peaks of the two minerals are observed (top) and PDF-2 standards (bottom) used in the analysis.

Conclusions
It is concluded that the material has precipitated struvite (potential source of N and P) and carnallite (K source potential).

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