

**ANALYSIS OF ORGANIC NITROGEN COMPOUNDS AND THEIR
TRANSFORMATION IN BIOLOGICALLY TREATED SLUDGE FROM
PHARAMCEUTICAL AND EXPLOSIVES INDUSTRIES**

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ABSTRACT

Many nitroaromatic compounds (NACs) and explosives are of environmental concern because of their toxicity and their tendency to transform to more watersoluble compounds. These compounds are widely spread in the environment due to the large amounts used in industrial and military activities. Complex mixtures can be formed during different degradation and transformation processes in the environment. These mixtures are difficult to analyse. Despite several studies, the transformation processes and reaction products of NACs in soil and water systems are still largely unknown.

In this study, sludge, from a water treatment plant that takes care of wastewater from pharmaceutical and explosives industries, was biologically treated. Transformation and degradation of the explosives and nitroaromatics in the sludge during the different treatments was studied. The sludge was treated under aerobic or anaerobic conditions. LC/MS and GC/MS were used to analyse the explosives and nitroaromatics in the sludge, before and during the treatments. Mass spectrometric detectors can be used for identifying unknown substances by specific fragmentation patterns. LC-MS is used for polar and thermally unstable compounds while GC-MS has the advantage of available spectral libraries for comparison and identification of unknown compounds.

This study showed a decrease in the amount of explosives and nitroaromatics during both the aerobic and anaerobic treatments, except for some pharmaceutical compounds that seem to accumulate in the treated sludge. The degradation of nitroaromatics seems to have been successful for both the aerobic and the anaerobic system.