

P-XTRACT: PHOSPHATE RECYCLING FROM A LOCAL WASTEWATER TREATMENT PLANT

Lorenz Bier-Schorr, Philipp Kurz

Institut für Anorganische und Analytische Chemie und Freiburger
Materialforschungszentrum (FMF), Albert-Ludwigs-Universität Freiburg, Germany

Since 2017, the European Union has defined phosphate as a critical raw material.[1] The EU itself has no convenient deposits of phosphate rock as primary material for an economic production of P-fertilisers. In the course of a phosphate recycling offensive of the German federal government, communal sewage plant operators are obliged to recover high amounts of phosphate from the sewage water. However, numerous procedures for achieving this goal are currently being explored, but as a standard route has not been established yet, phosphate recycling from wastewater is a currently very active research field.

Our group supports the project P-XTRACT, which aims to develop a possible procedure to recycle phosphate regionally from sewage water.[2] The project coordinator is the association for sewage treatment Staufener Bucht, which is building a combustion plant for sewage sludge in Grezhausen close to Freiburg. The operation of this plant is planned to start in winter 2023. Among other topics, our contribution to the project contains the analysis of the sewage sludge raw materials, combustion experiments in the laboratory as well as detailed characterizations of the obtained sewage sludge ashes.

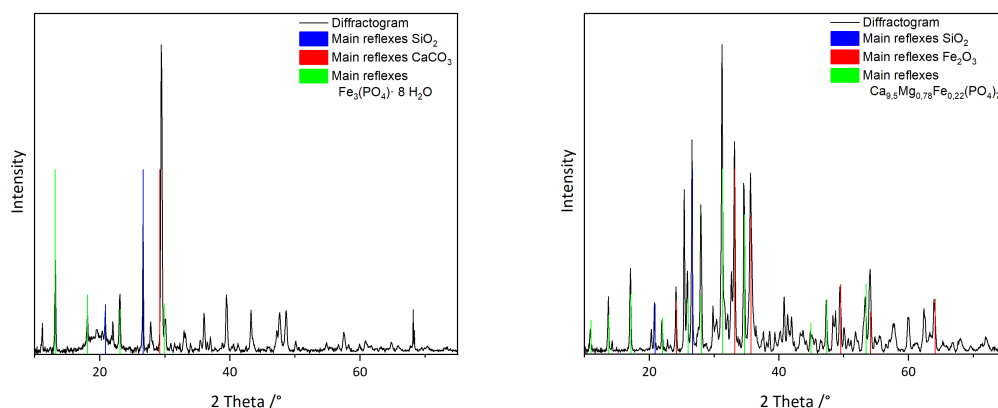


Figure 1: Left - X-ray analysis of a sewage sludge starting material. Right - X-ray analysis of the ash obtained after combustion in a pyrolysis furnace at 815 °C.

Furthermore, we investigate possibilities to influence the combustion chemistry by adding additives such as alkali carbonates in order to obtain products that can be used as P fertiliser in the end.[3] The presentation will provide an overview of our first results with a special focus on the inorganic chemical species and transformations occurring as sludge is converted into ash. By running normalized tests on phosphate solubilities, it is additionally possible to get rough estimates on the plant availability of the phosphate in the obtained “model ashes”.

[1] European Commission "2017 list of Critical Raw Materials for the EU", **2017**.

[2] <https://azv-staufener-bucht.de/p-xtract/>

[3] W. Werner. *Monographie über Herstellung, Eigenschaften und Wirkung der Rhenania-Dünger*, M & H Schaper, Hannover, **1967**.