

FLASHPHOS – complete thermochemical recycling of sewage sludge

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The FlashPhos process will recover high-quality white phosphorus and other raw materials at large scale using sewage sludge as input material. A pilot plant is currently being developed by an international consortium in the FlashPhos project (Horizon 2020 Grant 958267). To select optimal process conditions for the design and operation of the pilot plant, this study investigates the thermal behaviour of sewage sludge. Combustion, melting and reduction of sludge from different sources are studied both theoretically and experimentally. The experimental investigations were performed in DSC-TGA, establishing the starting temperatures and rates for these different processes. The initial steps consist of drying, volatilization, and combustion reactions, releasing the chemical energy stored in the organic part of the sludge. In the FlashPhos process, this combustion energy is used for heating and melting the ash, which saves a considerable amount of energy. In a second part, the melting point and fusion enthalpy of the ash is studied. Finally, the required temperature and reaction rate of the reduction of the molten ash with carbon is investigated. These insights are crucial for the design and optimization of the thermal process. The obtained values could be compared and complemented with theoretical insights from thermodynamic calculations, such as the expected melting point, solubilities, equilibria and enthalpies.