Changes in filtration properties of digested sludge under the influence of magnetic field

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A B S T R A C T

A key element in the management of sewage sludge is the process of sludge dewatering. The reduction of sludge hydration is the basis for its efficient and economical drying and also transport, natural utilization, or combustion. An important aspect is also the quality of supernatant from sludge dewatering. Supernatant is recirculated to the wastewater treatment process and increases the load of pollution in the influent wastewater. In order to efficiently dewater sewage sludge, conditioning agents, especially polyelectrolytes, are used. There are many known and tested conditioning methods such as chemical, physical, biological, as well as their combinations. In this study, the possibility of sludge conditioning prior to the dewatering process was investigated. Ferric coagulant, polyelectrolyte, and magnetic field generated by a solenoid were used as conditioning agents. It was suggested that dual conditioning of sludge with ferric coagulant and polyelectrolyte could be effectively supported by the use of a magnetic field. It was assumed that the magnetic field would enhance the forming of rigid and condensed dry matter structures in the sludge. Such changes in the structure and properties of sludge could allow for an easier extraction of the water contained in the flocs. Substantial importance was attributed to the presence of the paramagnetic material in the conditioning mixture. It was concluded that the superior method of conditioning was the dual method using the PIX-113 and polyelectrolyte. The use of the magnetic field caused heterogeneous changes in the characteristics of the conditioned sludge. The doses of the PIX coagulant and the direction of sludge flow by the solenoid were the main variables in this study.

Keywords: Digested sludge; Conditioning; Polyelectrolyte; Ferric coagulant; Magnetic field; Dewatering

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