

# **Application of dielectric properties measurement in microwave sludge processing**

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Food industry sludge has a complex and resistant structure to biological degradation. Therefore the main aim of sludge pre-treatment is modify the sludge structure for enhanced utilization in biological process, such as composting or anaerobic degradation. Microwave irradiation is an intensive method to assist the hydrolysis of macromolecules in sludge, what make suitable to reach enhanced biodegradability under aerobic conditions or increase the biogas yield and accelerate the rate of anaerobic digestion. During the sludge pre-treatments the modification of physicochemical structure of sludge, i.e. disintegration of sludge flock, disruption of cell; the dielectric parameters are changed, as well.

In our work we focused on the determination of dielectric constant and dielectric loss factor of different types of food industry sludge and the change of dielectric parameters during the wastewater treatment technology and also during microwave sludge pre-treatment. There was experienced, that the organic matter solubility and biodegradability increased due to the thermal effect of microwave irradiation. Our experimental results verified that a strong correlation was found between the change of dielectric parameters and the change of biodegradability indicators. These relationships enable to develop an in-line and real-time control method to estimate the efficiency of sludge conditioning process prior to aerobic and anaerobic utilization.

**Keywords:** microwave, food industry sludge, biodegradability, dielectric properties

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