

# Comparison between a two-stage and single-stage digesters when treating a synthetic wastewater contaminated with phenol

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## Abstract

Phenol is a pollutant found in many industrial wastewaters, which diminishes biogas formation in anaerobic digesters. In this study, a two-stage (acidogenic and methanogenic) anaerobic digester (TSAD) was compared to a single stage digester (SSD), in treating a synthetic wastewater contaminated with phenol. Both systems were operated in batch-dilution and semi-continuously at 35°C, and were loaded with a synthetic wastewater containing a constant concentration of readily biodegradable organic matter and an increasing concentration of phenol. The TSAD had greater biogas production, and its acidogenic reactor fermented the readily biodegradable matter without inhibition by accumulation of phenol (up to 1 450 mg·l<sup>-1</sup>). The acidogenic reactor also prevented inhibition of biogas formation in the second phase (methanogenic), by holding phenol and fast produced organic acids. Batch TSAD is a potential wastewater treatment option to decontaminate streams containing readily biodegradable matter contaminated with phenol. This system enhances biogas production and allows better control of the acidogenic and methanogenic phases.

**Keywords:** Acidogenic, biodegradation, biogas, industrial waste, methanogenic, phenol, two-phase anaerobic digestion