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ULTRASONIC DEGRADATION OF POLYMER IN SOLUTION

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Abstract

In industry, the disposal amount of wastewater is huge, and contains a lot of chemicals that are harmful to environment. In wastewater treatment, ultrasound recently becomes a promising technique with tremendous advantages: ability to irradiate through large volumes of liquid; simple apparatus with no reaction initiator; making less disturbance to the original chemical structure; and creating tremendously high change in temperature and pressures during cavitation at room temperature. This paper, from processed experimental data, will try to offer a high potential technique in wastewater treatment particular in involving polymer degradation. In this work, we investigate degradation of polyethylene oxide (PEO), dextran, cellulose.

Solutions of PEO, dextran, cellulose are degraded at different frequencies (from 20 kHz to 1 MHz). The power delivered into solution was measured by calorimetry. In order to suppress production of $\cdot\text{OH}$ radicals, *t*-Butanol is dissolved at 100 mM into the solution. The degradation is evaluated with viscometry and gel permeation chromatography (GPC).

The degradation occurs rapidly with all samples at the first minutes of irradiation then slowing down. Long sonication gives a limiting molecular weight, depending on samples.

Key words: Polymer degradation, ultrasound, frequency dependence.