1. Introduction

The behavior of sonochemistry is complex and involves different phenomena, such as cavitation bubbles and acoustic streaming. Ultrasonic fields are generated by sonochemistry, and their effects can be studied using experimental methods. The main goal of this study is to investigate the effects of ultrasound on sonochemistry.

2. Numerical Simulations

Linear wave propagation and scattering in a quasistatic electromechanical model can be described by the wave equation

$$ \nabla^2 \phi - \frac{1}{c^2} \frac{\partial^2 \phi}{\partial t^2} = 0 $$

where $P$ is the acoustic pressure, $\rho$ is the density, and $c$ is the speed of sound in the medium. The frequency spectrum of the wave depends on the properties of the medium and the frequency of the ultrasound. The space-dependent part of the solution is

$$ \frac{1}{c^2} \frac{\partial^2 \phi}{\partial t^2} = \rho \nabla^2 \phi $$

where $n$ is the number of waves and $f$ is the frequency of the ultrasound. The limitations of the solution of the Helmholtz equation are not taken into account.

3. Lead Dioxide Electrocrystallization

Lead dioxide electrocrystallization is a complex mechanism involving several steps. First, the formation of lead dioxide occurs at the cathode, and this process is strongly influenced by the presence of ultrasound. The process is

$$ \text{PbO}_2 + \text{H}_2 \rightarrow \text{PbO}_2 + \text{H}_2 \text{O} $$

It has been studied that the effect of ultrasound on the electrocrystallization process is significant. The growth rate of lead dioxide can be improved by the application of ultrasound.

4. Treatment of Chlorinated Compounds

Ultrasonic treatment is widely used for waste treatment due to its effectiveness in breaking down complex organic molecules into simpler compounds. Chlorinated organic compounds such as dichloromethane, trichloroethylene, and perfluorocarbons are used in industrial processes. The effectiveness of ultrasonic treatment depends on the concentration of the compound and the frequency of the ultrasound.

In conclusion, the use of ultrasonic treatment for the decomposition of chlorinated compounds is an effective and environmentally friendly method. Further research is needed to optimize the treatment conditions and to explore other applications of this technology.