

2004 Apr;11(2):61-5.

### **Inactivation of *Saccharomyces cerevisiae* by ultrasonic irradiation.**

**Tsukamoto I, Yim B, Stavarache CE, Furuta M, Hashiba K, Maeda Y.**

Graduate School of Engineering, Osaka Prefecture University, 1-1 Gakuen-cho, Sakai, Osaka 599- 8531, Japan. [tikuko@ams.osakafu-u.ac.jp](mailto:tikuko@ams.osakafu-u.ac.jp)

We have investigated the inactivation of *Saccharomyces cerevisiae* (yeast cells) by ultrasonic irradiation. The amplitude on the vibration face contacting the sample solution was used as an indication of the ultrasonic power intensity. The effects of the amplitude on the vibration face and the initial cell numbers on the sonolytic inactivation of yeast cells have been investigated using a horn-type sonicator (27.5 kHz). The inactivation of the yeast cells by ultrasonic irradiation shows pseudo first-order behavior. The inactivation rate constant varied from 0.0007 to 0.145 s<sup>-1</sup> when the amplitude on the vibration face was in the range of 1-7 microm(p-p). The change in the inactivation rate constant as a function of the amplitude on the vibration face was similar to that of the OH radical formation rate under the same conditions. The threshold of this sonicator was 3 microm(p-p) with the amplitude on the vibration face. The initial cell numbers (from 10<sup>2</sup> to 10<sup>5</sup> mL<sup>-1</sup>) had an influence on the inactivation of the yeast cells by ultrasonic irradiation. The inactivation rate constants varied from 0.023 to 6.4 x 10<sup>-3</sup> s<sup>-1</sup>, and the inactivation by ultrasonic irradiation was fastest at the lowest initial cell numbers. In a squeeze-film-type sonicator (26.6 kHz), 90% inactivation of the yeast cells was achieved by ultrasonic irradiation for 60 min.