

PM-10

Effect of air, oxygen and CO₂ pressure on the fermentative capacity of Baker's yeast

ANA FILIPA CAMPELO, ISABEL BELO

Centro de Engenharia Biológica, Universidade do Minho, 4710-057 BRAGA, Portugal Tel. +351 253604413, Fax. +351 253678986, email: ibelo@deb.uminho.pt

The main function of Baker's yeast in the bread dough is the production of carbon dioxide from sugars. Thus, the achievement of high values of the fermentative capacity of the *Saccharomyces cerevisiae* cells is a crucial quality parameter of the final product in the process of Baker's yeast production. Highly aerobic culture conditions are used in the Baker's yeast production in order to maximize the cell growth. Several authors have proposed the utilization of air pressure or pure oxygen pressure raise in the bioreactor to improve culture oxygenation and consequently, to increase Baker's yeast productivity.

In this work, the effect of the Baker's yeast cells exposure to increased pressure of air, oxygen and CO₂ on the leavening ability of the cells was study. Baker's yeast suspensions were prepared using commercial dry yeast (DSM). The cells were suspended in yeast culture media and incubated in a stainless steel bioreactor at 30 °C, 150 rpm and at different values of pressure and gas composition. After 3h of exposure, the fermentative capacity of cells in dough was assessed through the measurement of the CO₂ produced. The same bioreactor was used for this determination and the fermentative capacity in defined dough was determined by the measurement of the CO₂ pressure increase rate. The cells exposure to an air pressure of 6 bar had no effects on the Baker's yeast leavening ability. Identical values of CO₂ production rate were obtained when cells were treated with air at 1.2 bar and 6 bar, and with pure oxygen at 1.2 bar. Moreover, cell growth was stimulated by the air and oxygen pressure increase up to 6 bar and 1.2 bar, respectively. However, when treatment was performed with higher values of pure oxygen pressure a strong reduction of fermentative capacity of the cells was observed. A 50 % reduction of the CO₂ produced was found when 6 bar of pure oxygen pressure was used. Also, a total cell growth inhibition was observed under this condition. On the other hand, the exposure of baker's yeast cells to 6 bar of total pressure of a gas mixture containing 21 % (v/v) oxygen, 8 % CO₂ blended with N₂, increased the fermentative capacity of the cells.