

P284

Comparison of yeast response to increased pressure at aerobic and anaerobic conditions

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Objectives: With this work it was intended to compare and analyse the effects of pressure raise on fermentative process were yeasts are used, either for metabolites production or for cell mass production. The main goal was the study of *Saccharomyces cerevisiae* response to increased total pressures (up to 6 bar) under aerobic and anaerobic conditions.

Results: *Saccharomyces cerevisiae* in complex medium were exposed to different values of total pressure (1 to 6 bar) at aerobic conditions, using air and pure oxygen, and at anaerobic conditions, using N₂ and CO₂. The metabolic behaviour of the cells was followed by the measurements of cell growth and ethanol production throughout time. Also, cell morphologic changes were assessed by image analysis techniques. Total pressure raise up to 6 bar was harmless to cells when air or pure nitrogen was used as a sparging gas. However, when pure oxygen or pure CO₂ were applied, at high values of pressure, a strong cell activity inhibition was observed. In both cases, cell growth and fermentation were repressed, and glucose uptake-rate was drastically reduced. Cell growth inactivation by pressurized O₂ and CO₂ was confirmed by the reduction of the number of budding cells. Changes on cell size distribution were also found and are discussed.

Conclusions: Besides the interest of the results in the fermentation technology, the similarity of cell response to oxygen and carbon dioxide pressures can have important impact on the modified atmospheres design for food preservation.