World Academy of Science, Engineering and Technology
International Journal of Biotechnology and Bioengineering
Vol:15, No:02, 2021

Understanding the Thermal Resistance of Active Dry Yeast by Differential Scanning Calorimetry Approach

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Abstract : Yeasts, anhydrobiotic organisms, can survive extreme water disturbances, thanks to the prolonged and reversible suspension of their cellular activity as well as the establishment of a defense arsenal. This property is exploited by many industrialists. One of the protection systems implemented by yeast is the vitrification of its cytoplasm by trehalose. The thermal resistance of dry yeasts is a crucial parameter for their use. However, studies on the thermal resistance of dry yeasts are often based on yeasts produced in laboratory conditions with non-optimal drying processes. We, therefore, propose a study on the thermal resistance of industrial dry yeasts in relation to their thermophysical properties. Heat stress was applied at three temperatures (50, 75, and 100°C) for 10, 30, or 60-minute treatments. The survival of yeasts to these treatments was estimated, and their thermophysical properties were studied by differential scanning calorimetry. The industrial dry yeasts resisted 60 minutes at 50°C and 75°C and 10 minutes at a temperature close to 100°C. At 100°C, yeast was above their glass transition temperature. Industrial dry yeasts are therefore capable of withstanding high thermal stress if maintained in a specific thermophysical state.

Keywords : dry yeast, glass transition, thermal resistance, vitrification
Conference Title : ICYBB 2021 : International Conference on Yeast Biotechnology and Biology
Conference Location : Lisbon, Portugal
Conference Dates : February 08-09, 2021