

TITLE: USE OF POTASSIUM CHLORIDE AND MAGNESIUM SULFATE FOR THE ADAPTATION OF *SACCHAROMYCES CEREVISIAE* PE-2 TO HIGH CONCENTRATIONS OF ETHANOL

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ABSTRACT: Brazil is the second largest producer of ethanol in the world and its production has steadily increased in recent years. The growing efficiency of Brazilian ethanol plants has been evident due to the innumerable technological contributions. Within the technological contributions we can highlight the selection and adaptation of yeasts to be used in the fermentation process. One technology to increase fermentation efficiency is Very High Gravity fermentation which is based on the tolerance of yeast to high concentrations of ethanol. In the presence of high concentrations of ethanol, the ionic gradients of the plasma membrane are interrupted, requiring the cell to expend greater amounts of energy to restore the balance of charges in the membrane. Thus, nutrient supplementation strengthens the activities of the ion pump responsible for the establishment of gradients, leading to increased yeast performance. This work had the aim to adapted yeasts *Saccharomyces cerevisiae* PE-2 to tolerate high ethanol concentration, using potassium chloride and magnesium sulphate. The treatments were: Control: yeasts were not adapted with ethanol and salts; Treatment 1: Yeasts were adapted in a hydro alcohol solution with 15% ethanol; Treatment 2: Yeasts were adapted in a hydro alcohol solution with 15% ethanol and 50 mM of KCl; Treatment 3: Yeast were adapted in a hydro alcohol solution with 15% ethanol and 50 mM of MgSO₄. For the study, initially, was added 15 mL of wort in Falcon tubes with their respective treatments for 2 hours. Subsequently, these were submitted to single batch fermentation in 500 mL Erlenmeyer with 200 mL of 23° Brix syrup wort. The fermentation was carried out under shaking of 130 rpm in shaker at temperature of 30 °C during 17 hours. The results obtained showed that the Treatment 3 presented the highest fermentation yield 52.93%, which was higher than control (51.57%), while treatment 1 presented yield of 38.15% and treatment 2 of 13.52%. Treatment with MgSO₄ did not significantly alter the fermentative yield. On the other hand, the Treatment with KCl decreased the yield. Only Treatment 2 presented low cell viability (65%), while the other treatments showed cellular viability around 98%. One suggestion for such an event is due to the presence of chlorine that potentiated the effect of ethanol on the yeast, leading to cell death. In conclusion, the magnesium sulfate does not harm yeast, whereas KCl has been shown to be toxic and lead to cell death.

Keywords: fuel ethanol, nutrient supplementation, very high gravity fermentation, yeast

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