New Methodology for Monitoring Alcoholic Fermentation Processes Using Refractometry

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Abstract : Determining the alcohol content in alcoholic fermentation bioprocess has a great importance. In fact, it is a key indicator for monitoring this fermentation bioprocess. Several methodologies (chemical, spectrophotometric, chromatographic...) are used to the determination of this parameter. However, these techniques are very long and require: rigorous preparations, sometimes dangerous chemical reagents, and/or expensive equipment. In the present study, the date juice is used as a substrate of alcoholic fermentation. The extracted juice undergoes an alcoholic fermentation by Saccharomyces cerevisiae. The study of the possible use of refractometry as a sole means for the in situ control of this process revealed a good correlation (R2 = 0.98) between initial and final ° Brix: ° Brix f = $0.377 \times$ ° Brixi. In addition, we verified the relationship between the variation in final and initial ° Brix (Δ ° Brix) and alcoholic rate produced (A exp): C Δ ° Brix / A exp = 1.1. This allows the tracing of abacus isoresponses that permit to determine the alcoholic and residual sugar rates with a mean relative error (MRE) of 5.35%.

Keywords : refractometry, alcohol, residual sugar, fermentation, brix, date, juice

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