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Ergosterol Biosynthesis: Non-Conventional Method for Improving Process

Authors : Madalina Postaru, Alexandra Tucaliuc, Dan Cascaval, Anca Irina Galaction

Abstract : Ergosterol (ergosta-5,7,22-trien-3β-ol) is the precursor of vitamin D2 (ergocalciferol), known as provitamin D2 as it is converted under UV radiation to this vitamin. The natural sources of ergosterol are mainly the yeasts (Saccharomyces sp., Candida sp.), but it can be also found in fungus (Claviceps sp.) or plants (orchids). As ergosterol is mainly accumulated in yeast cell membranes, especially in free form in the plasma-membrane, and the chemical synthesis of ergosterol does not represent an efficient method for its production, this study aimed to analyze the influence of aeration efficiency on ergosterol production by S. cerevisiae in batch and fed-batch fermentations, by considering different levels of mixing intensity, aeration rate, and n-dodecane concentration. Our previous studies on ergosterol production by S. cerevisiae in batch and fed-batch fermentation systems indicated that the addition of n-dodecane led to the increase of almost 50% of this sterol concentration, the highest productivity being reached for the fed-batch process. The experiments were carried out in a laboratory stirred bioreactor, provided with computer-controlled and recorded parameters. In batch fermentation system, the study indicated that the oxygen mass transfer coefficient, kLa, is amplified for about 3 times by increasing the volumetric concentration of n-dodecane from 0 to 15%. Moreover, the increase of dissolved oxygen concentration by adding n-dodecane leads to the diminution for 3.5 times of the produced alcohol amount. In fed-batch fermentation process, the positive influence of hydrocarbon on oxygen transfer rate is amplified mainly at its higher concentration level, as the result of the increased yeasts cells amount. Thus, by varying n-dodecane concentration from 0 to 15% vol., the kLa value increase becomes more important than for the batch fermentation, being of 4 times

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