1 0RVWRX¿ HW DO - % L Rtechnol Biomater 2017, 7:6 (S
DOI: 10.4172/2155-952X-C1-085

2nd World Biotechnology Congress

December 04-05, 2017 | Sao Paulo, Brazil

Modeling of fermentation process of Bacillus thuringiensis as a sporulating bacterium

1 0RVWRXÀ 6 6ROH\PDQL and M H Sarrafzadeh
University of Tehran, Iran

Sporulating bacteria constitute a large portion of industrial microorganisms. Many important bioproducts such as solvents, antibiotics, enzymes, and pesticides with applications in food, pharmaceutical, and chemical processes are produced by sporulatin bacteria. Bacillus thuringiensis (Bt) is an aerobic, rod-shaped, and sporulating bacterium that during its sporulation process produces toxic crystal proteins, called delta endotoxins, which have insecticidal action. Due to the economic importance of this product, great e orts have been made to improve its operation and control procedures especially by means of mathematical models. As shown in Fig. 1, there are three distinct types of cells in a Bt culture: vegetative cells, sporangia, and mature spores. e aim of this work was to provide a mathematical model that can estimate the populations of these three types of cells. In this paper, a cell populatio balance model was used to represent the dynamic behavior of the process. An unstructured and non-segregated model was us for the dynamic fermentation process with 0%, 50% and 100% oxygen saturation in a fed-batch culture. e mathematical model consists of a partial di erential equation (PDE) that describes the distribution of a cell population based on the cell age. To solve the mathematical model, the method of lines was used in MATLAB that approximates the PDE model by a set of nonlinear ordinary di erential equations (ODEs). en, the resulted ODEs were solved by the 4th order Rung-Kutta method. e results show that the proposed model can estimate the cell populations properly.

Biography

1 0RVWRX¿ LV FXUUHQWO\ D)XOO 3URIHVVRU RI &KHPLFDO (QJLQHHULQJ DW WKH 8QLYHUVLW\ RI 7HKUDQ + \HDUV +LV UHVHDUFK LQWHUHVWV LQFOXGH SURFHVV PRGHOLQJ VLPXODWLRQ DQG RSWLPL]DWLRQ DQG ,UDQ¶V 8QLYHUVLW\ RI 7HKUDQ DQG D 3K' LQ ÀXLGL]DWLRQ IURP &DQDGD¶V (FROH 3RO\WHFKQLTXH GH 0RQW FRQIHUHQFHV SOXV ¿YH ERRNV DQG IRXU ERRN FKDSWHUV *Numerical Methods for Chemical Engineers with MATLAB Applications*, published by Prentice Hall PTR in 1999. He is the Founder and Editor-in-Chief of *Chemical Product and Process Modeling* published by Walter de Gruyter GmbH, Germany and winner of University of Tehran's International Award, 2015. He is also the University of Tehan's distinguished Researcher, 2013.

PRVWRX¿#XW DF LU

Notes: