BCHE 8210

Independent Project Options

The principal goals of this independent project are 1) to gain experience with a fermentation process, and 2) to develop an experiment that can be used for a senior level Biochemical Engineering laboratory course (BCHE 4180L). In that course, 5-6 student groups might conduct the same experiment, but vary one or two key parameters. As a simple example, students in that course might study the effect of temperature on product formation using *E. coli,* with each group conducting the experiment at a different temperature. Thus, as an outcome of your independent project, you should propose one or two key variables that students might consider studying, and justify (to me) why those variables would be worth studying. (You are not expected to complete multiple experiments to demonstrate their relevance.)

1) We have a strain of *Pichia pastoris* which expresses Green Fluorescent Protein. (Please see Zupan et al., 2004.) The expression of GFP is accomplished in two phases. Specifically, the cells must be grown in a first phase (Zupan et al. used glycerol), and then induced in a second phase (Zupan et al. used sorbitol/methanol). In this project you should grow the strain in a controlled bioreactor, propose appropriate measurements, including for the GFP protein. The protein is intracellular, and you will need to be concerned with disrupting the cells. What variables would be worth studying? One important aspect of this project is to develop a procedure for quantifying GFP.
2) We have a strain of Saccharomyces cerevisiae "Bio-Ferm" (ALS1005) which is an ethanol-producing industrial strain from North American Bioproducts Corp. We will be using this strain for our chemostat experiment, and the same medium can be used in this project. In this independent project, you will use a batch process to accumulate ethanol. We have a gas phase ethanol probe which can be used to measure 'real-time' ethanol concentration in the gas phase, which should be correlated with ethanol production in the liquid phase. What variables would be worth studying?
3) We have a strain of *E. coli* (ALS1017) which expresses b-galactosidase. The plasmid requires 50 mg/L ampicillin to maintain selective pressure. In this independent project, you will use a process to express β-galactosidase and conduct an assay to measure its activity. You will have to develop an assay that is suitable for the lab environment using *o*-nitrophenyl-β-D-galactoside. The protein is intracellular, and you will need to be concerned with disrupting the cells. What variables are worth studying?

2025 Teams:

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