# ENGINEERING *ESCHERICHIA COLI* FOR BIOFUEL PRODUCTION

## Growth and Production Kinetics

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## Problem Statement

After reading "Engineering *Escherichia coli* for Biofuel Production", answer the following questions using Table 1 and Appendix B of the case study [1]:

1. Calculate $Y_{x/s}$ (yield coefficient of biomass on glycerol).
2. How much of the glycerol do you think is going into making biomass? Why?
3. Is the $Y_{x/s}$ calculated above a "true/maximum" yield or is it an "observed" yield?
4. Estimate the specific growth rate of *E. coli* and comment on the kinetics of this growth.
5. Comment on the kinetics of metabolite production.

**Table 1 – Culture performance of batch cultivation in a bioreactor for CPC-PrOH3 using glycerol as the major carbon source**

|  | Glycerol | Dry Cell Weight (Biomass) | Succinate | Acetate | Propionate | Ethanol | 1-Propanol |
|---|---|---|---|---|---|---|---|
| Initial Concentration (g/L) | 30.73 | 2.638 | 0.318 | 0.259 | 0.370 | 0.363 | 0 |
| Final Concentration (g/L) | 0 | 5.474 | 0.906 | 4.297 | 1.152 | 9.897 | 2.438 |

## References

[1] Kajan Srirangan, Lamees Akawi, Lyndia Stacey, Cheryl Newton, Perry Chou and Marc Aucoin, Module 01. "Engineering *Escherichia coli* for Biofuel Production". Waterloo Cases in Design Engineering (WCDE), University of Waterloo.