ABE 572

Bioprocess Engineering

Homework 1

Q1- E. coli is cultivated in continuous culture under aerobic conditions with glucose limitation. When the system is operated at D= 0.2 hr-1, determine the effluent glucose and biomass concentrations assuming Monod kinetics.

(S_0 = 5 g/l, u= 0.25 hr^{-1}, K_S = 100 mg/L, $Y_{x/s}$ = 0.4 g/g)

Q2- In a two stage chemostat system, the volumes of the first and second reactors is 500 L and 300 L respectively. The first reactor is used for biomass production and the second is for a secondary metabolite formation. The feed flow rate to the first reactor is F = 100 L/h, and the glucose concentration is 5.0 g/L. Use the following constants for the cells.

$u_m = 0.3\ h^{-1}$, $K_s = 0.1$ g/L, $Y_{X/S} = 0.4$ g/g

Determine the cell and glucose concentrations after the first stage.