Module ChE-311 Biochemical Engineering

Downstream processing
Exercices
Cell lysis

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Exercise 2.4 Lysis kinetics in a bead mill

Schütte & Kula (1990) have lysed *Bacillus cereus* cells in a bead mill and measured the activity of the released L-Leucine dehydrogenase (LDH) in the liquid phase as a function of treatment duration. The results are given in the table below.

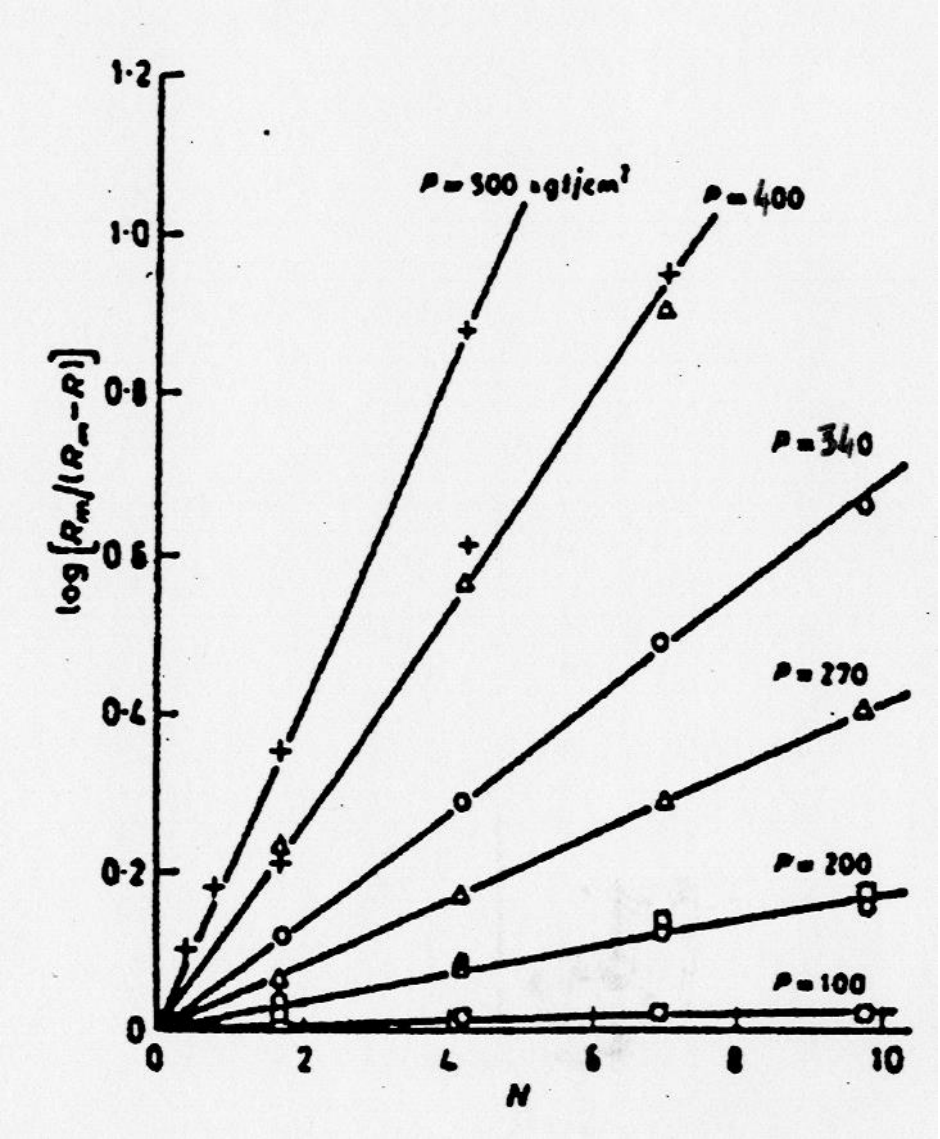
1. Assuming lysis kinetics is first order, determine the value of the kinetic constant

2. What is the main complication with linearizations of the form $\ln(R_m/(R_m-R)) = k \cdot t$?

t [min]	0.10	0.35	1.00	1.67	3.00	5.09	8.10	13.03
LDH [U/mL]	1.15	4.15	9.08	14.7	21.62	28.97	33.73	36.32

Results taken from: Schütte H., Kula M.-R. (1990): Pilot- and process-scale techniques for cell disruption. Biotechnology and Applied Biochemistry 12, 599-620

Exercise 2.5 Lysis in a HP homogenizer



Cell lysis of a yeast suspension was achieved using a high pressure homogenizer at different pressures. The results are given in the graph below.

1. How many passages N would you need to reach 90% lysis at each pressure? (take N as a continuous variable)

2. What minimal pressure would you need to achieve 75% lysis after three passages?

Reminder: 1 kg/cm^2 = 0.981 bar