

# BIOREACTOR ENGINEERING

## Chapter 9

# Sterilization in Fermentation

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Sterilization in Fermentation by Chew Few Ne

# Exercise 1

A fermentation medium contains an initial number of spores of  $8.5 \times 10^{10}$ . The medium is sterilized thermally at  $120^\circ\text{C}$  and the spore density was noted with the progress of time as below:

Time (min)	0	5	10	15	20	30
Number of Spore	$8.5 \times 10^{10}$	$4.23 \times 10^9$	$6.2 \times 10^7$	$1.8 \times 10^6$	$4.5 \times 10^4$	32.5

- Calculate the thermal death kinetic rate constant
- Calculate the number of spores at 40 min.



## Exercise 2

The thermal death kinetic data of a microorganism at 3 different temperatures are shown in table below:

Temperature, °C	115	120	125
$k_d$ , min <sup>-1</sup>	0.035	0.112	0.347

- Determine the activation energy and Arrhenius constant
- Calculate  $k_d$  at 30°C

