

Microbial Kinetics: Growth & Death Rate

PROBLEM 1: GROWTH CURVES

The following figure shows the growth curve of a bacterial culture. The y-axis represents the number of cells (log scale) and the x-axis represents time (hours). The curve shows a lag phase, an exponential growth phase, a stationary phase, and a death phase. The lag phase is the period of time when the bacteria are adapting to the new environment. The exponential growth phase is the period of time when the bacteria are dividing rapidly. The stationary phase is the period of time when the bacteria have reached a constant number. The death phase is the period of time when the bacteria are dying.

PROBLEM 2:

- a. What is the lag phase?
- b. What is the exponential growth phase? (What is the growth rate?)
- c. What is the stationary phase? (What is the carrying capacity?)

PROBLEM 3:

PROBLEM 3: GROWTH RATE

1. The growth rate of a bacterial culture is 0.5 h^{-1} . The initial number of bacteria is 10^6 . How many bacteria will there be after 2 hours?
2. The growth rate of a bacterial culture is 0.5 h^{-1} . The initial number of bacteria is 10^6 . How long will it take for the number of bacteria to reach 10^9 ?
3. The growth rate of a bacterial culture is 0.5 h^{-1} . The initial number of bacteria is 10^6 . How long will it take for the number of bacteria to reach 10^3 ?
4. The growth rate of a bacterial culture is 0.5 h^{-1} . The initial number of bacteria is 10^6 . How long will it take for the number of bacteria to reach 10^0 ?
5. The growth rate of a bacterial culture is 0.5 h^{-1} . The initial number of bacteria is 10^6 . How long will it take for the number of bacteria to reach 10^{-1} ?
6. The growth rate of a bacterial culture is 0.5 h^{-1} . The initial number of bacteria is 10^6 . How long will it take for the number of bacteria to reach 10^{-2} ?
7. The growth rate of a bacterial culture is 0.5 h^{-1} . The initial number of bacteria is 10^6 . How long will it take for the number of bacteria to reach 10^{-3} ?
8. The growth rate of a bacterial culture is 0.5 h^{-1} . The initial number of bacteria is 10^6 . How long will it take for the number of bacteria to reach 10^{-4} ?
9. The growth rate of a bacterial culture is 0.5 h^{-1} . The initial number of bacteria is 10^6 . How long will it take for the number of bacteria to reach 10^{-5} ?
10. The growth rate of a bacterial culture is 0.5 h^{-1} . The initial number of bacteria is 10^6 . How long will it take for the number of bacteria to reach 10^{-6} ?

Growth Curve



Figure 1: Growth Curve

	Exponential Growth Phase	Stationary Phase	Death Phase
Initial Number of Bacteria			
Final Number of Bacteria			
Time (hours)			

PROBLEM 4: GROWTH RATE AND DEATH RATE

1. The growth rate of a bacterial culture is 0.5 h^{-1} . The death rate is 0.1 h^{-1} . What is the net growth rate?
2. The growth rate of a bacterial culture is 0.5 h^{-1} . The death rate is 0.1 h^{-1} . What is the carrying capacity?

Golden Penny Lab Answer Key

Katy Farber, Penny Bishop



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