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Courses » Bioreactors

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## Unit 5 - week 3

Register for Certification exam

### Course outline

How to access the portal

Week 0

week 1

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week 3

- lecture 10 - batch growth kinetics
- lecture 11 - solution to PP 3.1
- lecture 12 - bioreactor analysis: chemostat and fed-batch
- lecture 13 - solution to PP 3.2
- lecture 14 - bioreactor environment parameters
- lecture 15 - bioreactor env. par. (DO)
- lecture 16 -

### Assignment 3

The due date for submitting this assignment has passed.

As per our records you have not submitted this assignment. **Due on 2019-02-27, 23:59 IS**

1) Match the following: 1 point

- | A                  | B  |
|--------------------|--|
| 1 Lag phase        | a. Period of constant specific growth rate                         |
| 2 Log phase        | b. Period of adaptation  |
| 3 Stationary phase | c. Period which results from nutrient depletion/toxin accumulation |
| 4 Death phase      | d. Period with secondary metabolite production                     |

- 1-a, 2-b, 3-c,4-d
- 1-b, 2-d, 3-a, 4-c
- 1-d, 2-a, 3-b, 4-c
- 1-b, 2-a, 3-d, 4-c

**No, the answer is incorrect.**

**Score: 0**

**Accepted Answers:**

*1-b, 2-a, 3-d, 4-c*

2) Diauxic growth is observed when 1 point

- There is only one limiting substrate available for growth
- There are more than one substrates available which are used sequentially.
- There is a shortage of limiting substrate
- There is feedback inhibition by the product formed

**No, the answer is incorrect.**

**Score: 0**

**Accepted Answers:**

*There are more than one substrates available which are used sequentially.*

3) A chemostat is operated in a 1 point

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Assignment 3

Week 3  
Feedback form

week 4

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Transcription**Score: 0****Accepted Answers:***Continuous mode*

4) In a chemostat containing suspended cells only, operating at steady state with negligible death rate, **1 point**

- The growth rate of cells is equal to the dilution rate
- The growth rate of cells is greater than the dilution rate
- The growth rate of cells is lesser than the dilution rate
- The growth rate is unaffected by the dilution rate.

**No, the answer is incorrect.****Score: 0****Accepted Answers:***The growth rate of cells is equal to the dilution rate*

5) Washout occurs in a chemostat when, **1 point**

- $D > \mu_m$
- $D < \mu_m$
- $D = \mu_m$
- Washout does not occur in a chemostat

**No, the answer is incorrect.****Score: 0****Accepted Answers:** *$D > \mu_m$* 

6) A batch operation is carried out using an aerobic bacteria to produce an industrially important enzyme. 20 g of cells were seeded in 80 L of media. The lag phase was found to be 30 min. The specific growth rate of the organism is  $0.1h^{-1}$  under the conditions maintained. Calculate the cell concentration after 3hrs of growth. Choose the answer closest to your calculated answer. **1 point**

- 0.321 g/l
- 0.564 g/l
- 0.226 g/l
- 0.865 g/l

**No, the answer is incorrect.****Score: 0****Accepted Answers:***0.321 g/l*

7) At the same conditions as above, what is the time required to yield a cell concentration of 1.5 g/l **1 point**

- 13.0 h
- 14.5 h
- 18.4 h
- 16.2 h

**No, the answer is incorrect.****Score: 0****Accepted Answers:***18.4 h*

8) A gram positive bacterium is cultured in a chemostat of capacity  $50m^3$ .  $K_s$  for the **1 point**



organism is 0.56 g/l. Under the operating conditions, the organism has a maximum specific growth rate of 10 /day. The chemostat is operated with a continuous feed substrate concentration of 20 g/l. Estimate the feed flow rate required to achieve 95% substrate conversion. Choose the answer closest to your calculated answer.

- 11.3  $m^3/h$
- 12.2  $m^3/h$
- 13.3  $m^3/h$
- 15.6  $m^3/h$

No, the answer is incorrect.

Score: 0

Accepted Answers:

13.3  $m^3/h$



9) Identify the flow rates where the washout occurs

1 point

- 13.3  $m^3/h$
- 16.0  $m^3/h$
- 9.2  $m^3/h$
- 20.2  $m^3/h$

No, the answer is incorrect.

Score: 0

Accepted Answers:

20.2  $m^3/h$

10) Which of the following statements show the advantages of a chemostat over batch reactor? 1 point

- It gives 3-4 times more productivity
- It enables better control over growth
- It enables selection of mutant strains
- It is easier to maintain than batch reactor.

No, the answer is incorrect.

Score: 0

Accepted Answers:

It gives 3-4 times more productivity

It enables better control over growth

It enables selection of mutant strains

11) Match the type of organisms in A to the optimum temperature given in B

1 point

- | A              | B       |
|----------------|---------|
| 1 Mesophile    | a. 60°C |
| 2 Thermophile  | b. 15°C |
| 3 Psychrophile | c. 30°C |

- 1-a, 2-b, 3-c
- 1-c, 2-b, 3-a

1-c, 2-a, 3-b

1-b, 2-a, 3-c

**No, the answer is incorrect.**

**Score: 0**

**Accepted Answers:**

*1-c, 2-a, 3-b*

12) Identify the components involved in temperature control in a bioreactor

1 pt

Resistance temperature device

Water jacket

Baffles

DO probe

**No, the answer is incorrect.**

**Score: 0**

**Accepted Answers:**

*Resistance temperature device*

*Water jacket*

13) Impellers are used in a bioreactor to bring about agitation of the contents so that:

1 point

The contents are in a suspension

It helps in  $O_2$  mass transfer

To prevent vortex formation

The products produced will be more stress tolerant.

**No, the answer is incorrect.**

**Score: 0**

**Accepted Answers:**

*The contents are in a suspension*

*It helps in  $O_2$  mass transfer*

14) When an oxygen mass balance is carried out with the bioreactor contents as the system, if **1 point** input rate = output rate, and the accumulation rate = 0, then which of the following is correct?

DO increases

DO decreases

DO is constant

DO increases and then decreases

**No, the answer is incorrect.**

**Score: 0**

**Accepted Answers:**

*DO is constant*

15) Sulphite-oxidation method can be used to estimate which parameter of a bioreactor?

1 point

Temperature variation

$K_L a$  value

Cell viability

Productivity

**No, the answer is incorrect.**



Score: 0

Accepted Answers:

$K_L a$  value

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