Unit 3 - Week 1

Assignment 1

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.

Due on 2020-09-30, 23:59 IST.

1) From below, identify the quantity that is not conserved: *1 point*

- charge
- energy
- momentum
- force

No, the answer is incorrect.
Score: 0
Accepted Answers:
force

2) A water tank of 5000 L capacity was filled with 2500 L of untreated water. Normally, at this facility, chlorination is done to treat drinking water. The allowable limit of chlorine in drinking water is 4mg/L. An inexperienced caretaker, added chlorine solution without proper measurement which resulted in elevated levels of chlorine in water resulting in a final concentration of 8mg/L. On noticing the mistake done, more untreated water was added at a rate of 160L/min. Calculate the time required to bring the concentration of chlorine to 4mg/L. Choose the value closest to your calculated value *2 points*

- 5 mins
- 11 mins
- 16 mins
- 21 mins

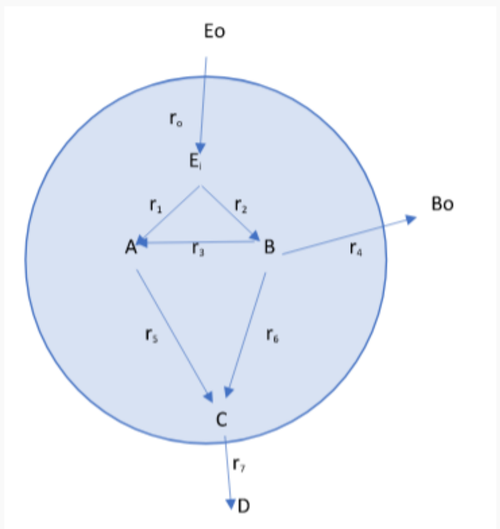
No, the answer is incorrect.
Score: 0
Accepted Answers:
16 mins

3) Once chlorinated (using 4mg/L chlorine), a strategy was followed to remove the chlorine from water before consumption to reduce its taste. Activated carbon filters were used to filter water which is chlorine treated. A filter of length 7cm removes chlorine at the rate of 4.6 mg/min. If 2 such filters are used in parallel, calculate the concentration of chlorine in the exit stream. Given the rate of inlet and exit stream as 5L/min. Choose the value closest to your calculated value *2 points*

- 1.28 mg/L
- 2.16 mg/L
- 4.67 mg/L
- 5 mg/L

No, the answer is incorrect.
Score: 0
Accepted Answers:
2.16 mg/L

4) For the system shown below, Write the steady state balance for the metabolite A. Where Eo, Ei, A , B, Bo, C, D are metabolites and r_n represents the rate of reactions. *1 point*



- $\frac{dA}{dt} = r1 - r3 - r5$
- $\frac{dA}{dt} = r1 + r3 - r5$
- $\frac{dA}{dt} = r0 + r1 - r3 - r5$
- $\frac{dA}{dt} = r0 - r1 - r2 - r5 + r3$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$\frac{dA}{dt} = r1 + r3 - r5$

5) The number of rows and columns in a stoichiometric matrix of size m x n denotes: *1 point*

- m- number of rate equations, n- number of reactants
- m- number of reactants, n- number of rate equations
- m- number of rate equations, n- number of extracellular products
- m- number of state variables, n- number of reactants

No, the answer is incorrect.
Score: 0
Accepted Answers:
m- number of rate equations, n- number of reactants

6) A bacterial culture is maintained in a conical flask. The flask is kept in a shaker incubator which swirls the contents to ensure proper mixing. However while performing the experiment, the rpm was wrongly fixed and the flasks were incubated under unfavourable conditions leading to nonuniformity in culture conditions within the flask. If the interest is in representing the variation in the concentration of the extracellular products produced by the bacteria at different spatial points in a flask with time, which among the following is the best choice? *1 point*

- Total derivative
- Partial derivative
- Substantial derivative
- Pincherle derivative

No, the answer is incorrect.
Score: 0
Accepted Answers:
Substantial derivative

7) A bacterial culture was maintained in a continuous stirred tank reactor under steady state in constant volume process. Identify from below the equation that best describes the change in concentration of product with time in the system given that there is no feedback to the system via input stream and that the products are constantly removed through the exit stream . r_{gP} - rate of generation of product, F_P - mole flow rate of product in the exit stream, F_o - mole flowrate of the inlet stream, V - volume of the reactor *1 point*

- $r_{gP}V = F_p$
- $-r_{gP}V = F_p$
- $r_{gP} = F\,V$
- $r_{gP}V = 0$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$r_{gP}V = F_p$