# Chemistry

Science, Chemistry

Advanced biochemistry ll Response to question The anaerobiosis needs the NAD+ regeneration from NADH so as to allow the continuation of glycolysis.

Part a

Figure 1 shows the fate of the glucose carbon atoms. C-1 (or C-6) becomes C-3 of a glyceraldeldehyde 3-phosphate and pyruvate subsequently. If the decarboxylation of the pyruvate occurs and ethanol is reduced, C-3 would be the C-2 of ethanol given by

$CH_3-CH_2-OH$.

Figure 1.

$O^{14}CO$

+

Part b

For all the conversion of all the labeled atoms of carbon to $^{14}CO_2$ from glucose during the fermentation of ethanol, the original label has to be placed on C-3 or C-4 of the glucose as these are changed to the pyruvate carboxyl group.

Response to question 2.

The fermentation of ethanol in yeast resulted into the following overall equation.

$Glucose + 2ADP + 2P1 \rightarrow 2\ ETHANOL + 2CO_2 + 2ATP + 2H_2O$.

This shows that phosphate was needed for the continuation of the operation of ethanol and glucose formation. For the extracts that included glucose, the process of fermentation continues up to when ADP and P1 inside the extracts were exhausted.

Part a

Phosphate was needed in the dehydrogenase of the glyceraldehydes 3-phosphate reaction and glucose stopped in this step after the exhaustion of P1. Since glucose remained, it went through phosphorylation by ATP, but P1 was not released.

Part b.

The yeast fermentation gave out CO2 and ethanol instead of lactate. In the absence these reactions and in the absence of oxygen, NADH will be accumulated. There would be no new for continued glycolysis. The bisphosphate hexose which accumulated fructose (1, 6-bisphosphate) in the form of energetic. The intermediate was at a valley or low point along the pathway between the input reaction energy that was ahead of it and the following energy reactions payoff.

Part c

P1 would be replaced by arsenate in a dehydrogenase reaction of glyceraldehydes 3-phosphate to provide acyl arsenate that is hydrolyzed spontaneously. This would inhibit the formation of fructose (1, 6-bisphosphate together with ATP thus allowing the formation of 3-phosphoglycerate, that continues in the pathway.

Response to question 3.

Reaction a, b and c will proceed in the direction shown. This is because the phase of payoff of glycolysis will give out ATP which is exergonic. This phase is typified by five reactions which are similar to those of reaction a, b and c. These include:

Glyceraldehyde 3-phosphate + P1 + 1, 3-bisphosphoglycerate + NADH + 1, 3 Bisphosphoglycerate + ADP 3-phosphoglycerate + ATP

3-phosphoglycerate 2-phosphoglycerate

2-phosphoglycerate phosphoenolpyruvate

Phosphoenolpyruvate + ADP pyruvate + ATP

The Pyruvate would be converted into the lactate as shown:

Pyruvate + NADH + lactate +

Response to question 4.

From the table, Ethylene glycol enters through the mediated route. This is so because the facilitated or passive diffusion occurs when the specific molecules are transported down the gradient of concentration high to low. In active transport the energy is used in transporting the molecules against the gradient concentration that is low to high as in the case of Ethylene glycol.

Response to question 5

Table 1

[S](M)

V(nmol/L. min)

8. 33 x 10-6

13. 8

1. 00 x 10 -5

16. 0

1. 25 x 10-5

19. 0

1. 67 x 10-5

23. 6

2. 00 x 10-5

26. 7

2. 50 x 10-5

30. 8

3. 33 x 10-5

36. 3

4. 00 x 10-5

40. 0

5. 00 x 10-5

44. 4

6. 00 x 10-5

48. 0

8. 00 x 10-5

53. 4

1. 00 x 10-4

57. 1

2. 00 x 10-4

66. 7

Graph 1

From the graph Km is 0. 279 and V max is 67 respectively

Work cited.

Stryer, Lubert, ymoczko, John, & Berg, Jeremy. Biochemistry. Oxford: Oxford University press. 2002. Print.