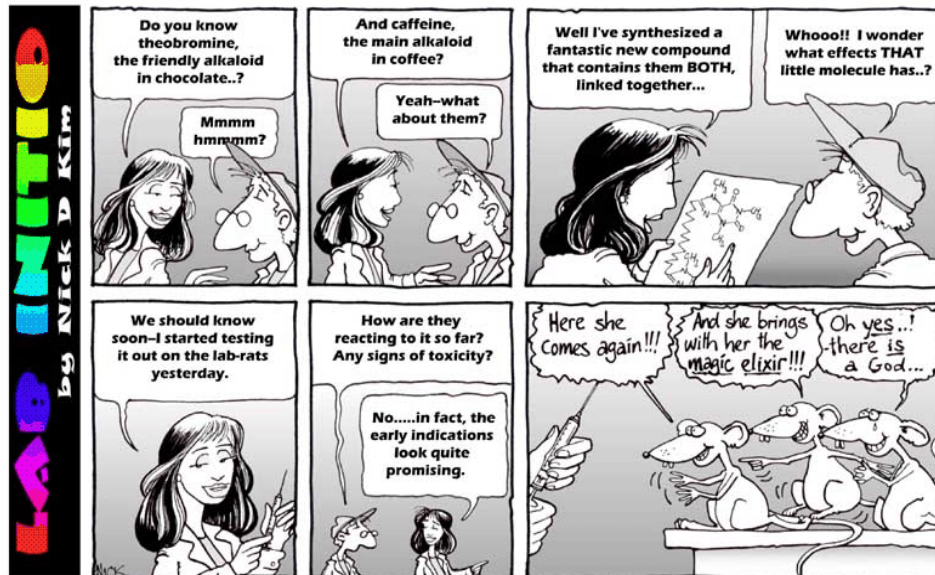


Recitation 09 Problems



(What you guys are going to need next week!)

WARM UP QUESTION (1995, Exam 2, Question 2)

How many net mols of ATP could be made per mol succinate formed in the conversion of liver tissue of 0.002 M glyceraldehyde-3-P to 0.001 M succinate in the presence of 0.04 M malonate and air? Please show how your answer was obtained.

QUESTION 1 (Old Exam Question)

- (A) In the presence of O₂ and arsenite (not arsenate!), liver tissue was observed to metabolize 0.002 M fumarate and 0.002 M acetyl CoA completely. What would the products be and how much of each product would be formed? Please give the enzymatic reactions to account for your answer (no formulas are necessary). How much ATP could be produced during this transformation?
- (B) What would the products be if arsenite and acetyl CoA are deleted from the incubation mix and 0.4 M malonate is added? Please show how your answer was obtained (again, no formulas are necessary). How much ATP could be generated?

Recitation 09 Problems

QUESTION 2 (Old Exam Question)

Show how a bacterial species can carry out the following overall metabolic transformation in the presence of air:



How many net moles of ATP could be made in this overall transformation? Please include in your answer all proposed intermediates (structural formulas not needed) and reactions catalyzed by enzymes discussed in class. Keep in mind that acetate, ATP, ADP, Pi, and air are the only substances supplied in substantial amounts. Other compounds may be present in catalytic amounts (i.e. if they are used they must be regenerated later in the reaction sequence).

QUESTION 3

Show how liver tissue can convert 1 mol of pyruvate and 1 mol of acetyl CoA to 1 mol of α -ketoglutarate in the presence of arsenite under aerobic conditions. Include the enzymatic steps necessary for this transformation and all intermediates. No need to show any structural formulas.

QUESTION 4 (Old Problem Set)

- (A) A rat liver tissue can convert 0.002 M malate to 0.001 M succinate in the presence of 0.4 M malonate under aerobic conditions. Please give the set of enzymatic reactions that account for this transformation and how much net ATP could be generated. No structural formulas are required.
- (B) Arsenite and 0.002 M acetyl CoA are added to the reaction. Malate and acetyl CoA are metabolized completely. What would be the products and how much of each would be formed? Please give the enzymatic reactions to account for your answer. No structural formulas are required.
- (C) The reaction is now carried out as in part (a) but in the presence of a high concentration of ATP relative to ADP. The malate is now completely converted into glucose-6-P. What is the final concentration of glucose-6-P? Please give the set of enzymatic reactions that account for this transformation. No structural formulas are required.