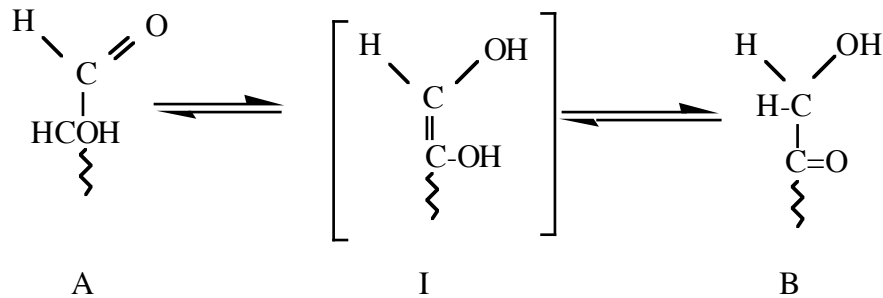


MCB 11 Problem Set 4 April 7, 2006

1. The Krebs Cycle as such does not involve molecular oxygen (O₂) yet it involves oxidation of the carbon chain that originated as glucose. The existence of two of the products of the Krebs cycle demonstrates that there is oxidation of that carbon chain. What are those products and for each, explain fully why its presence demonstrates that oxidations have taken place.
2. Discuss each of the following briefly, stressing their biochemical importance.
 - a. niacin
 - b. FAD
3. Bacteria growing in the presence of oxygen are studied and shown to be converting all six carbon atoms in the glucose to CO₂. There is abundant ATP, NAD, FAD in each organism. These bacteria are, however, not growing any larger and not reproducing. Propose an explanation. What changes would you make in this organism's metabolism to allow growth. Discuss fully.
4. Fermenting bacteria do not accumulate large amounts of NADH at the expense of NAD even though there is an oxidation step in their glycolytic pathway. Explain fully why this statement is true.
5. The following reaction occurs in glycolysis:



What type of reaction is this (as a whole)? Explain.

6. It could be said that the reaction phosphoenolpyruvate (PEP) to pyruvate drives the reaction that converts glucose to glucose-six-phosphate.
 - a. Explain that statement
 - b. When thought of in these terms, is this an efficient system. (That is, is available energy used productively?) Note that on the exam you would be given a chart showing glycolysis.
7. The reaction labeled number 8 **in the chart of glycolysis distributed at the exam** could be described as either of two of the reaction types that are common in glycolysis.
 - a. Name those two and list the other reactions in the scheme shown that fall into each of those two categories.
 - b. Of the reactions you have listed, which is reaction 8 *most* like? Explain

