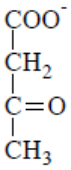
PROBLEM SET 7 – HW KEY

QUESTION 4 (HOMEWORK – DUE SUNDAY, MARCH 28TH 11:59AM-JUST BEFORE NOON)

(a) Based on what we know about how NAD^+ reacts to form NADH, 2 electrons and 1 proton

(b) The predicted structure of the product:

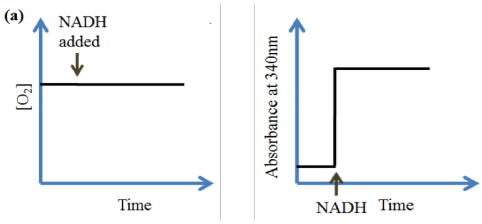


(c) There are no known transporters for NADH, and NADH is too large for passive diffusion across the mitochondrial IM. βHB is much smaller than NADH, and, based on the fact that the question states it is used in the matrix, it appears to be able to get across the mitochondrial IM into the matrix. Thus it can act as a shuttle for electrons and can be used to reduce NAD+ in the matrix to NADH, which then donates to complex I.

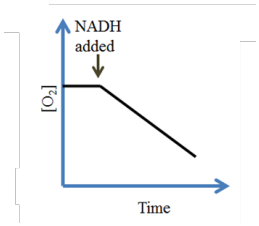
(d) Since 2e- from 1 βHB produces 1 NADH, the ATP synthesized by βHB is the same as by 1 NADH → 2.5 ATP per βHB.

QUESTION 6 (HOMEWORK – DUE SUNDAY, MARCH 28TH 11:59AM-JUST BEFORE NOON)

a)



b)



c)