cofactor \( \Delta E_0 \) \( \Delta G_0 \) (kcal/m)
---
NAD:H \( +0.27 \) -12.2
FAD.H.H \( +0.05 \) -2.3
cyto. b \( +0.25 \) -11.6
cyto. c \( +0.05 \) -2.3
cyto. a,a3 \( +0.52 \) -23.9
O=O

How the ETS works
- e's travel in pairs from donor substrates to CoQ (ubiquinone)
- from CoQ, e's travel singly from one Fe of hemes to next; H+ put between mem.
- 4 e's are stored in complex IV (a,a3) (biological capacitor) until O=O binds and accepts 4 e's to form O=O^-4
- 4 H+ are added and 2 H-O-H are formed

ATP formation
- ATP synthase uses energy of proton gradient to add PO_4 to ADP to form ATP
- ATP synthase is an integral part of the inner mitochondrial membrane and forms “pore” for H+ to pass through into matrix

Oxygen Debt
- after severe exercise stops, increased respiration rate (O_2 consumption) continues for several minutes. Why?
- still e's in ETS in red muscle fibers; must continue to supply O_2 to muscles until ATP levels return to normal

structures for exam 1
- chemical structures will comprise less than 10% of points
- structures which you are responsible for:
  - glucose, f-1 6-bisP, DHAP, glycerol P, pyruvate, acetyl, citrate, OAA, αKG, succinyl, reactive portion of thiamin PP

For exam 1, be able to:
- show electrons in the following:
  - Hydride ion
  - H atom
  - molecular oxygen (O=O)
  - superoxide radical
  - hydroxyl radical
Reactions for exam 1

• write the reactions which are the rate-limiting steps in pathways (pfk, pyruvate DH, citrate synthase, pyruvate carboxylase)

• write each of the 5 steps in pyr oxidation and in α KG oxidation