

Study Question 13

Answer questions by selecting appropriate examples from the Standard Reduction Potentials handout and showing your work and/or explaining your reasoning.

1. Compare NADH to FADH₂ in terms of their ability to reduce an aldehyde to a primary alcohol under standard conditions. Which of these cofactors, if any, can carry out the reaction?
2. The conversion of acetate → acetaldehyde → ethanol represents a series of reductions. Is it harder to convert acetate → acetaldehyde or acetaldehyde → ethanol?
3. The reaction catalyzed by isocitrate dehydrogenase involves an oxidation followed by a decarboxylation (pg 213b). Show how one could compute $\Delta G'^{\circ}$ for the conversion of oxalosuccinate into α -ketoglutarate (in other words, what is $\Delta G'^{\circ}$ for the decarboxylation step, separate from the oxidation step?). In your answer, set up the calculation. Regardless of the outcome of the calculation (which you don't have to carry out), what would you *expect* for the sign of the result? Why?