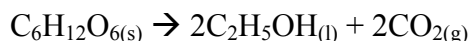


1. Hammes, ch. 1, #1-2a

2. (Taken from Chang, *Physical Chemistry for the Chemical and Biological Sciences*).

Alcoholic fermentation is the process in which carbohydrates are broken down into ethanol and carbon dioxide. The reaction is very complex and involves a number of enzyme-catalyzed steps. The overall change is



Calculate the standard enthalpy change for this reactions, assuming that the carbohydrate is α -D-glucose.

3. (Taken from Tinoco et al., *Physical Chemistry*)

Which of the above two reactions produces more energy per mole of glucose metabolized? What fraction of heat is liberated in the less efficient metabolic pathway?

4. (Taken from Tinoco et al., *Physical Chemistry*)

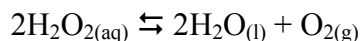
The enzyme catalase efficiently catalyzes the decomposition of hydrogen peroxide to give water and oxygen. At room temperature, the reaction goes essentially to completion.

a) Using heats of formation, calculate ΔH°_{298} for the reaction



ΔH°_f for gaseous H_2O_2 is $-133.18 \text{ kJ mol}^{-1}$.

b) The enzyme normally acts on an aqueous solution of hydrogen peroxide, for which the equation is



What is ΔH°_{298} for this process?

5. Hammes, Ch. 1, #1-3

6. Hammes, Ch. 1, #1-6