Task #80366

Write the balanced chemical equations that allow definition of the Ka values of [Succinic Acid (HOOCCH2CH2COOH)]. (C4H6O4)

Solution.

The dissociation constant of the acid (Ka) is the equilibrium constant of the acid dissociation reaction for the hydrogen cation and the anion of the acid residue. For polybasic acids, dissociation of which passes in several stages, operate with separate constants for different stages of dissociation, denoting them as Ka1, Ka2, etc. So, Succinic Acid – is dibasic acid, therefore, the dissociation constants will be two(Ka1, Ka2)

The first stage:

HOOC-CH2-CH2-COOH + H2O $\rightleftharpoons$ HOOC-CH2-CH2-COO$^-$ + H3O$^+$

Ka1 = [HOOC-CH2-CH2-COO$^-$]*[H3O$^+$] / [HOOC-CH2-CH2-COOH]*[H2O], where [HOOC-CH2-CH2-COO$^-$], [H30$^+$], [HOOC-CH2-CH2-COOH], [H2O] - ion concentration.

The second stage:

HOOC-CH2-CH2-COO$^-$ + H2O $\rightleftharpoons$ $^-$OOC-CH2-CH2-COO$^-$ + H30$^+$
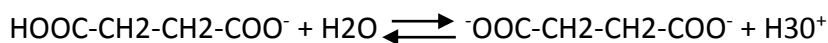
Ka2 = [$^-$OOC-CH2-CH2-COO$^-$]*[H30$^+$]/ [HOOC-CH2-CH2-COO$^-$]*[H2O], where [$^-$OOC-CH2-CH2-COO$^-$], [H30$^+$], [HOOC-CH2-CH2-COO$^-$], [H2O] - ion concentration.

Answer.

Ka1 = 6.31*10^-5 (information in the directory)

Ka2 = 2.35*10^-6 (information in the directory)