

Answer on Question #78505 - Chemistry - Physical Chemistry

Question:

Estimate pH in a 0.1 M solution of L-3-hydroxybutanoic acid ($pK_a=4.7$).

Solution:



$$C_0 \quad 0.1 \quad 0 \quad 0$$

$$\Delta C \quad -x \quad x \quad x$$

$$[C] \quad 0.1-x \quad x \quad x$$

$$10^{-4.7} = x^2 / (0.1-x);$$

$$x^2 = 2 \cdot 10^{-6} - 2 \cdot 10^{-5}x;$$

$$x^2 + 2 \cdot 10^{-5}x - 2 \cdot 10^{-6} = 0$$

$$x = 0.0014;$$

$$[H^+] = 0.0014 \text{ M};$$

$$pH = -\lg[H^+] = 2.85.$$

Answer: pH = 2.85.

Answer provided by AssignmentExpert.com