

Answer on the question #67074, Chemistry / Physical Chemistry

Question:

When a solution of benzoic acid was titrated with NaOH the pH of the solution half the acid neutralized was 4.2. what is dissociation constant of acid

Answer:

According to Henderson-Hasselbach equation, pH and the dissociation constant of the weak acid are related as:

$$pH = pK_a + \log\left(\frac{[A^-]}{[HA]}\right)$$

During the titration, when half of the acid is neutralized, the ratio $\frac{[A^-]}{[HA]}$ is equal to 1. This point in the titration is called half-equivalence point. Then, as the logarithm of 1 is zero, the pH at the half-equivalence point is equal to the pK_a . Thus, pK_a of weak acid is 4.2.