# Answer on the question #59734, Chemistry / Other

Question:

a sample of citric acid, a triprotic acid, is titrated with a sodium hydroxide solution. A 20.00 mL sample of the citric acid solution requires 17.03 mL of a 2.025 M solution of NaOH to reach the equivalence point. What is the molarity of the acid solution?

Solution:

The reaction equation of citric acid and sodium hydroxide is:

$$AH_3 + 3NaOH \rightarrow Na_3A + 3 H_2O$$
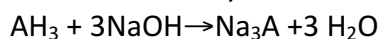
Then, the number of the moles of sodium and citric acid at the equivalence point relate as:

$$\frac{n(NaOH)}{3} = n(AH_3)$$

To find the number of the moles of sodium hydroxide, we should multiply molarity and volume:

$$n(NaOH) = c(NaOH) \cdot V(NaOH) = 17.03 \cdot 10^{-3}(L) \cdot 2.025(mol \cdot L^{-1}) = 0.03449 \, mol$$

Then, molarity, or molar concentration of the solution of citric acid is:

$$c = \frac{n(AH_3)}{V(AH_3)} = \frac{n(NaOH)}{3} \frac{1}{V(AH_3)}$$

$$c = \frac{0.03449(mol)}{3} \frac{1}{20.00 \cdot 10^{-3}(L)} = 0.5748 \, mol \cdot L^{-1}$$

Answer: 0.5748 mol L^{-1}