

Task:

A 0.2145g sample of KHP (FW = 204.22) was titrated with 27.12mL of NaOH.
What is the molarity of the NaOH?

Solution:

The chemical equation for this reaction is
 $\text{KHP} + \text{NaOH} = \text{KNaP} + \text{H}_2\text{O}$

The molarity is

$$C(\text{M}) = n(\text{mol}) / V (\text{L})$$

n- amount of the substance (mol)

V – volume of solution (L)

According to the chemical equation the amount of KHP is equal to the amount of NaOH

$$n(\text{KHP}) = n(\text{NaOH})$$

$$n(\text{KHP}) = C(\text{NaOH}) \cdot V(\text{NaOH})$$

The amount of KHP is

$$n(\text{KHP}) = m(\text{KHP}) / \text{FW}(\text{KHP})$$

That's why

$$m(\text{KHP}) / \text{FW}(\text{KHP}) = C(\text{NaOH}) \cdot V(\text{NaOH})$$

The molarity of NaOH is

$$C(\text{NaOH}) = m(\text{KHP}) / [\text{FW}(\text{KHP}) \cdot V(\text{NaOH})] = 0.2145 / [204.22 \cdot 27.12 \cdot 10^{-3}] = 3.873 \cdot 10^{-2} \text{ M}$$

Answer: $C(\text{NaOH}) = 3.873 \cdot 10^{-2} \text{ M}$