

Question #60268, Chemistry / Other |

If 114mL of 0.008 04M NaOH completely titrates 118mL of H<sub>3</sub>PO<sub>4</sub> solution, what is the molarity of the H<sub>3</sub>PO<sub>4</sub> solution?

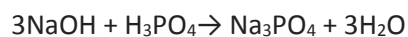
**Answer:**

The amount of used NaOH upon titration is determined as follows:

$v(\text{NaOH}) = C(\text{NaOH}) \times V(\text{NaOH})$ , where C – the concentration of NaOH and V – the volume of NaOH.

$$v(\text{NaOH}) = 0.00804 \text{ M} \times 114 \text{ ml} = 0.91656 \text{ mmol}$$

Taking into the account that sodium hydroxide reacts with H<sub>3</sub>PO<sub>4</sub> according to the equation:



it is clear that 3 molecules of NaOH neutralize 1 molecule of H<sub>3</sub>PO<sub>4</sub>.

Therefore the amount of titrated acid is:

$$v(\text{H}_3\text{PO}_4) = v(\text{NaOH})/3 = 0.91656 \text{ mmol}/3 = 0.30552 \text{ mmol}$$

Then the concentration of H<sub>3</sub>PO<sub>4</sub> solution is defined:

$$C(\text{H}_3\text{PO}_4) = v(\text{H}_3\text{PO}_4)/V(\text{H}_3\text{PO}_4) = 0.30552 \text{ mmol} / 118 \text{ ml} = 0.00259 \text{ M}$$