Answer on Question #77423, Chemistry / Organic Chemistry

Question:

A student prepared a 20 mL sample of hydrochloric acid solution. The sample was diluted with distilled water. The buret was filled completely with the titrant, which is 0.1 M NaOH, until it reached the top mark. The sample was later titrated with a 0.10 M NaOH solution. The endpoint was reached after the addition of 15 mL of titrant (NaOH). Calculate the concentration of HCL in molarity.

Also find these info:

Initial Volume reading of NaOH (mL)

Final Volume reading of NaOH (mL)

Volume of NaOH used (mL)

Molarity of NaOH (mol/L)

Moles of NaOH (mol)

Moles of HCL (mol)

Volume of HCL used (mL)

Molarity of HCL (mol/L)

Solution:

Volume of NaOH titrant: 15 mL = 0.015 L

Amount of NaOH: $0.10 \cdot 0.015 = 0.0015$ mol

Balanced equation: $HCl + NaOH \rightarrow NaCl + H_2O$

So the amount of HCl is same: 0.0015 mol

Volume of a sample of HCl solution: 20 mL = 0.020 L

Molarity of HCl: $0.0015 / 0.020 = 0.075$ mol/L

Answer:

Concentration of HCl: **0.075 mol/L** or **0.075 M**

Additional info:

Initial Volume reading of NaOH: **0 mL** (from task)

Final Volume reading of NaOH: **15 mL** (from task)

Volume of NaOH used: **15 mL** (from task)

Molarity of NaOH: **0.10 mol/L** (from task)

Moles of NaOH: **0.0015 mol** (see solution)

Moles of HCL: **0.0015 mol** (see solution)

Volume of HCL used: **20 mL** (from task)

Molarity of HCL: **0.075 mol/L** (see solution)