Answer on the Question #43567, Chemistry, Physical Chemistry

Question:

If 50 mL of 0.50 N HCl is reacted with 50 mL of 0.25 N NaOH, then what will be the concentration of the HCl after the reaction is complete?
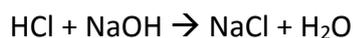
a) 0.9 N

b) 0.6 N

c) 0.3 N

d) 0.13 N

Solution:

The reaction equation is:

HCl + NaOH → NaCl + H$_2$O

The quantity of chlorine acid after the reaction is:

$$n(HCl) = n^0(HCl) - n^0(NaOH)$$

$$n^0 = cV$$

$$n^0(HCl) = 0.5 * 0.05 = 2.5 * 10^{-2} \ mol$$

$$n^0(NaOH) = 0.25 * 0.05 = 1.25 * 10^{-2} mol$$

So, the quantity of chlorine acid after the reaction is:

$$n(HCl) = 1.25 * 10^{-2} \ mol$$

If the volume of solution is the sum of HCl and NaOH solutions volumes, then:

$$c(HCl) = \frac{n(HCl)}{V} = \frac{1.25 * 10^{-2}}{100 * 10^{-3}} = 0.125 \ N$$

Answer: d) 0.13 N