Answer on Question #53557 – Chemistry – General chemistry

Question:

How many moles of [h30] or [oh] must you add to 87.5 ml of HA solution to adjust its PH from 8.92 to 6.33? Assume a negligible volume change.

Solution:

The concentration of $[H_3O]^+$ at pH of 8.92 is:

$C_1 = 10^{-pH} = 10^{-8.98} = 1.202 \times 10^{-9}$ mol/l

Thus, the number of moles of $[H_3O]^+$ in 87.5 ml equals: $n_1 = C_1 \times V = 1.202 \times 10^{-9}$ mol/l $\times 87.5 \times 10^{-3}$ l = 1.052×10^{-10} moles.

The concentration of $[H_3O]^+$ at pH of 6.33 is:

$C_2 = 10^{-pH} = 10^{-6.33} = 4.677 \times 10^{-7}$ mol/l

Therefore the number of moles of $[H_3O]^+$ in this volume should be:

$n_2 = C_2 \times V = 4.677 \times 10^{-7}$ mol/l $\times 87.5 \times 10^{-3}$ l = 4.09268×10^{-8} moles = 409.268×10^{-10} moles

The amount of $[H_3O]^+$, which should be added to rich pH of 6.33 equals:

$n_2 - n_1 = 409.268 \times 10^{-10}$ moles - 1.052×10^{-10} moles = 408.216×10^{-10} moles

Answer: 408.216×10^{-10} moles