Acid - Base Problem :

I have 0.1Liters of [NH_4^+]= 0.2 M, and on the other hand I add "V" Liters of [OH^-] $_0$ = 0'2 M

and when I finish adding "V" I am left with [H_3O^+] $_{final}$ = 0'15 M

$$NH_4^+ + H_2O \rightleftharpoons NH_3 + H_3O^+$$

t_0	0'1 x 0'2	0	0
t	0'1 x 0'2-x	x	x

$Ka=5'7.10^{-10}=\frac{(\frac{x}{0'1})^2}{\frac{0'02-x}{0'1}}$ $\rightarrow$x= $1'06.10^{-6}$ moles = number moles initials of H_3O^+

Nº. moles finals of H_3O^+ = 0'15 x (0'1+V)

Then : x- 0'15 x (0'1+ V)= y= nº moles that react with everything the OH^-

$$H_3O^+ + OH^- \rightleftharpoons 2\,H_2O$$

or: Kw = [H_3O^+][OH^-] $\rightarrow$[OH^-]= 10^{-14} /($\frac{y}{(0'1+V)}$)= 0'2

therefore y= $1'06.10^{-6}$- 0'015+ 0' 15.V

and $5.10^{-14}=\frac{y}{(0'1+V)}$ $\rightarrow$y= 5.10^{-15} + 5.10^{-14} .V

$1'06.10^{-6}$ – 0'015- 5.10^{-15} = V(5.10^{-14} - 0'15)

$\rightarrow$V= $\frac{0'015}{0'15}$= 0.1 liters