

What will be resultant pH when 200ml of soln of HCl (pH=2.0) is mixed with 300ml of an aqueous soln of NaOH (pH=12.0)? [1998, 6M]

Sol<sup>n</sup> pH of HCl = 2  $\Rightarrow [H^+] = 10^{-2} M$

Moles of  $H^+$  ion in 200ml of  $10^{-2} M$  HCl  
 $= \frac{10^{-2}}{1000} \times 200 = 2 \times 10^{-3}$

similarly pH of NaOH = 12

$[H^+] = 10^{-12} M$   $[OH^-] = 10^{-2}$

Mole of  $[OH^-]$  in 300ml of  $10^{-2} M$  NaOH  
 $= \frac{10^{-2}}{1000} \times 300 = (3 \times 10^{-3})$

Total Volume of soln after mixing = 500ml

Moles of  $OH^-$  ion left in 500ml of soln.

$= (3 \times 10^{-3}) - (2 \times 10^{-3}) = 10^{-3}$

Conc. of  $OH^-$  in resulting soln

$= \frac{10^{-3}}{500} \times 1000 = 2 \times 10^{-3} M$

pOH =  $-\log [2 \times 10^{-3}]$

$= 2.699$

pH =  $14 - pOH$

$= 14 - 2.699$

$= 11.301$