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NEUTRALIZATION CURVE OF STRONG ACIS VS STRONG BASE

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NEUTRALIZATION CURVE OF STRONG ACIS VS STRONG BASE

- consider the titration of 100mL of 1M hydrochloric acid with 1M sodium hydroxide solution. The pH of 1M hydrochloric acid is 0. When 50mL of the 1M base have been added, 50mL of unneutralised 1M acid will be present in a total volume of 150mL.

$[H^+]$ will therefore be $50 \times 1/150 = 3.33 \times 10^{-1}$, or $pH = 0.48$

- For 75 mL of base, $[H^+] = 25 \times 1/175 = 1.43 \times 10^{-1}$, $pH = 0.84$
- For 90 mL of base, $[H^+] = 10 \times 1/190 = 5.26 \times 10^{-2}$, $pH = 1.3$



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• For 98 mL of base, $[H^+] = 2 \times 1/198 = 1.01 \times 10^{-2}$, pH = 2.0

• For 99 mL of base, $[H^+] = 1 \times 1/199 = 5.03 \times 10^{-3}$, pH = 2.3

• For 99.9 mL of base, $[H^+] = 0.1 \times 1/199.9 = 5.00 \times 10^{-4}$, pH = 3.3

• Upon the addition of 100 mL of base, the pH will change sharply to 7, i.e. the theoretical equivalence point. The resulting solution is simply one of sodium chloride. Any sodium hydroxide added beyond this will be in excess of that needed for neutralisation.

• With 100.1 mL of base, $[OH^-] = 0.1/200.1 = 5.00 \times 10^{-4}$, pOH = 3.3 and pH = 10.7



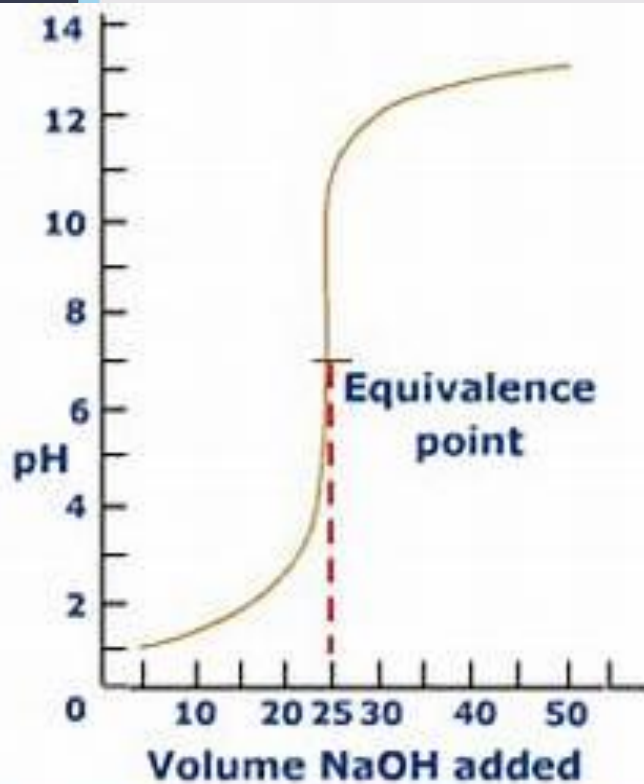
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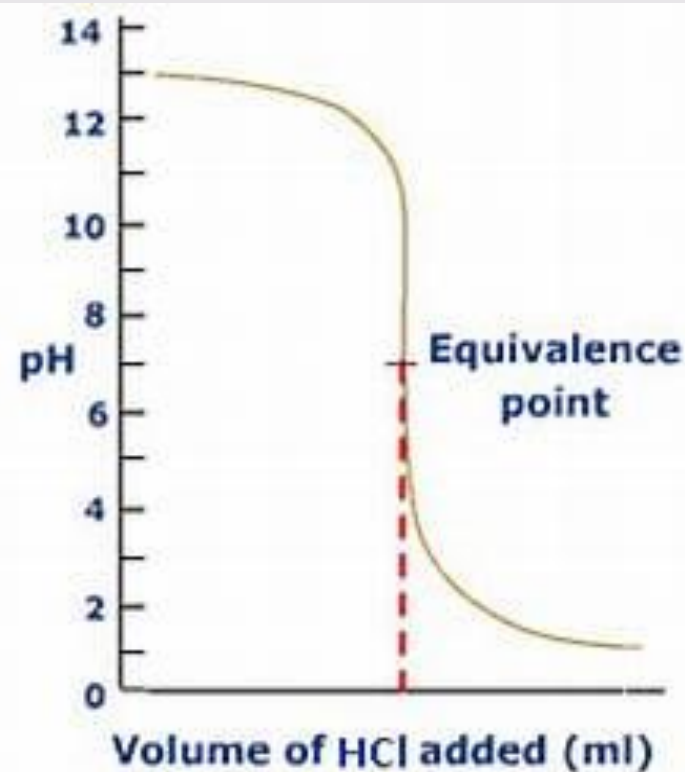
- **With 101mL of base, $[\text{OH}^-] = 1/201 = 5.00 \times 10^{-3}$, $\text{pOH} = 2.3$, and $\text{pH} = 11.7$**
- **These results show that as the titration proceeds, initially the pH rises slowly, but between the addition of 99.9 and 100.1mL of alkali, the pH of the solution rises from 3.3 to 10.7, i.e. in the vicinity of the equivalence point the rate of change of pH of the solution is very rapid.**



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Titration curve of strong acid (HCl) with a strong base (NaOH)



Titration curve of strong base (NaOH) with strong acid (HCl)



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THANK YOU