CH1202: Lab Report II

Determination of Degree of Hydrolysis and Hydrolysis Constant by Potentiometry

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§1 Aim

To determine the degree of hydrolysis and hydrolysis constant of *Anilinium Hydrochloride* using Potentiometer.

§2 Apparatus Required

- Potentiometer
- Platinum Electrode
- Calomel Electrode

§3 Chemicals Required

- Anilinium Hydrochloride
- Quinhydrone

§4 Experimental Data

Calculation of Hydrolysis Constant

1. pH is given by
$$pH = \frac{-E_{\text{obs}} + E_{\text{QH}} + E_{\text{cal}}}{0.0591}$$
where $E_{\text{QH}} = 0.6996\,V$ and $E_{\text{cal}} = -0.242\,V$.[1]
2. Since $pH = -\log[H^+] = -\log(c\alpha)$, $pH = -\log(c) - \log(\alpha)$, the degree of hydrolysis α can be calculated at any given concentration.
3. From α, using $K_h = \frac{c\alpha^2}{1-\alpha}$, we can deduce hydrolysis constant of Anilinium Hydrochloride.
4. The dissociation constant can also be calculated using the relation $K_b = \frac{K_w}{K_h}$.[2]

$[C_6H_5NH^{3+}Cl^-]$	E_{obs}	pH	α $[\times 10^{-2}]$	K_h $[\times 10^{-5}]$	K_b $[\times 10^{-10}]$
0.10	0.277	3.06	0.88	0.78	12.8
0.05	0.274	3.11	1.56	1.24	8.04
0.02	0.264	3.28	2.65	1.44	6.93
0.01	0.260	3.34	4.53	2.15	4.64

§5 Conclusion

The experimented value of $K_h = 1.40 \times 10^{-5}$ and that of $K_b = 8.11 \times 10^{-10}$.

[1] These are oxidation potentials. We took the sign conventions accordingly.
[2] The value of K_w at 25° C is assumed as 10^{-14}.