$K_w = [H^+][OH^-]$ $\quad K_w = 1 \times 10^{-14}\ mol^2\ dm^{-6}$

$pH = -\log_{10}[H^+]$

$K_a = \dfrac{[H^+][A^-]}{[HA]}$

$K_a\ (\text{weak acid}) = \dfrac{[H^+]^2}{[HA]}$

$[H^+] = K_a \times \dfrac{[\text{acid}]}{[\text{salt}]}$

$\text{rate} = k[\text{reactant}]^n$

$k = \dfrac{0.693}{t_{1/2}}$

$\Delta S^\ominus_{sys} = S^\ominus_{prod} - S^\ominus_{reac}$

$\Delta S^\ominus_{surr} = \dfrac{-\Delta H^\ominus_{reac}}{T}$

$\Delta S^\ominus_{total} = \Delta S^\ominus_{sys} \dfrac{-\Delta H^\ominus_{reaction}}{T}$

$\Delta G = -T\Delta S_{total}$

$\Delta G = \Delta H_{react} - T\Delta S_{sys}$

$\Delta E = h\nu$ $\quad \nu$: frequency of light absorbed.

Lattice energy $\propto \frac{\text{charge}}{\text{size}}$

$$\Delta H^{\ominus}_{hyd} \propto \frac{\text{charge}}{\text{size}}.$$

$$\Delta H^{\ominus}_{latt} + \Delta H^{\ominus}_{sol} = \Delta H^{\ominus}_{hyd}.$$

$Q = It$

$1\,F = 96\,500\ C\,mol^{-1}$

$F = eL$ — L – Avogadro's, e – electron charge

* $E = E^{\ominus} + \frac{RT}{zF} \ln \frac{[\text{oxidised form}]}{[\text{reduced form}]}$

T: Temp in K

z: no. of electrons transferred in the reaction

F: Faraday constant

* For metal/metal ion:

$$E = E^{\ominus} + \frac{0.059}{z} \log_{10} [\text{oxidised form}]$$