

Answer on Question #55708 - Chemistry - Physical chemistry

Question:

The emf of the cell Ag/AgCl, (0.05M)KCl // (0.05M)AgNO₃/Ag is 0.788v.find the solubility product of AgCl

Solution

Right electrode: $E_2 = E^0 + 0.05916 \lg[\text{Ag}^+]$

Left electrode: $E_1 = E^0 + 0.05916 \lg(K_{sp}/[\text{Cl}^-])$

The emf of the cell is $\Delta E = E_2 - E_1 = 0.05916 \lg([\text{Ag}^+][\text{Cl}^-] K_{sp}^{-1})$

$\lg(K_{sp}) = -15.92$

$K_{sp} = 10^{-15.92} = 1.202 \times 10^{-16}$ (This value is strange because it does not corresponds the reference data for AgCl solubility. But silver cyanide has this value - 1.2×10^{-16})

Check: $0.05916 \lg(0.05^2/(1.202 \times 10^{-16})) = 0.788 \text{ V}$

Answer: 1.202×10^{-16}