

Answer on Question #83960 - Chemistry - Physical Chemistry

Question:

The emf of the cell

$\text{Ag(s)} \mid \text{AgCl(satd)}, \text{KCl}(0.05 \text{ mol dm}^{-3})/\text{AgNO}_3, (0.01 \text{ mol dm}^{-3}) \mid \text{Ag(s)}$

is 0.31 V at 298.15 K. The mean activity coefficient of KCl is 0.817 and that of AgNO_3 , is 0.723.

Calculate

the solubility product of AgCl at 25°C.

Solution:

$$K_{sp} = [\text{Ag}^+] = [\text{Cl}^-]$$

$$a = \alpha \cdot c;$$

$$c = a / \alpha;$$

$$c(\text{KCl}) = 0.05 / 0.817 = 0.041 \text{ mol/L};$$

$$c(\text{AgNO}_3) = 0.01 / 0.723 = 0.007 \text{ mol/L};$$

$$K_{sp} = 0.007.$$

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