

Thermodynamic properties of palladium chloride complexes in aqueous solutions

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On the basis of expert estimates of literature data for thermodynamic properties of substances in the system Cl–Pd (aq) the values of stepwise and total stability constants for $[\text{PdCl}_n]^{2-n}$ complexes are recommended. The standard electrode potential of $\text{PdCl}_4^{2-}/\text{Pd}(\kappa)$ half-cell ($E_{298.15}^\circ = 0.646 \pm 0.007$ V) is calculated. This value yields $\Delta_f G_{298.15}^\circ = -400.4 \pm 1.4$ kJ/mol for $\text{PdCl}_4^{2-}(\text{aq})$. On the basis of calorimetric studies published in the literature the following thermodynamic quantities are calculated: $\Delta_f H_{298.15}^\circ (\text{PdCl}_4^{2-}(\text{aq})) = -524.6 \pm 1.6$ kJ/mol, and $\Delta_f H_{298.15}^\circ \text{Pd}^{2+}(\text{aq}) = 189.7 \pm 2.6$ kJ/mol. Using the accepted values for the total stability constant of PdCl_4^{2-} and the standard electrode potential of $\text{PdCl}_4^{2-}/\text{Pd}(\kappa)$ half-cell, the value of $\Delta_f G_{298.15}^\circ \text{Pd}^{2+}(\text{aq}) = 190.1 \pm 1.4$ kJ/mol is defined.

Key words: thermodynamic, electrochemistry, palladium chloride complexes, Pd^{2+}

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