other texts; e.g. for the cell reaction

$$Ag(c) \rightarrow Ag^{+}(aq) + e^{-} \qquad E^{\circ} = -0.8v.$$

All the cell reactions are written as oxidations; i.e. with the electrons on the right-hand side.

The equation

$$\Delta G^{\circ} = -RT\ln K = -1.360 \log_{10} K$$

is also used to calculate ΔG° for some reactions ($T = 298^{\circ}K$, and K is the equilibrium constant of the reaction).

From these data ΔG°_{f} values are tabulated for a number of compounds in the solid and (occasionally) gaseous states and for aqueous solutions. This standard free energy of formation is the most useful thermodynamic quantity for practical application; if it is negative, as in

$$Os(c) + 2O_2 \rightarrow OsO_4\ (g) \quad \Delta G^{\circ}_{f} = -70 \text{ kcals/mole}$$

the reaction should proceed spontaneously in the direction indicated. However, this tells us nothing of the rate of such a reaction, merely that it is thermodynamically possible. If ΔG°_{f} were large and positive the reaction could not proceed spontaneously, with or without a catalyst. Of course, by proceeding to non-standard states of reaction the balance may be changed. It is also possible to calculate equilibrium constants for reactions involving the compounds quoted by using these ΔG°_{f} values together with other readily available data.

Potential diagrams are given for the various oxidation states of the elements, and these provide a useful shorthand way of summarising information on the relative stabilities in solution of their various oxidation states.

In short, this review provides at least a foundation for the more quantitative aspects of platinum metal chemistry. It should stimulate further research in a field which, for the platinum group elements, has received less attention than it deserves.

References

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