

8.3.1 Classification of electrode types

Conventional electrodes as half cells for electroanalytical techniques involve redox reactions (electrodes of zeroth, 1st, 2nd and 3rd kinds) as follows:

Class 0: Inert metals used in oxidation-reduction electrolytic cells. Ideal inert materials exchange electrons reversibly with the electrolyte components and are not subject to oxidation or corrosion themselves, i.e., “ideally” polarizable electrodes.

Class 1: Reversible metal/metal ion (ion exchanging metals bathed in electrolytes containing their own ions), for example Ag/Ag^+ .

Class 2: Reversible metal/metal ion with saturated salt of the metal ion and excess anion X^- , for example $\text{Ag}/\text{AgX}/X^-$.

Class 3: Reversible metal/metal salt or soluble complex/second metal salt or complex and excess second cation, for example $\text{Pb}/\text{Pboxalate}/\text{Caoxalate}/\text{Ca}^{2+}$ or $\text{Hg}/\text{HgEDTA}^{2-}/\text{CaEDTA}^{2-}/\text{Ca}^{2+}$.

At a *gas-electrode* one component of the redox couple is in the gaseous state. For the hydrogen gas electrode, see section 3.4.12.

Ion-selective electrodes (ISEs) based on thin films or selective membranes as recognitive elements are equivalent to other half-cells, see the subsections 8.3.2.1 - 8.3.2.4).

Chemically modified electrodes (CME) form a separate group. See 8.3.3.