standard hydrogen electrode

For solutions in protic solvents, the universal *reference electrode* for which, under standard conditions, the standard electrode potential (H^+/H_2) is zero at all temperatures.

The *absolute electrode potential* of the hydrogen electrode under standard conditions can be expressed in terms of thermodynamic quantities by applying a suitable Born–Haber cycle, thus:

$$E^o(H^+/\,H_2)(\text{abs}) \;=\; (\Delta_{at}G^o + \Delta_{ion}G^o + \alpha_{H^+}{}^{o,\,S}/F)$$

where $\Delta_{at}G^o$ and $\Delta_{ion}G^o$ are the atomization and ionization Gibbs energies of H_2, $\alpha_{H^+}{}^{o,\,S}$ is the real potential of H_2 in solvent S and F is the Faraday constant.

The recommended absolute electrode potential of the hydrogen electrode is:

$$E^o\,(H^+/H_2)^{H_2O}\,(\text{abs}) = (4.44 \pm 0.02)\ \text{V}$$
$$\text{at } 298.15\ \text{K}$$

1986, *58*, 957