

# STATISTICAL MOLECULAR THERMODYNAMICS

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Video 13.7

Review of Module 13

## CRITICAL CONCEPTS FROM MODULE 13

- Separation of species that react by transfer of electrons allows the potential difference to be transformed into work in an electrochemical cell.
- By adopting a convention for the standard potential of one half cell (the Standard Hydrogen Electrode), and then measuring full cell standard potentials, conventional standard potentials may be assigned to all other half cells.
- Debye-Hückel theory permits ready determination of standard cell potentials from asymptotic behavior of potential with respect to dilute electrolyte ionic strength.

## CRITICAL CONCEPTS FROM MODULE 13

- The Nernst equation and the relation  $\Delta G = -nFE$  establishes a connection between electrochemistry and thermodynamics; ionic thermochemical quantities can be assigned in this way.

$$E = E^{\circ} - \frac{RT}{nF} \ln Q$$

- Electrochemical cells can be used to measure otherwise difficult equilibrium constants.
- Batteries and fuel cells are practical realizations of electrochemistry.
- Solar photons can be harnessed to catalytically split water and generate hydrogen as a clean solar fuel.

$$dU = \delta q + \delta w$$



*This train has reached its destination...*

*Thanks for riding, and all best wishes for future journeys!*