

Standard Hydrogen Electrode Statements Analysis

<https://gemini.google.com/app/ea743c80dcc9ba5a>

Response: To determine which statements regarding the standard hydrogen electrode (SHE) are correct, let's analyze each statement individually:

- **(a) E° value of the electrode is considered as 0.00 V.**
 - **Correct.** By convention, the standard electrode potential (E°) of the Standard Hydrogen Electrode is defined as exactly 0.00 V at all temperatures to serve as a reference potential.
- **(b) The half-reaction is irreversible.**
 - **Incorrect.** The half-reaction $2\text{H}^+(\text{aq}) + 2\text{e}^- \rightleftharpoons \text{H}_2(\text{g})$ is highly reversible, which allows it to function effectively as either an anode or a cathode.
- **(c) The half-reaction is always spontaneous.**
 - **Incorrect.** Spontaneity depends entirely on the relative reduction potential of the standard electrode coupled with it in the electrochemical cell.
- **(d) It can act as the anode or cathode depending on the electrochemical cell under consideration.**
 - **Correct.** If connected to an electrode with a higher reduction potential, the SHE acts as the anode (oxidation occurs). If connected to an electrode with a lower (more negative) reduction potential, the SHE acts as the cathode (reduction occurs).

Conclusion

Statements **(a)** and **(d)** are correct.
