REDOX REACTIONS

SDSU CHEM 251

OXIDATION & REDUCTION

- REDOX reactions involve the transfer of electrons from one species to another.
- The total reaction can be broken into two half-reactions:
    - A **red**uction: $B + e^- \rightarrow B^-$
    - An **ox**idation: $A \rightarrow A^+ + e^-$
- The reaction is balanced by the number of electrons involved in the reaction.

REACTION CONDITIONS

- In order for a REDOX reaction to proceed certain conditions must be met:
  - One reactant must be able to be reduced.
  - One reactant must be able to be oxidized.
  - The **net potential** for the REDOX reaction **must be positive** ($E°_{cell} > 0V$)

CELL POTENTIALS

- The cell potential for the REDOX reaction can be calculated from the standard reduction potentials for the two half reactions (tabulated): $E°_{cell} = E°_{+} - E°_{-}$
- Where $E°_{+}$ is the standard reduction potential for the **reduction half reaction**, and $E°_{-}$ is the standard reduction potential for the **oxidation half reaction**.
- An important note is that the potential for the oxidation half of the reaction is treated as a reduction in the equation.

IDENTIFY THE PROPER REACTANT

If a solution contains Fe^{3+}, which of the reactants listed below could be used to reduce Fe^{3+} to Fe^{2+}?

Reduction Potentials

$Fe^{3+} + e^- \rightleftharpoons Fe^{2+}$ $E° = 0.771$ V

$MnO_4^- + e^- \rightleftharpoons MnO_4^{2-}$ $E° = 0.56$ V

$IrCl_6^{2-} + e^- \rightleftharpoons IrCl_6^{3-}$ $E° = 1.026$ V

Options:

MnO_4^-

MnO_4^{2-}

$IrCl_6^{2-}$

$IrCl_6^{3-}$