

Chapter 17 Part 2

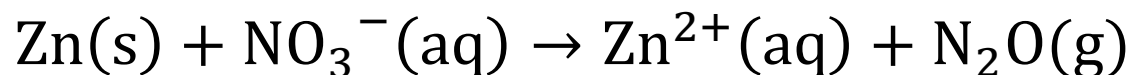
Dr. Turner

Balancing Redox Reactions in Acidic Solution

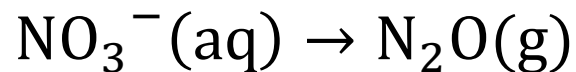
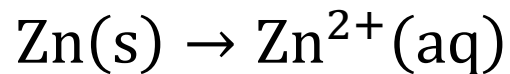
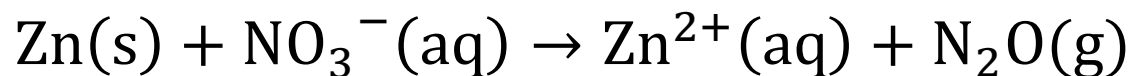
- Write the equations for the oxidation and reduction half-reactions
- In each half-equation
 - ▣ Balance the atoms of all the elements except O and H
 - ▣ Balance oxygen using H_2O
 - ▣ Balance hydrogen using H^+
 - ▣ Balance charge using electrons
- If necessary, equalize the number of electrons in the oxidation and reduction half equations by multiplying one or both half-equations by appropriate integers
- Add the half-equations, then cancel species common to both sides of the over-all equation
- Check that numbers of atoms and charges balance

Balancing Redox Reactions in Acidic Solution

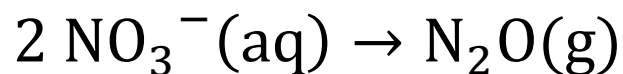
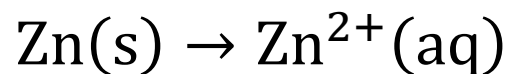
Write the balance equation for the reaction below in acidic solution.



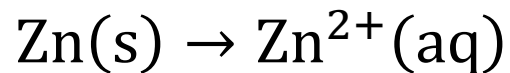
Write Half Reactions



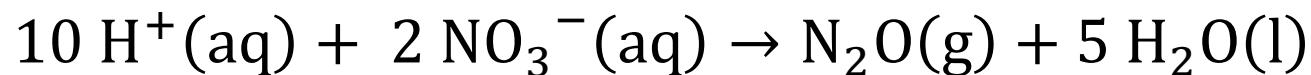
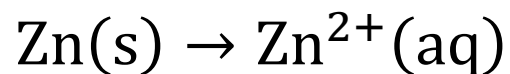
Balance the atoms of all the elements except O and H



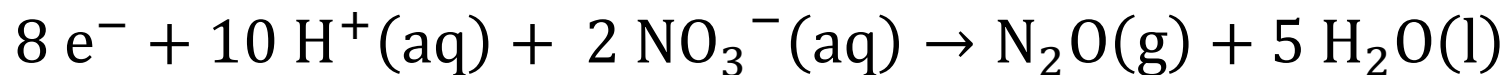
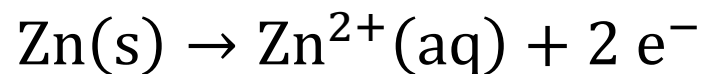
Balancing O using H₂O



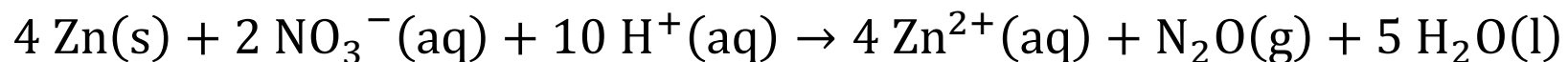
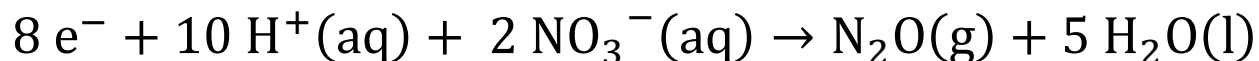
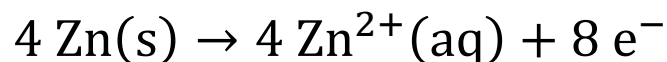
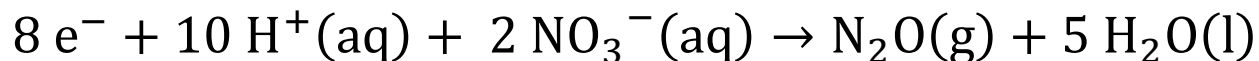
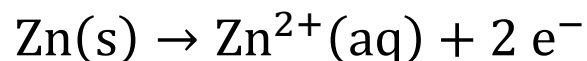
Balancing H using H^+



Balancing Charge by Adding Electrons



Combine the Half-Equations

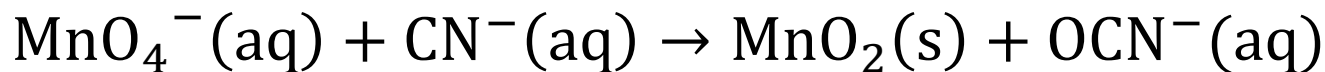


Balancing Redox Reactions in Basic Solution

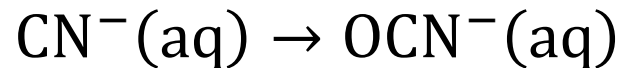
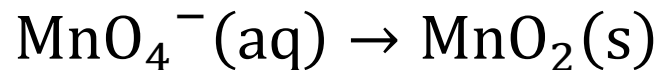
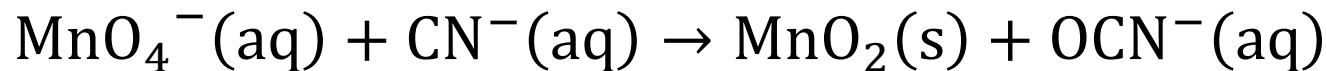
- Balance the equation as if the reaction were occurring in acidic medium
- To both sides of the overall equation obtained, add a number of OH^- that is equal to the number of H^+ ions.
- On the side of the overall equation containing both H^+ and OH^- ions, combine them to form H_2O molecules.
- If H_2O molecules now appear on both sides of the overall equation, cancel the same number from each side, leaving a remainder of H_2O on just one side.
- Check that numbers of atoms and charges balance.

Balancing Redox Reactions in Basic Solution

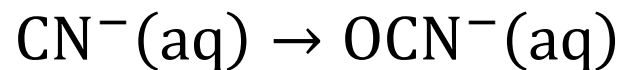
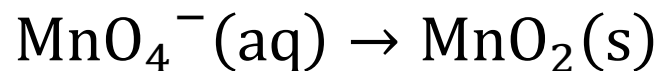
Balance the equation for the reaction in which permanganate ion oxidizes cyanide ion to cyanate ion in basic solution and is itself reduced to $\text{MnO}_2(\text{s})$.



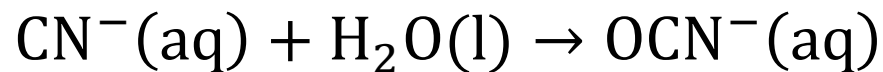
Write Half Reactions



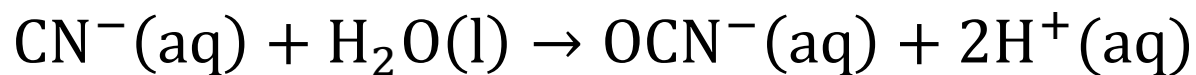
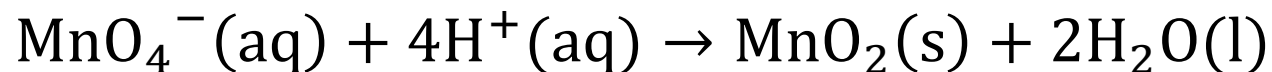
Balance the atoms of all the elements except O and H



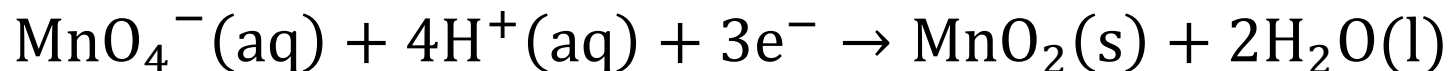
Balancing O using H₂O



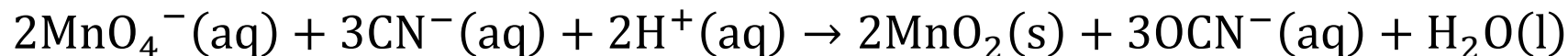
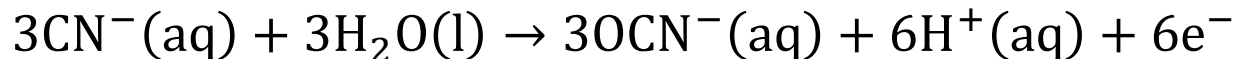
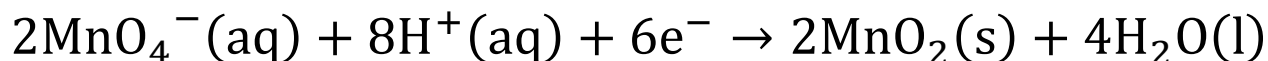
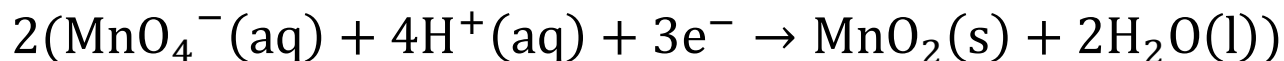
Balancing H using H^+



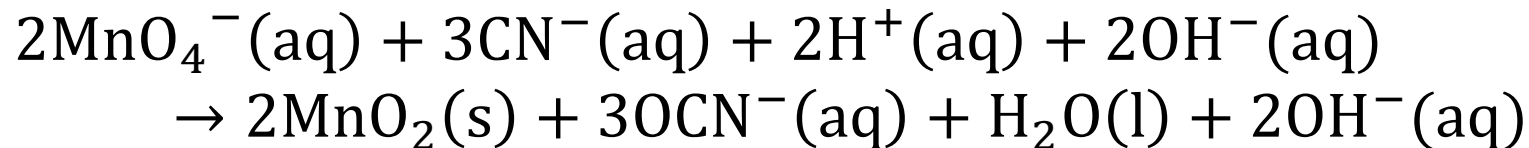
Balancing Charge by Adding Electrons



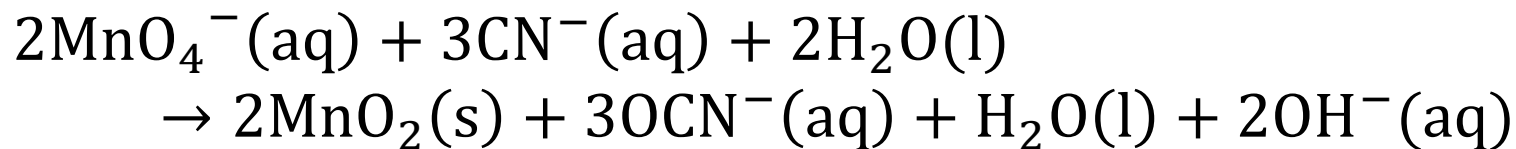
Combine the Half-Equations



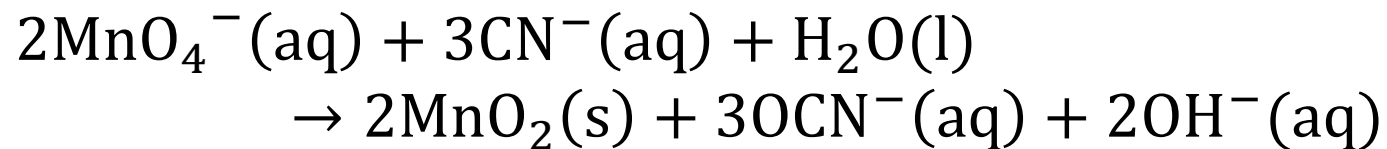
Add OH^- to both sides for every H^+



Combine H^+ with OH^- to make H_2O



Cancel extra H₂O



Half Reactions

Identify the reduction half-reaction for:



- A. $2 \text{Na(s)} + 2 \text{e}^- \rightarrow 2 \text{Na}^+(\text{aq})$
- B. $\text{F}_2(\text{g}) + 2 \text{e}^- \rightarrow 2 \text{F}^-(\text{aq})$
- C. $2 \text{Na(s)} \rightarrow 2 \text{Na}^+(\text{aq}) + 2 \text{e}^-$
- D. $\text{F}_2(\text{g}) \rightarrow 2 \text{F}^-(\text{aq}) + 2 \text{e}^-$

Balancing Redox Reactions

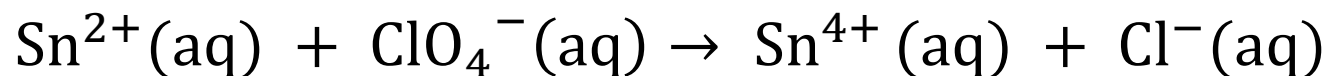
Write the balanced overall redox equation for the half-reactions below.



- A. $\text{Fe}^{3+}(\text{aq}) + \text{Br}^{-}(\text{aq}) \rightarrow \text{Fe}(\text{s}) + \text{Br}_2(\text{l})$
- B. $\text{Fe}^{3+}(\text{aq}) + 2 \text{Br}^{-}(\text{aq}) \rightarrow \text{Fe}(\text{s}) + \text{Br}_2(\text{l})$
- C. $2 \text{Fe}^{3+}(\text{aq}) + 4 \text{Br}^{-}(\text{aq}) \rightarrow 2 \text{Fe}(\text{s}) + 2 \text{Br}_2(\text{l})$
- D. $2 \text{Fe}^{3+}(\text{aq}) + 6 \text{Br}^{-}(\text{aq}) \rightarrow 2 \text{Fe}(\text{s}) + 3 \text{Br}_2(\text{l})$

Balancing redox reactions in acidic sol'n

Balance the following reaction in acidic solution.



Balancing redox reactions in basic sol'n

Balance the following reaction in basic solution.

