VII) Writing Balanced Equations for Redox Reactions Using the Standard Reduction Table

April 30, 2018 8:32 PM

VII) Writing Balanced Equations for Redox Reactions Using the Standard Reduction Table

Steps:

1) Find the appropriate reduction and oxidation half-reactions from the table, and write them down, one above the other.

2) Balance electrons.

3) Cancel where appropriate and write the balanced equation. Electrons should cancel and not be written in the overall redox reaction *(electrons should only be present in half-reactions).*

→ e^- ... often you can cancel H_2O, H^+

Practice Questions: Write a balanced reaction for the following reactants.

1. MnO_4^- (acidic) and H_2SO_3

reduction: $MnO_4^- + 8H^+ + 5e^- \rightarrow Mn^{2+} + 4H_2O$ ×2

oxidation: $H_2SO_3 + H_2O \rightarrow SO_4^{2-} + 4H^+ + 2e^-$ ×5

$2MnO_4^- + 16H^+ + 10e^- \rightarrow 2Mn^{2+} + 8H_2O$

$5H_2SO_3 + 5H_2O \rightarrow 5SO_4^{-2} + 20H^+ + 10e^-$

8-5=3 H_2O

20-16=4 H^+

NET: $2MnO_4^- + 5H_2SO_3 \rightarrow 2Mn^{2+} + 5SO_4^{2-} + 3H_2O + 4H^+$

2. Cu and NO_3^- (acidic) to produce Cu^{2+} and NO

reactants products.

$Cu_{(s)} \rightarrow Cu^{2+}$ (oxidation)

$NO_3^- \rightarrow NO$ (reduction)

oxidation: $Cu_{(s)} \rightarrow Cu^{2+} + 2e^-$ ×3

reduction: $NO_3^- + 4H^+ + 3e^- \rightarrow NO_{(g)} + 2H_2O$ ×2

$3Cu_{(s)} \rightarrow 3Cu^{2+}_{(aq)} + 6e^-$

$2NO_3^- + 8H^+ + 6e^- \rightarrow 2NO_{(g)} + 4H_2O$

Net: $3Cu_{(s)} + 2NO_3^-{}_{(aq)} + 8H^+_{(aq)} \rightarrow 3Cu^{2+}_{(aq)} + 2NO_{(g)} + 4H_2O_{(l)}$