

Unit 8, Lesson 04: Balancing Redox Reactions in Basic Conditions

These youtube videos by Tyler DeWitt are excellent. Before reading the notes, please watch:

1. How to Balance Redox Equations in Basic Solution
2. How to Balance Redox Equations in Basic Solution Example Problem

The main trick is to remember to add OH^{1-} ions **TO BOTH SIDES** of the chemical equation that was balanced in acidic conditions.

Let's take the reactions that we balanced in acid conditions from the last lesson and balance them in basic conditions:

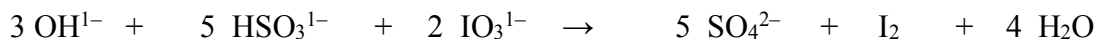
Example #1, balanced in acidic conditions:



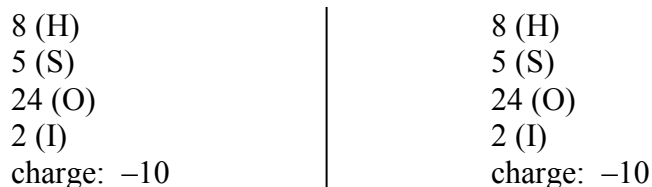
Step 1: Recopy the reaction and add 3 OH^{1-} ions **TO BOTH SIDES** to neutralize the 3 H^{1+}



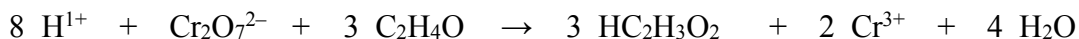
Step 2: the 3 H^{1+} and 3 OH^{1-} on the product side will combine to make 3 H_2O . These 3 water molecules add to the water molecule that is already there to make a total of 4 H_2O . The reaction is now balanced in basic conditions. Re-write the simplified equation and draw a box around it:



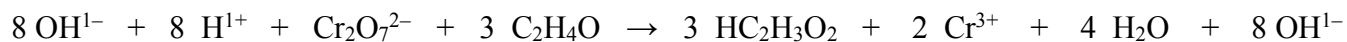
Step 3: Double-check!!!



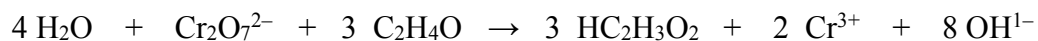
Example #2, balanced in acidic conditions (this is the slow oxidation of ethanal to ethanoic acid):



Step 1: Recopy the reaction and add 8 OH^{1-} ions **TO BOTH SIDES** to neutralize the 8 H^{1+}



Step 2: the 8 H^{1+} and 8 OH^{1-} on the reactant side will combine to make 8 H_2O . These 8 water molecules will cancel out the 4 H_2O molecules on the product side, leaving 4 H_2O on the reactant side. The reaction is balanced in basic conditions. Re-write the simplified equation, drawing a box around it:



Step 3: Double-check!!! Both sides have 20 (H), 14 (O), 2 (Cr), 6 (C) and a total charge of -2