

Name: \_\_\_\_\_  
Blk: \_\_\_\_\_ Date: \_\_\_\_\_

Chemistry 12  
Electrochemistry Lesson #4  
**Balancing Half- Reactions**

A half reaction must be balanced for \_\_\_\_\_ and \_\_\_\_\_.

Memory-Aid for balancing Half reactions:

His name was: **MAJOR HYDROXIDE** or \_\_\_\_\_.

1. Balance the \_\_\_\_\_ species first by adding \_\_\_\_\_
2. Balance the \_\_\_\_\_ atoms second by adding \_\_\_\_\_
3. Balance the \_\_\_\_\_ atoms third by adding \_\_\_\_\_
4. Balance the \_\_\_\_\_ last by adding \_\_\_\_\_.

Example 1.

Balance the half reaction  $\text{RuO}_2 \leftrightarrow \text{Ru}$ . The reaction occurs in **ACIDIC** solution

Step 1.

Step 2.

Step 3.

Step 4.

TO BALANCE HALF REACTIONS IN BASIC SOLUTION FOLLOW THE FOUR STEPS OF MAJOR HYDROXIDE AND THEN ADD THE **DISSOCIATION OF WATER** ( \_\_\_\_\_ )SO THAT \_\_\_\_\_

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Example 2.

Balance the half reaction:  $\text{Pb} \leftrightarrow \text{HPbO}_2^-$  which occurs in **BASIC** solution.

Step 1.

Step 2.

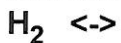
Step 3.

Step 4.

Step 5.

Example 3:

Balance the half reaction which occurs in **ACIDIC** solution



Step 1.

Step 2.

Step 3.

Step 4.

### **CHANGES IN OXIDATION NUMBERS DURING HALF-REACTIONS**

In the half reaction:  $\text{MnO}_4^- \leftrightarrow \text{MnO}_2$

- Calculate the Oxidation Numbers for Mn on both sides of the equation
- Calculate the change in oxidation number ( $\Delta\text{ON}$ ) and assign a value for the change
- Balance the half reaction in **ACIDIC** solution using MAJOR HYDROXIDE
- Determine from your answer in "b" if this is a reduction or an oxidation half reaction.

**Seatwork/homework:** EXERCISES 19, 22-23 pg 203-204 and PLO's T1.