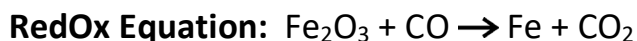


Balancing Reduction / Oxidation (RedOx) Equations

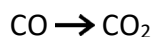
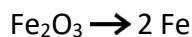
The first step in balancing a RedOx reaction is to verify that it is indeed RedOx by identifying the element that is oxidized and the element that is reduced. This is accomplished by assigning oxidation numbers to all elements in each reactant and each product. If an element's oxidation number decreases (the element gains electrons) during the reaction, it is being reduced; if an element's oxidation number increases (the element loses electrons), it is being oxidized.



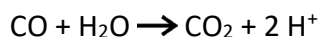
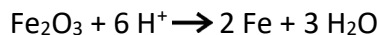
1. Write the reduction half-cell reaction and the oxidation half-cell reaction.



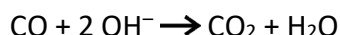
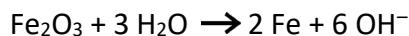
2. Balance each half-cell reaction individually
 - a. Balance atoms other than H and O by changing their coefficient



- b. In an acidic environment, balance the Oxygens / Hydrogens by adding H_2O and/or H^+



- c. In a basic environment, balance the Oxygens / Hydrogens by adding H_2O and/or OH^-



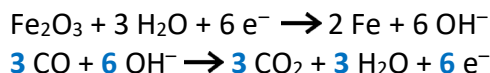
3. Add electrons to balance the charge.



4. Make the electrons in each half-cell reaction equal:

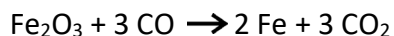
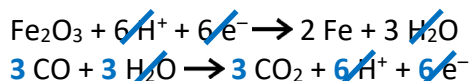


Basic:

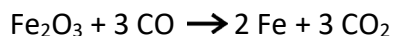
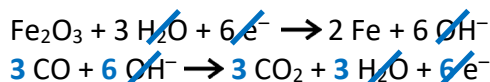


5. Add the Oxidation and Reduction equations once the electrons gained equal the electrons lost (Law of Conservation of Matter).
- Cancel out the electrons.
 - Cancel out (or reduce to the lowest possible numbers) any other species that are present on both sides of the reaction.
 - Simplify the coefficients to the smallest whole number ratio if necessary.

Acidic:



Basic:



Additional Example

- $\text{Cr}(\text{OH})_3 + \text{Br}_2 \rightarrow \text{CrO}_4^{2-} + \text{Br}^-$ in basic solution

Reduction half-cell reaction:



Oxidation half-cell reaction:

