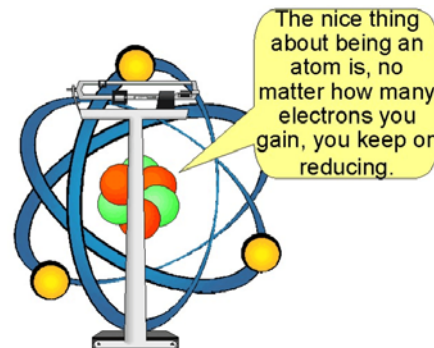


Analyzing Oxidation-Reduction Reactions

When chemical bonds form, electrons are either lost, gained or shared. Metals lose electrons. This is what happens when iron rusts. When the iron, a metal, combines with oxygen, a non metal, to form rust, it loses electrons. This process is called oxidation even when the nonmetal is not oxygen. Nonmetals gain electrons causing their oxidation states to go down. This is called reduction. It is possible to tell what was oxidized and what was reduced in a chemical reaction by checking the oxidation states of the elements before and after the reaction. The element that has an increase in oxidation state was oxidized while the one that has a decrease in oxidation state was reduced.



Example



For each of the examples below, determine the oxidation states of the elements on both sides of the equation. Then determine which element was oxidized and which was reduced. Write your answer in the space provided.

Reaction	Element:	
	Oxidized	Reduced
Example: $\text{Cu} + 2\text{AgNO}_3 \rightarrow \text{Cu}(\text{NO}_3)_2 + 2\text{Ag}$ $\overset{0}{\text{Cu}} + 2\overset{+1}{\text{Ag}}\overset{+5}{\text{N}}\overset{-2}{\text{O}_3} \rightarrow \overset{+2}{\text{Cu}}(\overset{+5}{\text{N}}\overset{-2}{\text{O}_3})_2 + \overset{0}{2\text{Ag}}$	Cu	Ag
1. $2\text{Mg} + \text{O}_2 \rightarrow 2\text{MgO}$		
2. $\text{Zn} + 2\text{HCl} \rightarrow \text{ZnCl}_2 + \text{H}_2$		
3. $\text{Fe}_2\text{O}_3 + 3\text{CO} \rightarrow 2\text{Fe} + 3\text{CO}_2$		
4. $2\text{K}_2\text{Cr}_2\text{O}_7 + 2\text{H}_2\text{O} + 3\text{S} \rightarrow 4\text{KOH} + 2\text{Cr}_2\text{O}_3 + 3\text{SO}_2$		

Reaction	Element:	
	Oxidized	Reduced
5. $2\text{H}_2\text{O} + \text{O}_2 \rightarrow 2\text{H}_2\text{O}_2$		
6. $2\text{KClO}_3 \rightarrow 2\text{KCl} + 3\text{O}_2$		
7. $4\text{NaOH} + \text{Ca}(\text{OH})_2 + \text{C} + 4\text{ClO}_2 \rightarrow 4\text{NaClO}_2 + \text{CaCO}_3 + 3\text{H}_2\text{O}$		
8. $3\text{P} + 5\text{HNO}_3 + 2\text{H}_2\text{O} \rightarrow 5\text{NO} + 3\text{H}_3\text{PO}_4$		
9. $3\text{Cu} + 8\text{HNO}_3 \rightarrow 2\text{NO} + 3\text{Cu}(\text{NO}_3)_2 + 4\text{H}_2\text{O}$		
10. $2\text{PbSO}_4 + 2\text{H}_2\text{O} \rightarrow \text{PbO}_2 + \text{Pb} + 2\text{H}_2\text{SO}_4$		
11. $4\text{HCl} + \text{MnO}_2 \rightarrow \text{MnCl}_2 + 2\text{H}_2\text{O} + \text{Cl}_2$		
12. $4\text{NH}_3 + 5\text{O}_2 \rightarrow 4\text{NO} + 6\text{H}_2\text{O}$		
13. $16\text{HCl} + 2\text{KMnO}_4 \rightarrow 8\text{H}_2\text{O} + 2\text{KCl} + 2\text{MnCl}_2 + 5\text{Cl}_2$		
14. $\text{Cu} + 2\text{H}_2\text{SO}_4 \rightarrow \text{CuSO}_4 + \text{SO}_2 + \text{H}_2\text{O}$		
15. $8\text{HNO}_3 + 6\text{KI} \rightarrow 6\text{KNO}_3 + 3\text{I}_2 + 2\text{NO} + 4\text{H}_2\text{O}$		
16. $\text{I}_2 + 5\text{HClO} + \text{H}_2\text{O} \rightarrow 2\text{HIO}_3 + 5\text{HCl}$		
17. $\text{K}_2\text{Cr}_2\text{O}_7 + 3\text{SnCl}_2 + 14\text{HCl} \rightarrow 2\text{CrCl}_3 + 3\text{SnCl}_4 + 2\text{KCl} + 7\text{H}_2\text{O}$		
18. $\text{SnCl}_2 + 2\text{HgCl}_2 \rightarrow \text{SnCl}_4 + \text{Hg}_2\text{Cl}_2$		