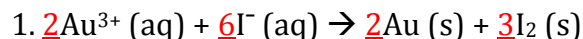




### **Balancing REDOX Reactions – Supplemental Worksheet KEY**

*The tutorials have been removed to save space. Refer to the original worksheet for clarification on how to balance REDOX reactions.*

Are these reactions are REDOX reactions? If yes, then balance the reaction using the half-reaction method.



To balance elements: Insert coefficients.



To balance charge: Add electrons.

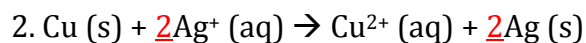


To balance electrons: Multiply by coefficients.



Combine:





To balance elements: Insert coefficients.



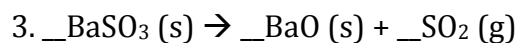
To balance charge: Add electrons.



To balance electrons: Multiply by coefficients.



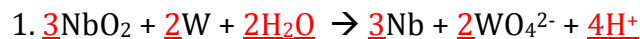
Combine:



NOT A REDOX REACTION. Also, it is already balanced :)



Balance the following reactions using the half-reaction method in an **acidic** solution.



To balance elements (other than O and H): Insert coefficients.



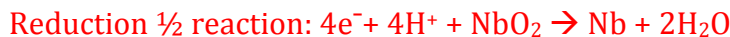
To balance oxygens: Add water.



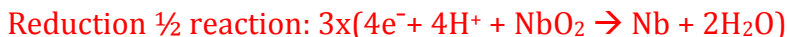
To balance hydrogens: Add  $\text{H}^+$  (since we're in acidic solutions).



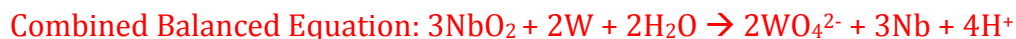
To balance charge: Add electrons.

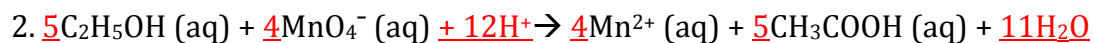


To balance electrons: Multiply by coefficients.



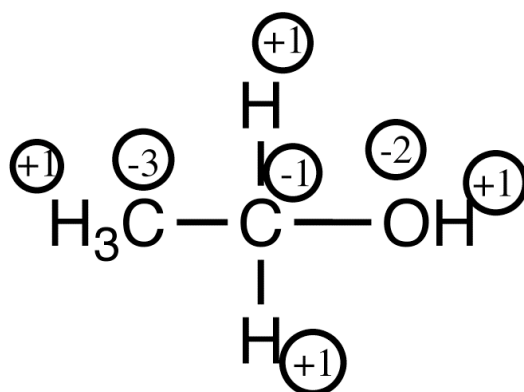
Combine:



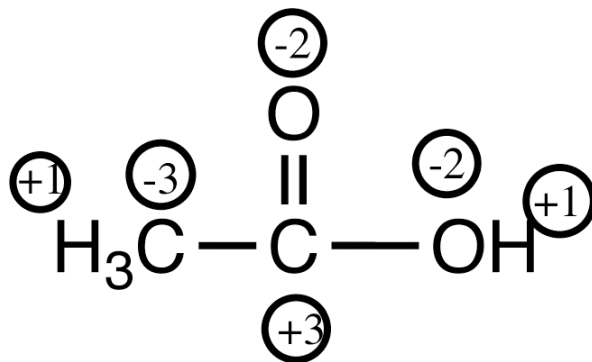


Here the assignment of oxidation numbers can be challenging. Refer to the following diagrams for the assignment of oxidation numbers on the hydrocarbons!

Ethanol:



Acetic Acid:



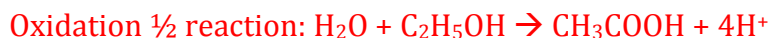
To balance elements (other than O and H): Insert coefficients.



To balance oxygens: Add water.



To balance hydrogens: Add  $\text{H}^+$  (since we're in acidic solutions).

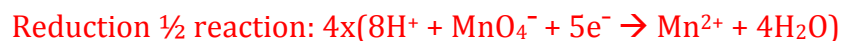




To balance charge: Add electrons.

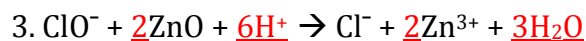


To balance electrons: Multiply by coefficients.



Combine:





To balance elements (other than O and H): Insert coefficients.



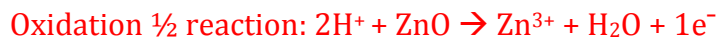
To balance oxygens: Add water.



To balance hydrogens: Add  $\text{H}^+$  (since we're in acidic solutions).



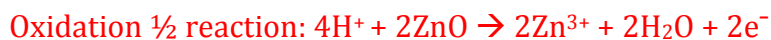
To balance charge: Add electrons.



To balance electrons: Multiply by coefficients.

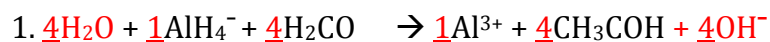


Combine:





Balance the following reactions using the half-reaction method in a **basic** solution.



To balance elements (other than O and H): Insert coefficients (nothing needed to be done here though!)



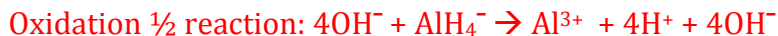
To balance oxygens: Add water (also nothing needed to be added in this example)



To balance hydrogens: Add  $\text{H}^+$ .

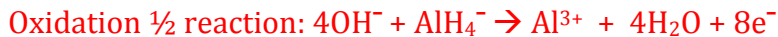


BUT it is a BASIC solution. Add  $\text{OH}^-$  to BOTH sides (enough to combine with all  $\text{H}^+$ )

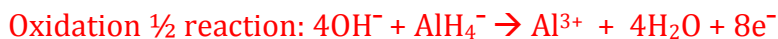


**Cancel any waters on both sides: Not needed in this example**

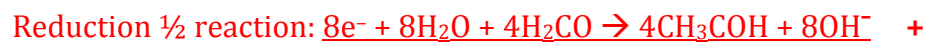
To balance charge: Add electrons.



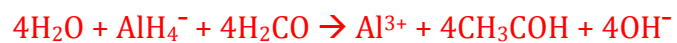
To balance electrons: Multiply by coefficients.



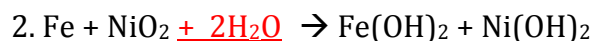
Combine:



Combined Balanced Equation:







To balance elements (other than O and H): Insert coefficients.



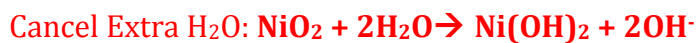
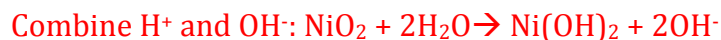
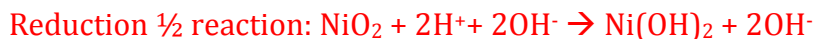
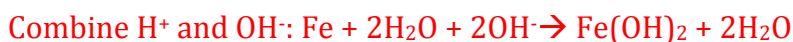
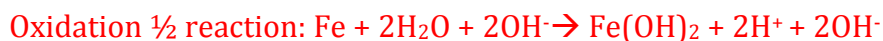
To balance oxygens: Add water.



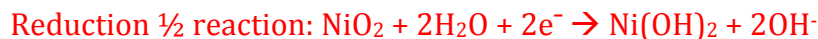
To balance hydrogens: Add H<sup>+</sup>.



BUT it is a BASIC solution. Add OH<sup>-</sup> to BOTH sides (enough to combine with all H<sup>+</sup>)



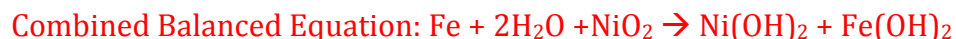
To balance charge: Add electrons.



To balance electrons: Multiply by coefficients.

Not necessary! 2e<sup>-</sup> are already on either side!

Combine:





To balance elements (other than O and H): Insert coefficients.



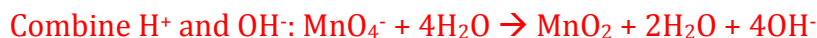
To balance oxygens: Add water.



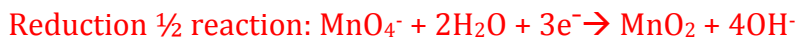
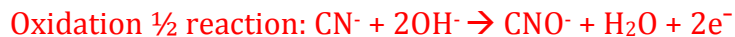
To balance hydrogens: Add H<sup>+</sup>.



BUT it is a BASIC solution. Add OH<sup>-</sup> to BOTH sides (enough to combine with all H<sup>+</sup>)



To balance charge: Add electrons.



To balance electrons: Multiply by coefficients.





Department of Chemistry  
University of Texas at Austin

Name: \_\_\_\_\_

