

Math Tutor

BALANCING REDOX EQUATIONS

A redox equation must conserve both mass and charge. So, to balance a redox equation, you must balance both atoms and charge (electrons). The problem-solving tips and sample below show how to balance an equation for a redox reaction in *basic* solution.

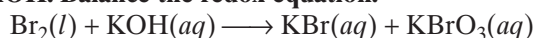
Problem-Solving TIPS

To balance redox equations for reactions in *basic* solution:

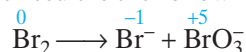
- Add OH^- and H_2O to balance oxygen and hydrogen in the redox half-reactions.
- Add OH^- ions to the side of the equation that needs oxygen atoms. Make sure you add enough OH^- ions so that the number of oxygen atoms added is twice the number needed.
- Then, add enough H_2O molecules to the other side of the equation to balance the hydrogen atoms.

SAMPLE

The following unbalanced equation represents a redox reaction that takes place in a basic solution containing KOH. Balance the redox equation.



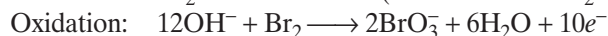
Write the full ionic equation, assign oxidation numbers, and eliminate species whose oxidation numbers do not change. The result is the following equation:



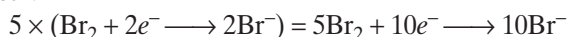
Divide this equation into half-reactions. Note that Br_2 is the reactant in both half-reactions.



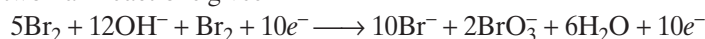
Add H_2O and OH^- to balance atoms in basic solution. Then, add electrons to balance charge.



To balance transferred electrons, you must multiply the reduction half-reaction by 5 so that both reactions have $10e^-$.



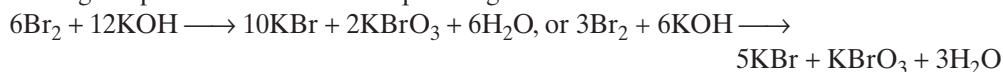
Combining the two half-reactions gives



Canceling common species gives

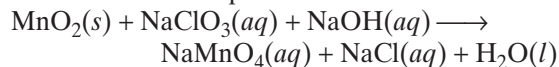


Returning the potassium ions to the equation gives



PRACTICE PROBLEMS

1. Balance the following equation for a redox reaction that takes place in basic solution:



2. Balance the following equation for a redox reaction that takes place in basic solution:

