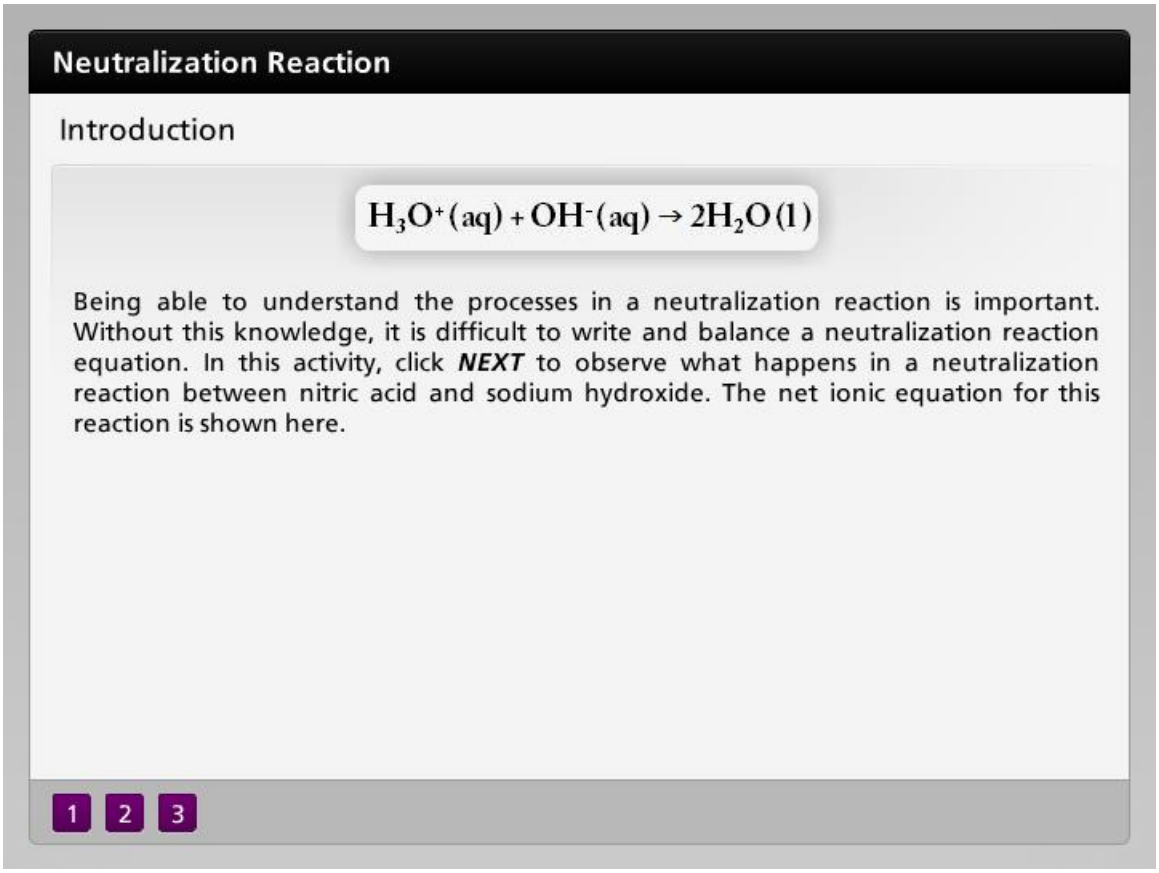
Module 11: Acid/Bases, Neutralization, and Redox Reactions
Topic 3 Content: Neutralization Reaction Notes

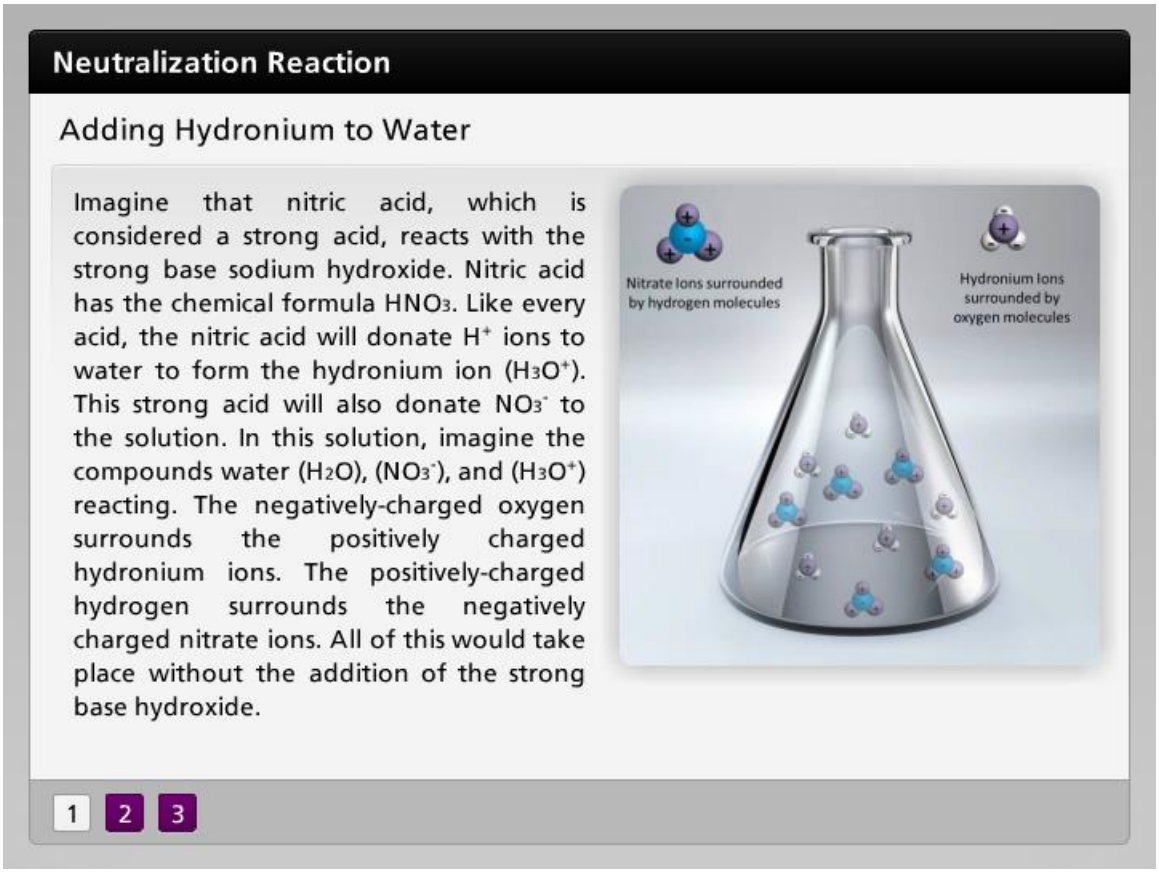
Introduction



Being able to understand the processes in a neutralization reaction is important. Without this knowledge, it is difficult to write and balance a neutralization reaction equation. In this activity, click ***NEXT*** to observe what happens in a neutralization reaction between nitric acid and sodium hydroxide. The net ionic equation for this reaction is shown here.

Module 11: Acid/Bases, Neutralization, and Redox Reactions
Topic 3 Content: Neutralization Reaction Notes

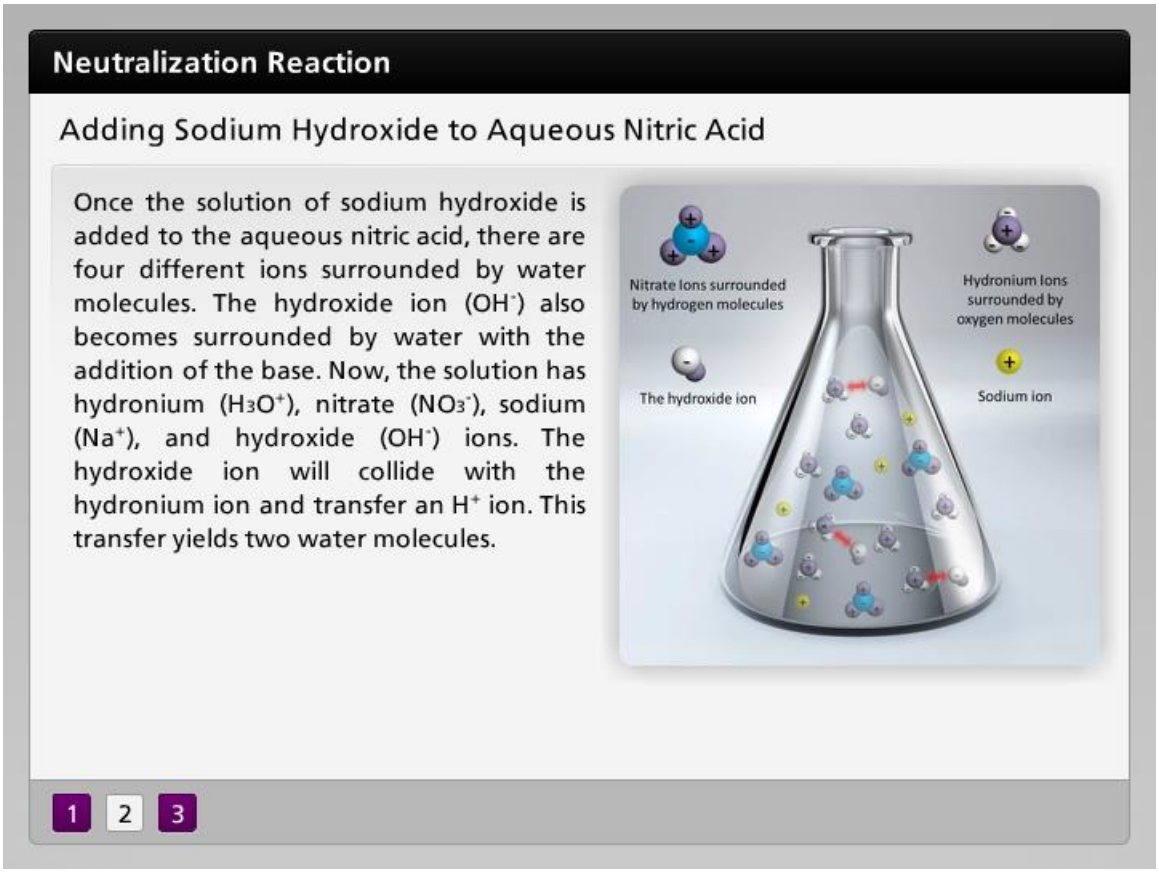
Adding Hydronium to Water



Imagine that nitric acid, which is considered a strong acid, reacts with the strong base sodium hydroxide. Nitric acid has the chemical formula HNO_3. Like every acid, the nitric acid will donate H^+ ions to water to form the hydronium ion (H_3O^+). This strong acid will also donate NO_3^- to the solution. In this solution, imagine the compounds water (H_2O), (NO_3^-), and (H_3O^+) reacting. The negatively-charged oxygen surrounds the positively charged hydronium ions. The positively-charged hydrogen surrounds the negatively charged nitrate ions. All of this would take place without the addition of the strong base hydroxide.

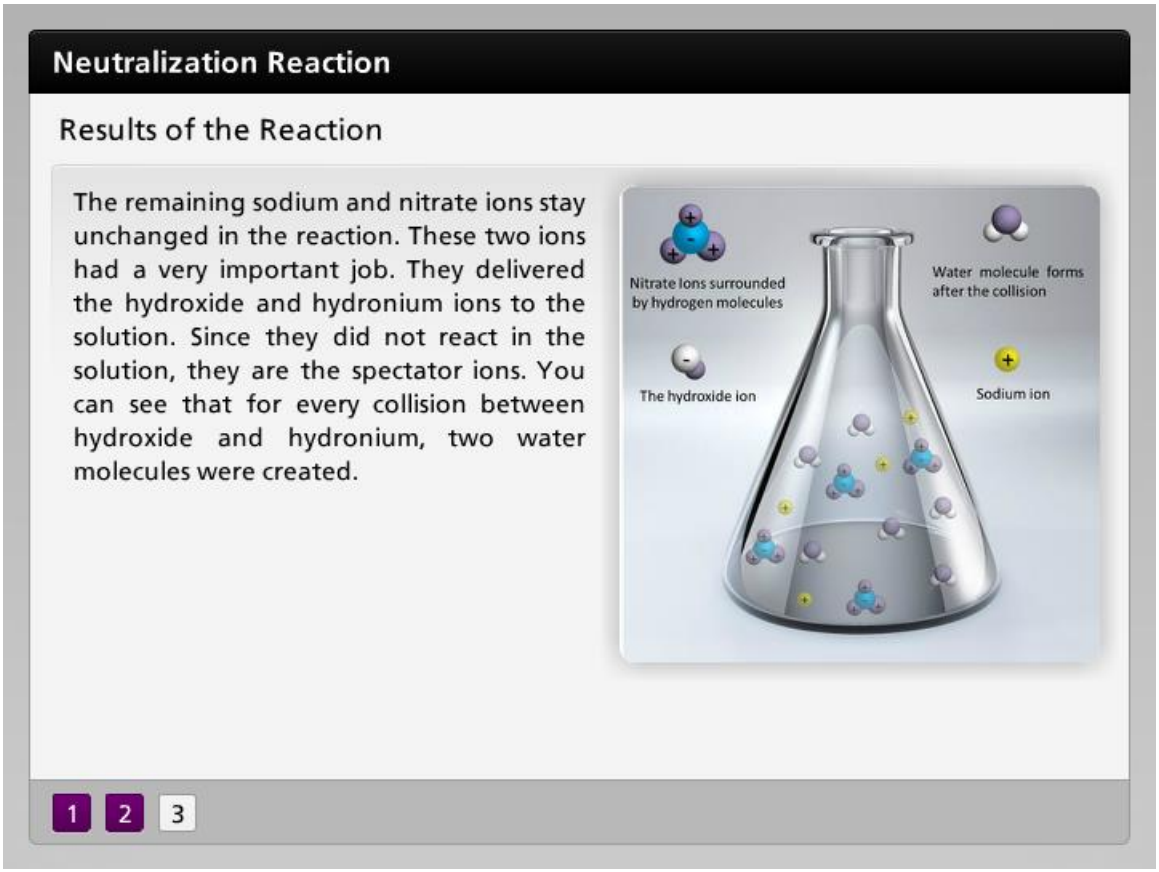
Module 11: Acid/Bases, Neutralization, and Redox Reactions
Topic 3 Content: Neutralization Reaction Notes

Adding Sodium Hydroxide to Aqueous Nitric Acid



Once the solution of sodium hydroxide is added to the aqueous nitric acid, there are four different ions surrounded by water molecules. The hydroxide ion (OH^-) also becomes surrounded by water with the addition of the base. Now, the solution has hydronium (H_3O^+), nitrate (NO_3^-), sodium (Na^+), and hydroxide (OH^-) ions. The hydroxide ion will collide with the hydronium ion and transfer an H^+ ion. This transfer yields two water molecules.

Results of the Reaction



The remaining sodium and nitrate ions stay unchanged in the reaction. These two ions had a very important job. They delivered the hydroxide and hydronium ions to the solution. Since they did not react in the solution, they are the spectator ions. You can see that for every collision between hydroxide and hydronium, two water molecules were created.