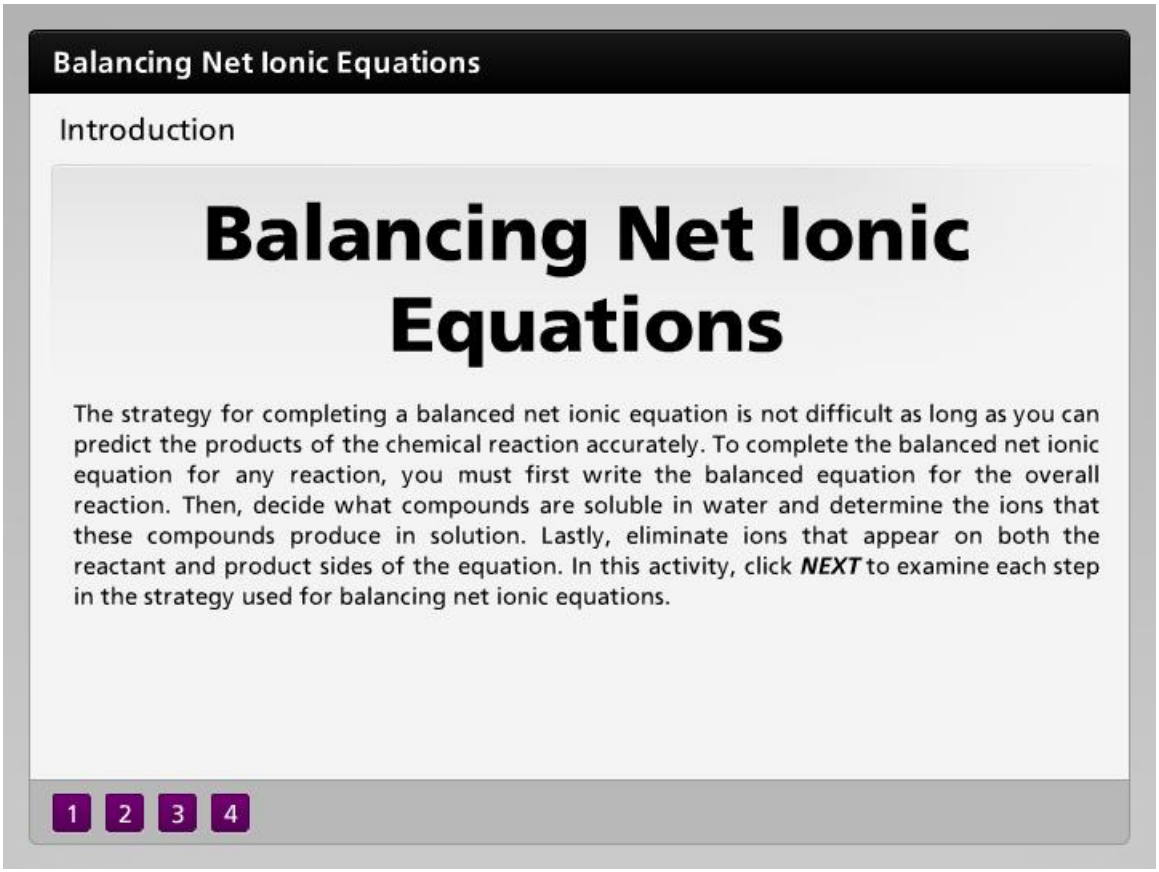
Module 6: Chemical Reactions
Topic 5 Content: Balancing Net Ionic Equations Notes

Introduction



The strategy for completing a balanced net ionic equation is not difficult as long as you can predict the products of the chemical reaction accurately. To complete the balanced net ionic equation for any reaction, you must first write the balanced equation for the overall reaction. Then, decide what compounds are soluble in water and determine the ions that these compounds produce in solution. Lastly, eliminate ions that appear on both the reactant and product sides of the equation. In this activity, click ***NEXT*** to examine each step in the strategy used for balancing net ionic equations.

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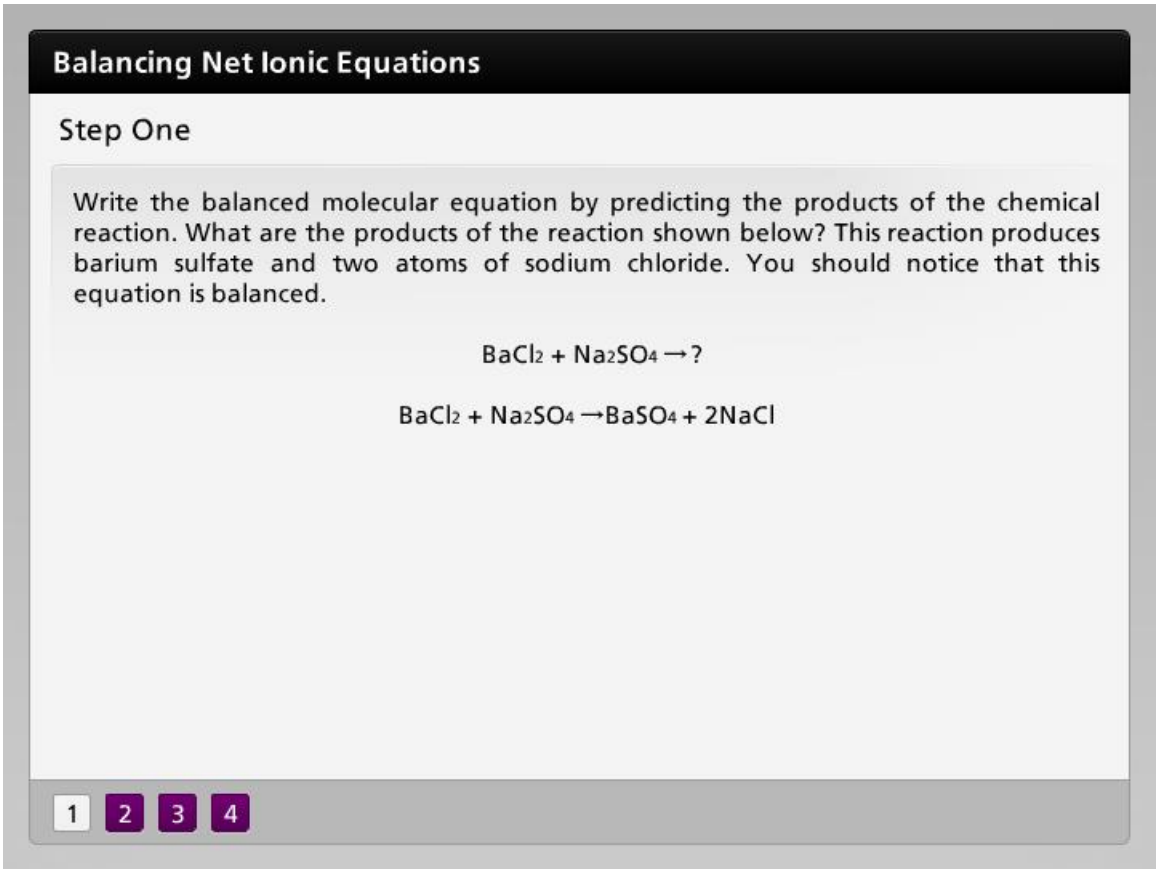
Step One

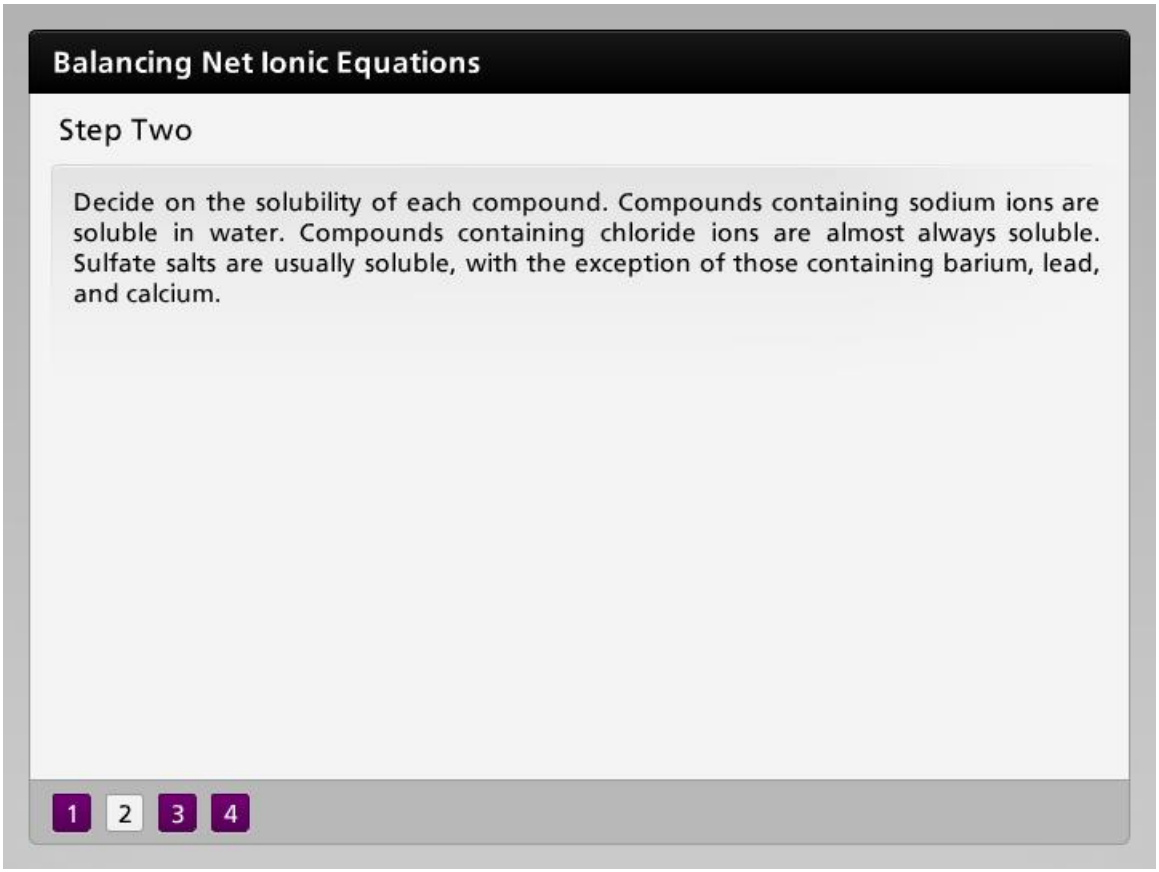


Write the balanced molecular equation by predicting the products of the chemical reaction. What are the products of the reaction shown below? This reaction produces barium sulfate and two atoms of sodium chloride. You should notice that this equation is balanced.

$$BaCl_2 + Na_2SO_4 \rightarrow \ ?$$

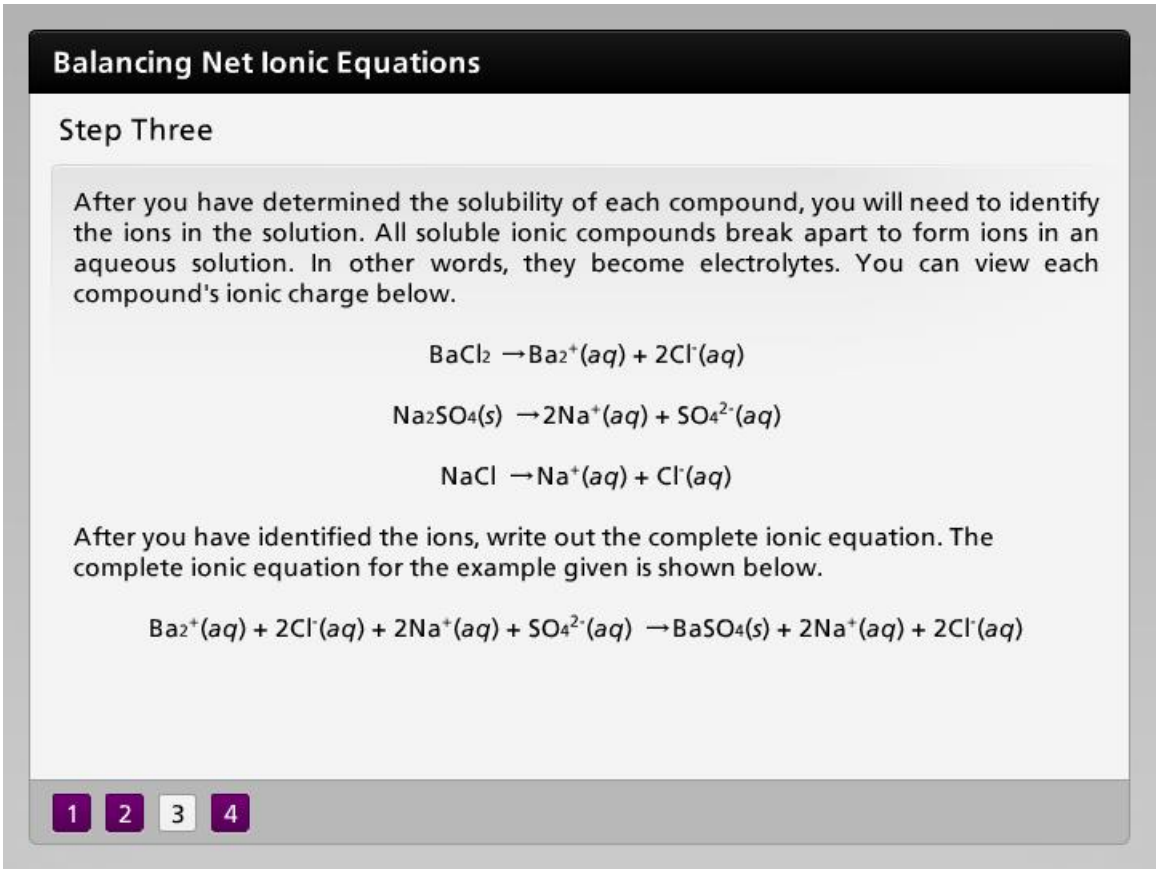
$$BaCl_2 + Na_2SO_4 \rightarrow \ BaSO_4 + 2NaCl$$

Step Two



Decide on the solubility of each compound. Compounds containing sodium ions are soluble in water. Compounds containing chloride ions are almost always soluble. Sulfate salts are usually soluble, with the exception of those containing barium, lead, and calcium.

Step Three



After you have determined the solubility of each compound, you will need to identify the ions in the solution. All soluble ionic compounds break apart to form ions in an aqueous solution. In other words, they become electrolytes. You can view each compound's ionic charge below.

$$BaCl_2 \rightarrow Ba_2^{+}(aq) + 2Cl^{-}(aq)$$

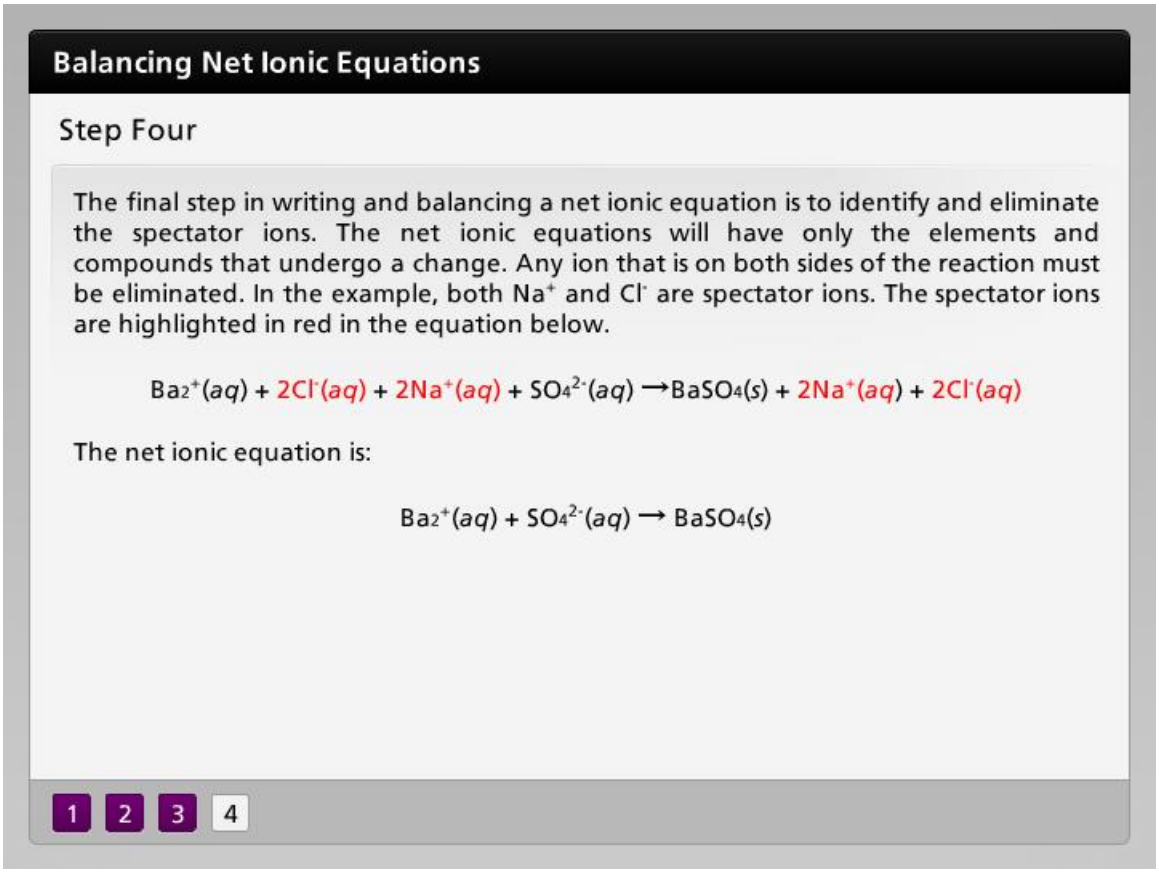
$$Na_2SO_4(s) \rightarrow 2Na^{+}(aq) + SO_4^{2-}(aq)$$

$$NaCl \rightarrow Na^{+}(aq) + Cl^{-}(aq)$$

After you have identified the ions, write out the complete ionic equation. The complete ionic equation for the example given is shown below.

$$Ba_2^{+}(aq) + 2Cl^{-}(aq) + 2Na^{+}(aq) + SO_4^{2-}(aq) \rightarrow BaSO_4(s) + 2Na^{+}(aq) + 2Cl^{-}(aq)$$

Step Four



The final step in writing and balancing a net ionic equation is to identify and eliminate the spectator ions. The net ionic equations will have only the elements and compounds that undergo a change. Any ion that is on both sides of the reaction must be eliminated. In the example, both Na^+ and Cl^- are spectator ions. The spectator ions are highlighted in red in the equation below.

$$Ba_2^{+}(aq) + 2Cl^{-}(aq) + 2Na^{+}(aq) + SO_4^{2-}(aq) \rightarrow BaSO_4(s) + 2Na^{+}(aq) + 2Cl^{-}(aq)$$

The net ionic equation is:

$$Ba_2^{+}(aq) + SO_4^{2-}(aq) \rightarrow BaSO_4(s)$$