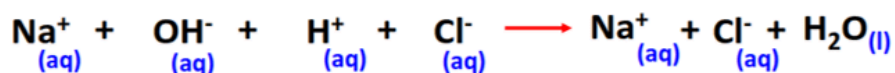


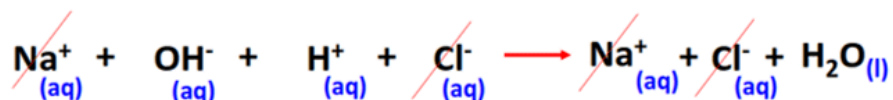
Unit 4: Properties of Solutions
Ionic Equations

This worksheet will explore the fundamental concept of ionic equations in chemistry, which provide more informative representations of chemical reactions. It will cover the complete ionic equation, showcasing all ions involved in a reaction, and the net ionic equation, which simplifies by excluding spectator ions.

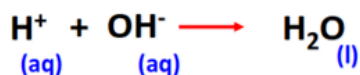
1. What does a complete ionic equation represent in a chemical reaction?
2. Which type of equation simplifies a chemical reaction by excluding spectator ions?
3. In the reaction below between hydrochloric acid (HCl) and sodium hydroxide (NaOH), which of the following is/are spectator ions? (There may be multiple answers.)



Complete ionic equation



Spectator ions are canceled



Net ionic equation

Cite: <https://topblogtenz.com/net-ionic-equation-hcl-naoh/>

- In the reaction between aqueous potassium chloride (KCl) and silver nitrate (AgNO₃) to form silver chloride (AgCl) precipitate, what are the spectator ions?
- Write the complete ionic equation for the reaction between aqueous potassium sulfate (K₂SO₄) and barium chloride (BaCl₂) to form barium sulfate (BaSO₄) precipitate.
- Given the molecular equation: $\text{Na}_2\text{CO}_3(\text{aq}) + 2 \text{HCl}(\text{aq}) \rightarrow 2 \text{NaCl}(\text{aq}) + \text{H}_2\text{O}(\text{l}) + \text{CO}_2(\text{g})$, write the net ionic equation.
- In the reaction between aqueous silver nitrate (AgNO₃) and sodium chloride (NaCl) to form silver chloride (AgCl) precipitate, identify the spectator ions.

ANSWER KEY:

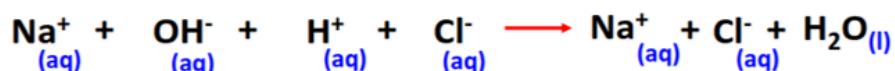
1. What does a complete ionic equation represent in a chemical reaction?

A complete ionic equation represents all ions involved in a chemical reaction, including spectator ions.

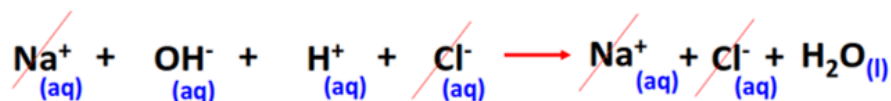
2. Which type of equation simplifies a chemical reaction by excluding spectator ions?

A net ionic equation simplifies a chemical reaction by excluding spectator ions, focusing on the key participants.

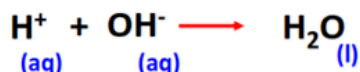
3. In the reaction below between hydrochloric acid (HCl) and sodium hydroxide (NaOH), which of the following is/are spectator ions? (There may be multiple answers.)



Complete ionic equation



Spectator ions are canceled



Net ionic equation

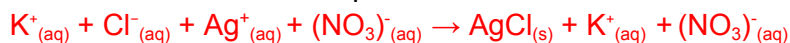
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In this reaction, chloride ions (Cl^-) and sodium ions (Na^+) are spectator ions because they remain unchanged on both sides of the equation.

4. In the reaction between aqueous potassium chloride (KCl) and silver nitrate (AgNO_3) to form silver chloride (AgCl) precipitate, what are the spectator ions?

Writing out the complete ionic equation we see:

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Once we cancel out the spectator ions, K^+ and NO_3^- , the net ionic equation is as follows:



Thus, In the reaction between KCl and AgNO_3 , the ions K^+ and NO_3^- do not participate in the formation of the silver chloride (AgCl) precipitate. Therefore, they are spectator ions and remain unchanged during the reaction.

5. Write the complete ionic equation for the reaction between aqueous potassium sulfate (K_2SO_4) and barium chloride (BaCl_2) to form barium sulfate (BaSO_4) precipitate.

Complete ionic equation:

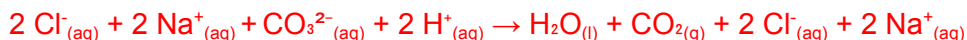


Complete ionic equation represents all ions involved in the reaction, including the spectator ions potassium (K^+) and chloride (Cl^-). A trick to use is to break each compound into simpler ions and place them on their respective sides. However, we can only do so to compounds that are aqueous (aq), or in other words, dissolved in water. This is why $\text{BaSO}_4_{(\text{s})}$, is not broken down to its components on the right side, since it is a solid.

6. Given the molecular equation: $\text{Na}_2\text{CO}_3(\text{aq}) + 2 \text{HCl}(\text{aq}) \rightarrow 2 \text{NaCl}(\text{aq}) + \text{H}_2\text{O}(\text{l}) + \text{CO}_2(\text{g})$, write the net ionic equation.

The net ionic equation focuses on the ions that change during the reaction, excluding spectator ions (Na^+ and Cl^-). First, write the complete reaction by breaking it down into simpler ions and canceling spectator ions.

Complete ionic equation:



Net ionic equation:



7. In the reaction between aqueous silver nitrate (AgNO_3) and sodium chloride (NaCl) to form silver chloride (AgCl) precipitate, identify the spectator ions.

In this reaction, the ions Ag^+ and NO_3^- do not participate in forming the precipitate (AgCl) and remain unchanged, making them spectator ions. First break down the reaction into its simpler ions and identify the spectator ions (ions that appear on both sides).