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## Student Exploration: Ionic Bonds

**Directions:** Follow the instructions to go through the simulation. Respond to the questions and prompts in the orange boxes.

**Vocabulary:** chemical family, electron affinity, ion, ionic bond, metal, nonmetal, octet rule, shell, valence electron

**Prior Knowledge Questions** (Do these BEFORE using the Gizmo.)

1. Nate and Clara are drawing pictures with markers. There are 8 markers in a set. Nate has 9 markers and Clara has 7. What can Nate and Clara do so that each of them has a full set?

Nate can give Clara 1 marker, so they each have a full set.

2. Maggie is sitting at a table with Fred and Florence. Maggie has 10 markers, but Fred and Florence each have only 7 markers. How can they share markers so each has 8?

Maggie has to give away 2 markers to Fred and Florence so each has 8.

### Gizmo Warm-up

Just like students sharing markers, atoms sometimes share or swap electrons. By doing this, atoms form bonds. The *Ionic Bonds* Gizmo allows you to explore how **ionic bonds** form.

To begin, check that **Sodium (Na)** and **Chlorine (Cl)** are selected from the menus at right. Click **Play** (  ) to see electrons orbiting the nucleus of each atom. (Note: These atom models are simplified and not meant to be realistic.)



1. Each atom consists of a central nucleus and several **shells** that contain electrons. The outermost electrons are called **valence electrons**. (Inner electrons are not shown.)

How many valence electrons does each atom have? Sodium: 1 Chlorine: 7

2. Click **Pause** (  ). Elements can be classified as **metals** and **nonmetals**. Metals do not hold on to their valence electrons very tightly, while nonmetals hold their electrons tightly. **Electron affinity** is a measure of how tightly the valence electrons are held.

- A. Try pulling an electron away from each atom. Based on this experiment, which atom is a metal?

Sodium

Which is a nonmetal?

Chlorine

- B. Try moving an electron from the metal to the nonmetal. What happens?

# Ionic Bonds Gizmo Answer Key

**E Staff**



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## **Table of Contents Ionic Bonds Gizmo Answer Key**

1. Understanding the eBook Ionic Bonds Gizmo Answer Key
  - The Rise of Digital Reading Ionic Bonds Gizmo Answer Key
  - Advantages of eBooks Over Traditional Books
2. Identifying Ionic Bonds Gizmo Answer Key
  - Exploring Different Genres
  - Considering Fiction vs. Non-Fiction
  - Determining Your Reading Goals
3. Choosing the Right eBook Platform
  - Popular eBook Platforms
  - Features to Look for in an Ionic Bonds Gizmo Answer Key
  - User-Friendly Interface
4. Exploring eBook Recommendations from Ionic Bonds Gizmo Answer Key
  - Personalized Recommendations
  - Ionic Bonds Gizmo Answer Key User Reviews and Ratings
  - Ionic Bonds Gizmo Answer Key and Bestseller Lists
5. Accessing Ionic Bonds Gizmo Answer Key Free and Paid eBooks
  - Ionic Bonds Gizmo Answer Key Public Domain eBooks
  - Ionic Bonds Gizmo Answer Key eBook Subscription Services
  - Ionic Bonds Gizmo Answer Key Budget-Friendly Options

6. Navigating Ionic Bonds Gizmo Answer Key eBook Formats
  - ePub, PDF, MOBI, and More
  - Ionic Bonds Gizmo Answer Key Compatibility with Devices
  - Ionic Bonds Gizmo Answer Key Enhanced eBook Features
7. Enhancing Your Reading Experience
  - Adjustable Fonts and Text Sizes of Ionic Bonds Gizmo Answer Key
  - Highlighting and Note-Taking Ionic Bonds Gizmo Answer Key
  - Interactive Elements Ionic Bonds Gizmo Answer Key
8. Staying Engaged with Ionic Bonds Gizmo Answer Key
  - Joining Online Reading Communities
  - Participating in Virtual Book Clubs
  - Following Authors and Publishers Ionic Bonds Gizmo Answer Key
9. Balancing eBooks and Physical Books Ionic Bonds Gizmo Answer Key
  - Benefits of a Digital Library
  - Creating a Diverse Reading Collection Ionic Bonds Gizmo Answer Key
10. Overcoming Reading Challenges
  - Dealing with Digital Eye Strain
  - Minimizing Distractions
  - Managing Screen Time
11. Cultivating a Reading Routine Ionic Bonds Gizmo Answer Key
  - Setting Reading Goals Ionic Bonds Gizmo Answer Key
  - Carving Out Dedicated Reading Time
12. Sourcing Reliable Information of Ionic Bonds Gizmo Answer Key
  - Fact-Checking eBook Content of Ionic Bonds Gizmo Answer Key
  - Distinguishing Credible Sources
13. Promoting Lifelong Learning
  - Utilizing eBooks for Skill Development
  - Exploring Educational eBooks
14. Embracing eBook Trends
  - Integration of Multimedia Elements

- Interactive and Gamified eBooks

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