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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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