

Name: _____ Date: _____ Period: _____

Gizmo Lab: Ionic Bonds

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. Differentiate between a cation and anion.
2. Which groups most readily form cations?
3. Which groups most readily form anions?

Gizmo Warm-up

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: _____ Chlorine: _____

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 moving an electron from the metal to the nonmetal. What happens? The reverse?

Activity A: Ions	<u>Get the Gizmo ready:</u> <ul style="list-style-type: none">• Click Reset.• Check that sodium and chlorine are still selected.	
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Introduction: Some of the particles that make up atoms have an electrical charge. Electrons are negatively charged, while protons are positively charged. Particles with opposite charges (+ and -) attract, while particles with the same charge (+ and + or - and -) repel.

Question: What happens when atoms gain or lose electrons

1. **Count:** Electrons move around the nucleus of atoms in specific shells, shown by the rings around the atoms in the Gizmo. The first ring holds two electrons, and the second holds eight. (Electrons in the inner rings are not shown; you can assume these rings are full.)
 - A. Observe the sodium and chlorine atoms. Assuming that the inner rings are full of electrons, how many electrons are there total in each atom?

Sodium: _____ Chlorine: _____
 - B. Each atom is neutrally charged, which means that each atom has the same number of protons and electrons. Based on this, how many protons are in each atom?

Sodium: _____ Chlorine: _____