INTRODUCTION TO COLLEGE CHEMISTRY
EDUCATOR QUICK START GUIDE

Ionization Energy

Integrated Chemistry Concepts:

- Cation and Anion Formation
- Octet Rule
- Specific Ion Charges/Valence Electrons
- Ionic Radii
- Ionization Energy Trends
- Electron Affinity Trends

Use Collisions HE PRE-INSTRUCTIONALLY to engage your students and explore a topic.

Assign your students the first 8 levels of Ionization Energy. During gameplay, ask your students to answer the following guided questions:

1. What did you have to do to create a positive ion?
2. How does creating a positive ion change the size of the atom?
3. What did you have to do to create a negative ion?
4. How does creating a negative ion change the size of the atom?
5. What determines how many electrons you should add or remove from the atom?
6. How did you create an ion with a 2^+ charge?
7. Did it require more or less energy to remove the second electron?
8. How did you create an ion with a 3^- charge?
9. How did the amount of energy used change as you added more electrons?
10. Does removing an outer electron release or use energy?

Use Collisions HE POST-INSTRUCTIONALLY to practice, review, and extend the learning.

After instruction, encourage your students to work through the remaining core game levels. To check for student understanding, here are some additional guided questions to incorporate into your lesson:

1. Explain the rules of the Ionization Energy game using some or all of the following keywords: protons, electrons, cation, anion, ionization energy (first, second, third), electron affinity.
2. How much energy is used to remove each individual electron from magnesium when forming an ion? What is a possible explanation for this difference in energy?
3. In Level 6, what are the charges of the ions that you built for the 1st and 2nd targets?
4. Which ion formation takes more energy: K^+ or Li^+? Mg^{2+} or Be^{2+}? Why?
5. Identify the relationships between the group number of the element, the number of valence electrons it has, and the charge of its ion.
6. Explain why it makes sense for some elements to become cations while others become anions.

You can also use the Ionization Energy Sandbox to highlight a specific concept integrated into gameplay and encourage your students to earn the built-in Achievements.

Additional resources:

- Ionization Energy Content Area Overview
- Ionization Energy Formative Assessment
- Ionization Energy Extension Activity

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