

Radii Trends

Integrated Chemistry Concepts:

- Atomic Neutrality
- Electron configuration
- Aufbau Principle
- Hund's Rule
- Periodic trend of atomic size
- Periodic trend of electronegativity

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

Assign your students the first 7 levels of Radii Trends. During gameplay, ask your students to answer the following guided questions:

1. In Level 2, how many protons (red) did you add? How many electrons (blue)?
2. In Level 3, you placed 5 protons in the atom. How many electrons did you use?
3. Based on what you have seen thus far, what is the relationship between the number of protons and electrons in an atom?
4. How many electrons can be placed into one orbital?
5. In Level 3, you should have noticed that your fifth electron went into an orbital of a different shape of which there were three. How many electrons in total could fit in these new orbitals?
6. In Level 3, you also see the addition of a new energy level. In the first two rounds (the first energy level) there was only one type of orbital. How many types are there in the second energy level?
7. In Level 4, you had to determine the pattern for filling the orbitals known as Hund's Rule. Describe the rule you had to follow.
8. In Level 5, you must create 2 atoms. Explain what was true about the number of protons and electrons in the larger of your two atoms compared to the smaller one.
9. Write out a summary of what you learned from the first 7 levels of the Radii Trends game.

Additional resources:

- Radii Trends Content Area Overview
- Radii Trends Formative Assessment
- Radii Trends Extension Activity

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

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

1. Write the electron configuration of one atom that you built in Level 8.
2. In Level 9, what happened to the number of energy levels as you went down a group?
3. After playing Level 9, identify the trend in atomic radius that is represented and explain why this happens.
4. In Level 11, did the number of energy levels change down the group? Why or why not?
5. After playing Level 11, identify the trend in atomic radius that is represented and explain why this happens.
6. In later games, you will start to join atoms together to build molecules. Explain why larger atoms that join together will often have a larger distance between them than smaller ones joined together using what you saw in the Radii Trends Game.
7. Explain the rules of the Radii Trends game using some or all of the following keywords: protons, electrons, orbitals, electron configuration, Hund's Rule.

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