

Atom Screen

In the atom screen, students can build atoms and determine how the identity, net charge, and mass of an atom or ion is determined.

TRACK the number of the protons, neutrons, and electrons in your atom.

BUILD an atom using protons, neutrons, and electrons.

IDENTIFY the element.

CALCULATE the net charge on the atom/ ion created.

DETERMINE the mass of the atom/ion created.

Symbol Screen

In the Symbol screen, students interpret atomic symbols by building atoms using protons, neutrons and electrons.

SHOW electron cloud model of atom/ion.

INVESTIGATE information provided by atomic symbols.

DETERMINE the stability of atom/ ion created.

Game Screen

Students are presented with 5 challenge questions in each game.

Game 1 – Identify the element when provided a model or count of subatomic particles.

Game 2 – Calculate the mass number or charge of an atom or ion.

Game 3 – Interpret atomic symbols

Game 4 – Mixed review

TRACK highest previous score.

CONTROL game sounds or enable a timer before starting a game.

RETURN to previous screens to review while answering game questions.

Customization Options

Query Parameter and Description	Examples
<code>highContrastParticles</code> - changes appearance of protons, neutrons, and electrons to have flat appearance and high-contrast colors.	<code>highContrastParticles</code>
<code>screens</code> - specifies which screens are included in the sim and their order. Each screen should be separated by a comma. For more information, visit the Help Center .	<code>screens=1</code> <code>screens=1,3</code>

Model Simplifications

- Although the title of the sim is “Build an Atom”, students can build both neutral atoms and ions.
- The nucleus is magnified to allow students to see the number of protons and neutrons.
- The radii of the orbits in the Bohr model are not in the correct ratio.
- In the “Cloud” model, the shape of the cloud is not meant to represent orbitals and the size of the cloud does not represent actual atomic or ionic radii. The cloud simply gets larger and darker as the number of electrons in the cloud increases.
- We define “Stable” as an isotope whose half-life is too long to be measured. The nucleus of an “Unstable” atom vibrates but does not fall apart.

- Students can create ions that are not found in nature (for example, He^{+2}). Students can still reach suggested learning goals related to net charge on ions even if not all ions they create exist in nature.
- Excited states are not allowed in the sim. In the Bohr model, if a core electron is removed, an outer electron will move to the inner shell. The sim does not show the subsequent release of a photon due to this electron movement.
- The Symbol representation uses the standard isotope notation with the mass number on the top and the atomic number on the bottom. This may differ from how the data is displayed in some periodic tables (atomic number at the top). Students who are unfamiliar with the isotope notation may require additional scaffolding.

Suggestions for Use

Sample Challenge Prompts

- Write a mathematical equation to show how the mass number of an atom is calculated.
- Describe the location of protons, neutrons, and electrons in an atom.
- Write a mathematical expression to explain how to calculate the net charge of an atom/ion.
- Explain how to use an atomic symbol to determine the number of protons, neutrons, and electrons in an atom/ion.

See all published activities for Build An Atom [here](#).

For more tips on using PhET sims with your students, see [Tips for Using PhET](#).