

The Next Generation Science Standards (NGSS)

CHAPTER 4, LESSON 2: THE PERIODIC TABLE

HS-PS1-1. Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms.

DISCIPLINARY CORE IDEAS

PS1.A: Structure and Properties of Matter

- Each atom has a charged sub-structure consisting of a nucleus, which is made of protons and neutrons, surrounded by electrons. (HS-PS1-1)
- The periodic table orders elements horizontally by the number of protons in the atom's nucleus and places those with similar chemical properties in columns. The repeating patterns of this table reflect patterns of outer electron states. (HS-PS1-1), (HS-PS1-2)

Students apply what they have learned about protons, neutrons, and electrons to play a game to begin to learn about the structure of the periodic table. Students focus mainly on the meaning of atomic number, atomic mass, and the number of protons, neutrons, and electrons in an atom on the periodic table.

SCIENCE AND ENGINEERING PRACTICES

Developing and Using Models

- Develop a model to predict and/or describe phenomena. (MS-PS1-1)
- Use a model to predict the relationships between systems or between components of a system. (HS-PS1-1)

Analyzing and interpreting data

Using mathematics and computational thinking

Students use information from the periodic table such as atomic number and atomic mass as a type of model to represent an element. Students see that the number of protons equals the number of electrons in an atom. Students also see that the number of protons and the atomic mass can be used to determine the number of neutrons the element is likely to have.

CROSSCUTTING CONCEPTS

Patterns

- Different patterns may be observed at each of the scales at which a system is studied and can provide evidence for causality in explanations of phenomena. (HS-PS1-1), (HS-PS1-3)

Students will observe patterns in the way that each new element in the periodic table has one more proton than the element before. Students will also see that the number of electrons always equals the number of protons in an element on the periodic table. Students will see that they can always determine the number of neutrons an element is likely to have by determining what number they need to add to the atomic number (number of protons) to get close to the atomic mass.