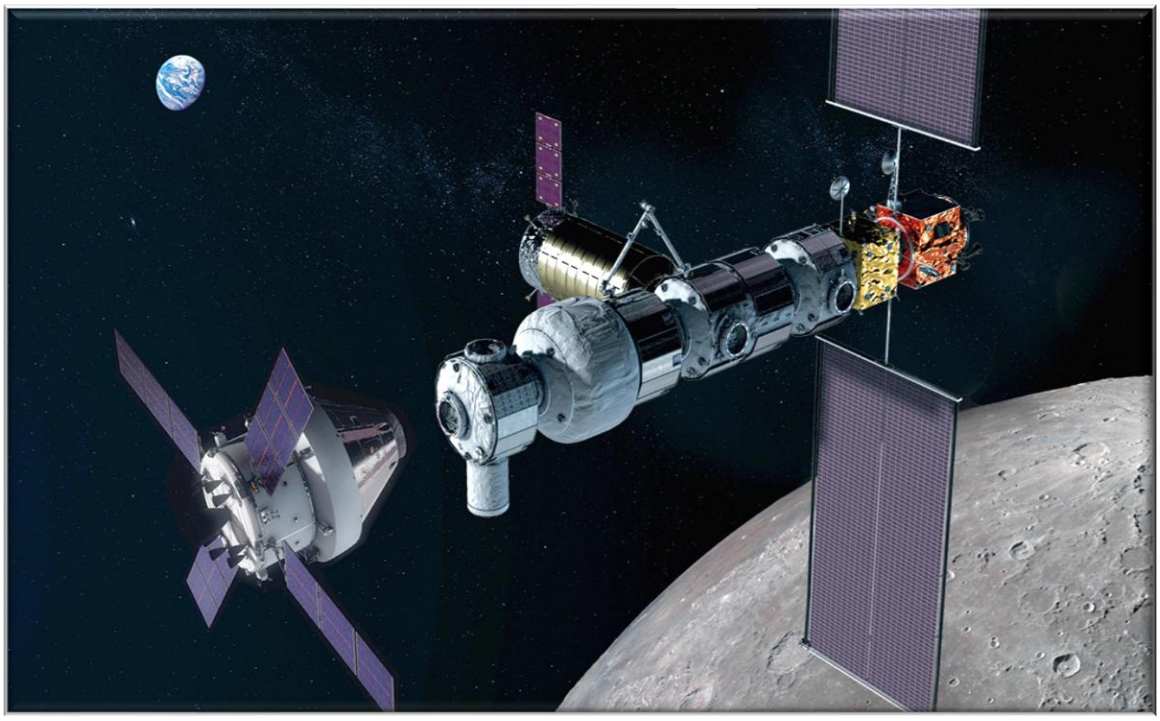
Spacegate Station Season 5

Episode 25



Atoms and the Periodic table

Resource Content

- Guided Notes
- Higher Order Discussion Sheet
- Guided Notes Answer Key
- Curriculum Alignment Page

Season 5 Episode 25

Atoms and the Periodic Table Guided Notes

WORD BANK

asteroids	malleable	nucleus
atom	metals	periodic table
atomic number	molecule	periods
chemical properties	negative	positive
compound	neutral	proton
ductile	neutron	reactions
groups	ninety-four	transitional
laboratory	nonmetals	

SECTION 1 — What Is an Atom?

1. An _____ is the basic building block of all matter in the universe.
2. The center of an atom is called the _____, which contains protons and neutrons.
3. A proton has a _____ electrical charge.
4. A neutron has _____ charge.
5. An electron has a _____ electrical charge and moves quickly around the nucleus.
6. When atoms join, they form a _____, and when molecules join, they form a _____.

SECTION 2 — The Periodic Table

7. The _____ is an organized chart of all known elements.
8. Each element is identified by its _____, which tells the number of protons in the nucleus.
9. Horizontal rows on the periodic table are called _____.
10. Vertical columns are called _____, and elements in the same column share similar _____.
11. Elements are divided into two main classes: _____ and _____.

SECTION 3 — Metals and Nonmetals

12. _____ are shiny, good conductors of heat and electricity, and are usually solid at room temperature.
13. Metals can be shaped because they are _____ (can be pounded into sheets) and _____ (can be stretched into wires).
14. _____ are gases or brittle solids and are poor conductors of heat and electricity.
15. The large block of metals in the center of the table is called the _____ metals.

SECTION 4 — Elements in Nature and the Universe

16. Of the 118 known elements, _____ are found naturally on Earth.
17. The remaining elements were created by scientists in a _____.
18. Scientists can create new elements by adding a _____ or _____ to an existing atom.

SECTION 5 — Why the Periodic Table Matters

19. The periodic table helps scientists understand how elements behave in _____.
20. It also helps scientists identify unknown materials, such as samples collected from _____ or other space objects.

HIGHER-ORDER DISCUSSION SHEET

1. **Systems Thinking — Atomic Structure**
   Why is understanding the structure of an atom important for understanding all matters?

2. **Patterns — Periodic Table Organization**
   How does the arrangement of elements help scientists predict how an element will behave?

3. **Cause and Effect — Charges and Interactions**
   How do the charges of protons, neutrons, and electrons affect how atoms interact?

4. **Human Impact — Creating New Elements**
   What are the benefits and risks of scientists creating new elements in laboratories?

5. **Cross-Disciplinary Thinking — Space Science Connection**
   Why is it useful for astronomers and chemists to work together when analyzing materials from asteroids?

6. **Engineering and Technology — Tools of Discovery**
   What technologies make it possible to identify the elements in a sample taken from space?

7. **Communication — Clear Scientific Language**
   Why is it important for scientists to use precise language when describing atomic structure?

8. **Real-World Application — Everyday Materials**
   How does understanding metals and nonmetals help engineers design useful materials?

9. Argument from Evidence - Natural vs. Synthetic Elements
   Should scientists continue creating new elements? Support your answer with evidence.

10. **Reflection — Personal Learning**
    What part of the periodic table do you find most interesting, and why?

Guided Notes Answer Key

SECTION 1

1. atom
2. nucleus
3. positive
4. neutral
5. negative
6. molecule, compound

SECTION 2

7. periodic table
8. atomic number
9. periods
10. groups, chemical properties
11. metals, nonmetals

SECTION 3

12. metals
13. malleable, ductile
14. nonmetals
15. transitional

SECTION 4

16. ninety-four
17. laboratory
18. proton, neutron

SECTION 5

19. reactions
20. asteroids

CURRICULUM ALIGNMENT PAGE

Spacegate Station – Season 5, Episode 25

Atoms and the Periodic Table

Grade Band: Middle School (6–8)

Focus Areas: Atomic Structure, Elements, Periodic Table, Properties of Matter

Episode Length: 16 minutes

Instructional Purpose: Core instruction, enrichment, and remediation

Learning Objectives

Students will be able to:

- Describe the structure of an atom (protons, neutrons, electrons).
- Explain the role of electrical charge in atomic structure.
- Identify how elements are arranged on the periodic table.
- Distinguish between metals and nonmetals based on physical properties.
- Explain how atomic number determines an element's identity.
- Describe how scientists create synthetic elements.
- Connect atomic structure to real-world applications and space science.

NGSS Alignment (Middle School)

MS-PS1-1 Develop models to describe the atomic composition of simple molecules and extended structures.
Episode Connection: Atom structure, molecules, compounds.

MS-PS1-2 Analyze and interpret data on the properties of substances before and after interactions.
Episode Connection: Properties of metals vs. nonmetals.

MS-PS1-3 Gather and make sense of information to describe that synthetic materials come from natural resources.
Episode Connection: Creation of synthetic elements.

MS-PS1-4 Develop a model that predicts and describes changes in particle motion, temperature, and state of matter.
Episode Connection: Particle behavior and charge interactions.

MS-ESS1-3 Analyze and interpret data to determine scale properties of objects in the solar system.
Episode Connection: Asteroid sample analysis.

Science & Engineering Practices (SEPs)

- Developing and Using Models: Atomic structure, periodic table organization.
- Analyzing and Interpreting Data: Properties of metals and nonmetals.
- Constructing Explanations: How atomic structure determines behavior.
- Engaging in Argument from Evidence: Natural vs. synthetic elements.
- Obtaining, Evaluating, and Communicating Information: Explaining element properties and organization.

Florida B.E.S.T. Science Standards Alignment

SC.7.P.8.1- Model the structure of an atom.
Episode Connection: Protons, neutrons, electrons, nucleus.

SC.7.P.8.2 - Identify properties of elements on the periodic table.
Episode Connection: Metals, nonmetals, transition metals.

SC.7.P.8.3 - Distinguish between physical properties of metals and nonmetals.
Episode Connection: Conductivity, malleability, brittleness.

SC.7.P.8.4 - Explore the organization of the periodic table.
Episode Connection: Groups, periods, atomic number.

SC.8.N.1.1 - Define scientific inquiry and explain how scientists investigate the natural world.
Episode Connection: Laboratory creation of elements, asteroid sample analysis.