

Periodicity of Elements

Why?

Within musical scales the notes form a series that repeats every eighth note. Eight notes up from a C note is another C note. Each interval or series is referred to as an octave since it contains eight notes. Elements also form an eight step series. The purpose of this activity is to explore how valence electrons generate an eight step series that repeats itself within the Periodic Table.

Learning Objectives

- Associate groups on the periodic table with a number of valence electrons in an electron configuration.
- Associate periods on the periodic table with a number of principal energy levels (shells) in an electron configuration.

Success Criteria

- Assign a group number for the elements in groups 1, 2 and 13-18 based upon the number of ground-state valence electrons in their atoms.
- Assign a period number for the elements in groups 1, 2 and 13-18 based upon the number of occupied shells in a ground-state electron configuration for the element.

Prerequisites

- Electron Configuration
- Nuclear Charge

Information

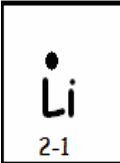

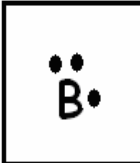


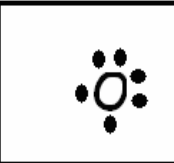
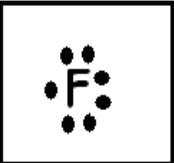

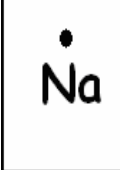
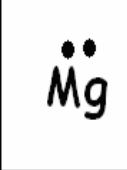
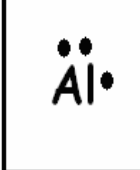

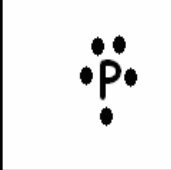



Periodic Table is grid made up of:

- Rows (or periods) that proceed horizontally (from side to side) across the table
- Columns (or groups) that proceed vertically (up and down) on the table

Resources

- Periodic Table

Model: An Electron Dot Diagram of the Elements

1	2	13	14	15	16	17	18
 Li 2-1	 Be	 B	 C	 N	 O	 F	 Ne
 Na	 Mg	 Al	 Si	 P	 S	 Cl	 Ar

Task

Below the symbol for each element, write an electron configuration for the elements in the model. Lithium has been done for you.

Key Questions

- How are members of the same column (group) similar in terms of the number of valence electrons?
- Which group contains the least number of valence electrons?
- Which group contains the largest number of valence electrons?
- Which period (row) contains three occupied shells?

5. Within a group, which period, top or bottom is likely to contain atoms with the larger radius? Explain your answer.

6. In terms of the number of valence electrons, describe one cyclic property that can be observed in the model.

7. Refer to a Periodic Table and write the number of protons in the nucleus for the period 2 elements listed:

Li ___ Be ___ B ___ C ___ N ___ O ___ F ___ Ne ___

8. Which element within period 2 contains the greatest nuclear charge?

9. Which element within period 2 generates the greatest force of attraction between its nucleus and its valence electrons? Explain your answer.

Exercises

1. Identify the element, group number, period number, and nuclear charge for atoms with the following ground state electron configurations:

Electron Configuration	2-8-4	2-8-8-1	2-8-1	2-8-18-7	2-8-18-32-18-8
Element Symbol					
Group Number					
Period or Row Number					
Nuclear Charge					

2. Would any of these elements likely have similar chemical properties? Which ones and why?

3. Pick two elements from the chart that have very different chemical properties and explain why they are different.