

Chemistry Objectives — The Periodic Table

Goals: To be able to explain the history and organization of the modern periodic table, the people instrumental in developing it, and to use the periodic table as a tool in knowing chemical characteristics of the common elements.

Background Skills: Review the periodic table you labeled and colored earlier this year.

5.1 History of the Periodic Table

I. Mendeleev, Moseley, and Chemical Periodicity

A. Explain the origin of the periodic table.

1. Why was it necessary to organize the elements into a table?
- 2.
3. Tell the contributions of:
 - a) Dmitri Mendeleev
 - (1) What 2 main pieces of information about each element did he use to organize them?
 - (2) What was wrong with his table?
 - (a) Did he know this?
 - (b) How?
 - b) Moseley
 - (1) What did he find?
 - (2) How did his discovery affect Mendeleev's periodic table?
 - (3) Explain why the elements are not in perfect order according to atomic mass.

II. The Modern Periodic Table

- A. Which subatomic particle determines the chemical and physical properties of an element?
- B. How is the modern periodic table arranged? Describe it.
- C.
 1. Be able to explain the following WRT the periodic table:
 - a) Groups
 - (1) Representative elements
 - b) Periods (atomic number)
- D. State the periodic law

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E. How can the periodic law be used to predict physical and chemical changes?

5.2 Electron Configuration and the Periodic Table

I. Groups, Periods, and Blocks of the Periodic Table

A. What are the 4 blocks into which elements are classified based on their electron configurations? It's sometimes helpful to make a chart. List each block name down the left side of a page, and list the properties (a-d, below) across the top. Fill in the information for each block. Make one chart for #1, below, and another chart using the information in 2 and 3, below.

1. KNOW about each block:

- a) location on the periodic table
- b) list some examples of elements in the category
- c) how to find electron configuration endings quickly
- d) how to find the number of outer-shell electrons from the periodic table

2. Categories

- a) Noble gases
- b) Representative elements
- c) Transition metals
- d) Inner transition metals (Lanthanides, actinides)
- e) Alkali metals
- f) Alkaline earth metals
- g) Halogens
- h) Metalloids

3. Know about each category:

- a) definition
- b) location on the periodic table
- c) list some examples of elements in the category
- d) how to find electron configuration endings quickly
- e) how to find the number of outer-shell electrons from the periodic table (except transition metals)

5.3 Electron Configuration and Periodic Properties

We will investigate this a bit more in class with a group activity. You'll have 3-D models to look at when we're finished.

I. Periodic Trends in Atomic Size

A. Atomic sizes - how are they estimated? (WHY are they estimated?)

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- B. Group trends
 - 1. Where, in general, are they smallest? Largest?
- C. Periodic trends
 - 1. Where, in general, are they smallest? Largest?
- D. What is the *shielding effect*?

II. Periodic Trends in Ionization Energy

- A. Define *ionization energy*
- B. Group trends
- C. Periodic trends

III. Periodic Trends in Electron Affinity

- A. Define *electron affinity*
- B. Group trends
- C. Periodic trends

IV. Periodic Trends in Ionic Size

- A. What is an *ion*? How does it form?
- B. Explain how gaining or losing electrons affect the size of an ion
- C. Group trends
- D. Periodic trends

V. Periodic Trends in Electronegativity

- A. Define *electronegativity*
- B. Group trends
- C. Periodic trends

VI. Characteristics of Elements

- A. Know characteristics of common elements discussed and demonstrated in class. . .
 - 1. . . .especially those discussed in your homework!!