

The Periodic Table— Experiment Summaries and Concepts



It's in the Cards—Discovering the Periodic Law

Mendeleev's discovery of the periodic table has survived the test of time and stands to this day as the single most important tool to understand the chemistry of the elements. In this inquiry-based activity, students play chemical “solitaire” using special element card decks to reenact Mendeleev's original discovery of the periodic law. As the cards are arranged and rearranged based on logical trends in the properties of the elements, the nature of the periodic law is revealed.



Concepts

- Periodic law
- Periodic table
- Atomic mass
- Ionization energy

Density Is a Periodic Property—Discovering an Element

After observing trends in the properties of elements when they were arranged in order of increasing atomic mass, Mendeleev made a startling prediction. He predicted the existence and properties of at least three undiscovered elements. In this experiment students measure mass and volume data for silicon, tin, and lead, calculate their densities, and use these results to predict the density of germanium, Mendeleev's “undiscovered” element in the Group IV family of elements.

Periodic Trends and the Properties of Elements—Alkaline Earth Metals

Recognizing periodic trends in the properties of elements is key to understanding the full value of the periodic table. The purpose of this microscale lab activity is to identify periodic trends in the activity and solubility of the alkaline earth metals. Students first compare the reactions of metals to discover the trend in metal activity both within a group and across a period in the periodic table. Students then explore the solubility of a variety of alkaline earth metal compounds and use the resulting trend to identify an unknown.



- Periodic law
- Density
- Group IVA elements
- Period number

All in the Family—The Halogens and Their Compounds

In every family there are both similarities and differences. The same is true in chemical families as well. In this experiment students explore the similarities and differences in the chemical properties of the halogens and their compounds. Students determine which halogens are most and least active by investigating the pair-wise reactions of chlorine, bromine, and iodine with sodium chloride, sodium bromide, and sodium iodide. Students also examine the solubility of metal halides to see how they are the same and different. The experiment is carried out on the microscale level using small test tubes.



- Periodic table
- Periodic trends
- Group vs. period
- Alkaline earth metals
- Activity series

- Periodic table
- Periodic trends
- Groups or families
- Halogens
- Activity series