CRITICAL THINKING

As a member on the newly-inhabited space station Alpha, you are given the task of organizing information on newly discovered elements as it comes in from the laboratory. To date, five elements have been discovered and have been assigned names and symbols from the Greek alphabet. An analysis of the new elements has yielded the following data:

Element name	Atomic no.	Atomic mass	Properties
Epsilon ε	23	47.33	nonmetal, very reactive, produces a salt when combined with a metal, gaseous state
Beta β	13	27.01	metal, very reactive, soft solid, low melting point
Gamma γ	12	25.35	nonmetal, gaseous element, extremely unreactive
Delta Δ	4	7.98	nonmetal, very abundant, forms compounds with most other elements
Lambda Λ	9	16.17	metal, solid state, good conductor, high luster, hard and dense

50. Applying Models Create a periodic table based on the properties of the five new elements.

51. Predicting Outcomes Using your newly created periodic table, predict the atomic number of an element with an atomic mass of 11.29 that has nonmetallic properties and is very reactive.

52. Predicting Outcomes Predict the atomic number of an element having an atomic mass of 15.02 that exhibits metallic properties but is softer than lambda and harder than beta.

53. Analyzing Information Analyze your periodic table for trends, and describe those trends.

USING THE HANDBOOK

54. Review the boiling point and melting point data in the tables of the *Elements Handbook*. Make a list of the elements that exist as liquids or gases at the boiling point of water, 100°C.

55. Because transition metals have vacant *d* orbitals, they form a greater variety of colored compounds than do the metals of Groups 1 and 2. Review the section of the *Elements Handbook* on transition metals (pages 798–807) and answer the following:

a. What colors are exhibited by chromium in its common oxidation states?
b. What gems contain chromium impurities?
c. What colors are often associated with the following metal ions: copper, cadmium, cobalt, zinc, and nickel?
d. What transition elements are considered noble metals? What are the characteristics of a noble metal?

RESEARCH & WRITING

56. Prepare a report tracing the evolution of the current periodic table since 1900. Cite the chemists involved and their major contributions.

57. Write a report describing the contributions of Glenn Seaborg toward the discovery of many of the actinide elements.

ALTERNATIVE ASSESSMENT

58. Construct your own periodic table or obtain a poster that shows related objects, such as fruits or vegetables, in periodic arrangement. Describe the organization of the table and the trends it illustrates. Use this table to make predictions about your subject matter.

extension

Graphing Calculator

Graphing Atomic Radii

Go to **go.hrw.com** for a graphing calculator exercise that asks you to graph atomic radii versus atomic number for the Period 2 elements.

Keyword: HC6PERX