Date

Atoms and Bonding • Skills Lab

Comparing Atom Sizes

Problem

How is the radius of an atom related to its atomic number?

Skills Focus

making models, graphing, interpreting data

Materials

drawing compass

metric ruler

calculator

periodic table of the elements (Appendix D)

Procedure

Review the safety guidelines in Appendix A.

- 1. Using the periodic table as a reference, predict whether the size (radius) of atoms will increase, remain the same, or decrease as you go from the top to the bottom of a group, or family, of elements.
- 2. The data table on the next page lists elements in Group 2 of the periodic table. The atomic radius of each element is given in picometers (pm). Record your data in the data table.
- **3.** Calculate the relative radius of each atom compared to beryllium, the smallest atom listed. Do this by dividing each radius by the radius of beryllium. (*Hint:* The relative radius of magnesium would be 160 pm divided by 112 pm, or 1.4 pm.) Record these values, rounded to the nearest tenth, in the data table.
- **4.** Using a compass, draw a circle for each element with a radius that corresponds to the relative radius you calculated in Step 3. Use centimeters as your unit for the radius of each of these circles. Use the space below or a separate sheet for your circles. **CAUTION:** *Do not push the sharp point of the compass against your skin.*
- 5. Label each model with the symbol of the element it represents.

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Atomic Number	Element	Radius (pm)*	Relative Radius
4	Ве	112	1
12	Mg	160	
20	Ca	197	
38	Sr	215	
56	Ва	222	

Data Table

* *A picometer (pm) is one billionth of a millimeter.*

Analyze and Conclude

Write your answers in the spaces provided.

1. Making Models Based on your models, was your prediction in Step 1 correct? Explain.

- **2. Graphing** On a sheet of graph paper, make a graph of the data given in the first and third columns of the data table. Label the horizontal axis *Atomic Number*. Mark the divisions from 0 to 60. Then label the vertical axis *Radius* and mark its divisions from 0 to 300 picometers.
- **3. Interpreting Data** Do your points fall on a straight line or on a curve? What trend does your graph show?

4. Predicting Predict where you would find the largest atom in any group, or family of elements. What evidence would you need to tell if your prediction is correct?

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Comparing Atoms Sizes (continued)

5. Communicating Write a paragraph explaining why it is useful to draw a one- to two-centimeter model of an atom that has an actual radius of 100 to 200 pm.

More to Explore

Look up the atomic masses for the Group 2 elements. Devise a plan to model their relative masses using real-world objects.