Section 1: Organizing the Elements

Preview

Key Ideas

- How did Mendeleev arrange the elements in his periodic table?
- How are elements arranged in the modern periodic table?

Bellringer

One way to organize a large group of objects is to arrange them into groups of similar objects. This is how scientists organize all of the many elements. Practice the skill of categorizing by arranging the magazines listed below into similar groups.

Calling All Girls
Computer World
Beautiful Homes
Auto Racing
The Healthy Man
Sporting Times
Child's Play
Family Computing
Beautiful Homes
Car Trends
Homeopathic Medicine
Sports and Scores
Calling All Boys
All About Computing
Home Decorating
Classic Cars
The Healthy Woman
Golf for Everyone
Nursery Rhymes
How to Use the Internet
Modern Housekeeping
Easy Car Repairs
The Health Newsletter
Football Stories
Read Aloud Stories
Building a Web Site
Home Makers Magazine
The Sports Car Story
Good Nutrition
Tennis Tips

Bellringer, *continued*

1. Arrange the magazines into similar groups.
2. What criteria did you use for grouping the magazines?
3. Once you arrange the magazines into groups, could you sort the material further to make it even more organized?

Calling All Girls
Computer World
Beautiful Homes
Auto Racing
The Healthy Man
Sporting Times
Child's Play
Family Computing
Beautiful Homes
Car Trends

Homeopathic Medicine
Sports and Scores
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All About Computing
Home Decorating
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Recognizing a Pattern

- How did Mendeleev arrange the elements in his periodic table?

- In his periodic table, Mendeleev arranged elements in rows by increasing atomic mass.

Recognizing a Pattern, *continued*

- Mendeleev was able to predict new elements.
  - Mendeleev left spaces in his table to make the pattern fit.
  - He used the spaces to successfully predict the existence and properties of elements not yet discovered.

Properties of Germanium

	Mendeleev's prediction	Actual property
Atomic mass	70	72.6
Density*	5.5 g/cm^3	5.3 g/cm^3
Appearance	Dark gray metal	Gray metalloid
Melting point*	High	937 °C

**at room temperature and pressure*

- A few elements did not fit the pattern.

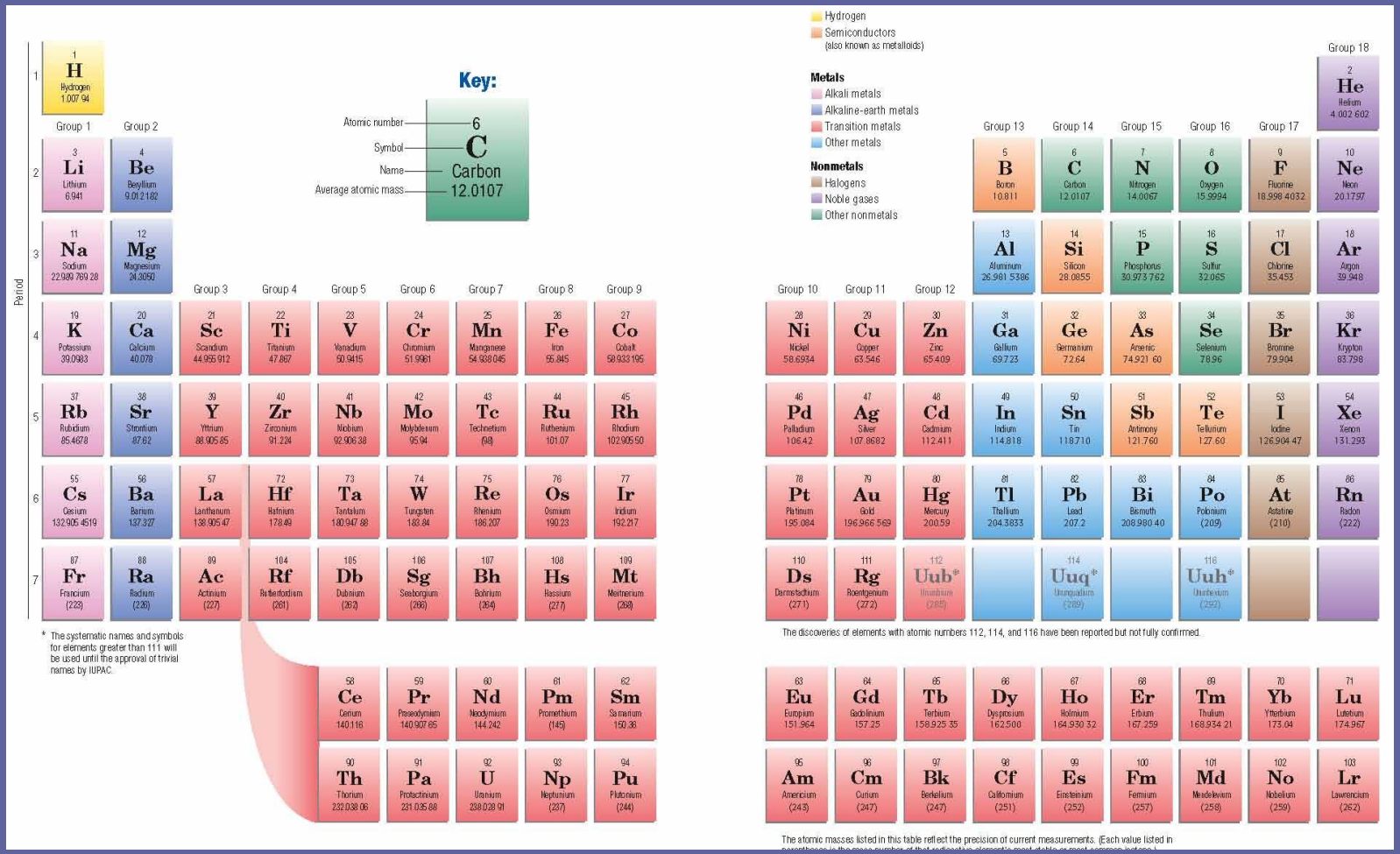
Changing the Arrangement

- How are elements arranged in the modern periodic table?
- The modern periodic table organizes elements by atomic number. When the elements are arranged in this way, elements that have similar properties appear at regular intervals.

Changing the Arrangement, *continued*

- As scientists learned more about the structure of the atom, they improved Mendeleev's table.
- Arranging the table by atomic number (number of protons) rather than by atomic mass fixed the discrepancies in Mendeleev's table.
- **periodic law:** the law that states that the repeating chemical and physical properties of elements change periodically with the atomic numbers of the elements

The Periodic Table of the Elements



Changing the Arrangement, *continued*

- Elements become less metallic across each period.
  - **period**: a horizontal row of elements in the periodic table

- Elements in a group have similar properties.
  - **group:** a vertical column of elements in the periodic table; elements in a group share chemical properties

Visual Concept: Periodic Table Overview