



Lecture Presentation

Chapter 7

Periodic Properties of the Elements

John D. Bookstaver
St. Charles Community College
Cottleville, MO

Development of Periodic Table

| | | | | | | | | | | | | | | | | | |
|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| H | | | | | | | | | | | | | | | | | He |
| Li | Be | | | | | | | | | | | B | C | N | O | F | Ne |
| Na | Mg | | | | | | | | | | | Al | Si | P | S | Cl | Ar |
| K | Ca | Sc | Ti | V | Cr | Mn | Fe | Co | Ni | Cu | Zn | Ga | Ge | As | Se | Br | Kr |
| Rb | Sr | Y | Zr | Nb | Mo | Tc | Ru | Rh | Pd | Ag | Cd | In | Sn | Sb | Te | I | Xe |
| Cs | Ba | Lu | Hf | Ta | W | Re | Os | Ir | Pt | Au | Hg | Tl | Pb | Bi | Po | At | Rn |
| Fr | Ra | Lr | Rf | Db | Sg | Bh | Hs | Mt | Ds | Rg | Cn | | | | | | |

| | | | | | | | | | | | | | |
|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| La | Ce | Pr | Nd | Pm | Sm | Eu | Gd | Tb | Dy | Ho | Er | Tm | Yb |
| Ac | Th | Pa | U | Np | Pu | Am | Cm | Bk | Cf | Es | Fm | Md | No |

Ancient Times

(9 elements)

Middle Ages-1700

(6 elements)

1735-1843

(42 elements)

1843-1886

(18 elements)

1894-1918

(11 elements)

1923-1961

(17 elements)

1965-

(9 elements)

Dmitri Mendeleev and Lothar Meyer independently came to the same conclusion about how elements should be grouped.

Development of Periodic Table

TABLE 7.1 • Comparison of the Properties of Eka-Silicon Predicted by Mendeleev with the Observed Properties of Germanium

| Property | Mendeleev's Predictions for Eka-Silicon (made in 1871) | Observed Properties of Germanium (discovered in 1886) |
|---------------------------------------|--|---|
| Atomic weight | 72 | 72.59 |
| Density (g/cm ³) | 5.5 | 5.35 |
| Specific heat (J/g-K) | 0.305 | 0.309 |
| Melting point (°C) | High | 947 |
| Color | Dark gray | Grayish white |
| Formula of oxide | XO ₂ | GeO ₂ |
| Density of oxide (g/cm ³) | 4.7 | 4.70 |
| Formula of chloride | XCl ₄ | GeCl ₄ |
| Boiling point of chloride (°C) | A little under 100 | 84 |

© 2012 Pearson Education, Inc.

Mendeleev, for instance, predicted the discovery of germanium (which he called eka-silicon) as an element with an atomic weight between that of zinc and arsenic, but with chemical properties similar to those of silicon.

© 2012 Pearson Education, Inc.