Name: _____ Chapter 6 Questions – Periodic Table Trends ★: Not covered.

All material and questions can be found in the textbook. Organized by section.

6.1 Organizing the Elements

Why did Mendeleev leave spaces in his periodic table?

He predicted that there were yet undiscovered elements that would occupy those spaces.

What effect did the discover of gallium have on the acceptance of Mendeleev's table?

The accuracy of Mendeleev's predictions gave his PTE great credibility.

What pattern is revealed when the elements are arranged in a periodic table in order of increasing atomic number? An increase in atomic mass & a repitition of many physical & chemical properties.

Based on their locations in the periodic table, would you expect carbon and silicon to have similar properties? Explain your answer. Yes. Same number of valence electrons says that they should have similar behaviors.

In general, how are metalloids different from metals and nonmetals?

Metalloids can either gain or give away electrons. Metals give away e^-. Nonmetals gain e^-. Metalloids can do both.

6.2 Classifying the Elements

Where are the alkali metals, the alkaline earth metals, the halogens, and the noble gases located in the periodic table?

1A, 2A, 7A & 8A respectively

★ Which of the following are symbols for representative elements: Na, Mg, Fe, Ni, Cl?

representative elements are ones from the S&P blocks.

Which noble gas does not have eight electrons in its highest occupied energy level?

He: $1s^2$

Which of these metals isn't a transition metal?

A. aluminum
B. silver
C. iron
D. zirconium

Write the electron configuration of these elements.

a. the noble gas in period 3 $1s^2 2s^2 2p^6 3s^2 3p^6$
b. the metalloid in period 3 $1s^2 2s^2 2p^6 3s^2 3p^2$
c. the alkali earth metal in period 3 $1s^2 2s^2 2p^6 3s^2$

6.3 Periodic Trends

Which element in ***each*** pair has atoms with a larger atomic radius? (*Circle best choice for each)*

A. sodium, lithium
B. strontium, magnesium
C. carbon, germanium
D. selenium, oxygen

Explain the difference between the first and second ionization energy of an element.

first IE: Energy to remove 1 e^- from a neutral atom.

second IE: " " " 2nd e^- " " " "
after the 1st has been removed.

Which element in ***each*** pair has a greater first ionization energy? (*Circle best choice for each)*

A. lithium, boron
B. magnesium, strontium
C. cesium, aluminum

Arrange the following groups of elements in order of increasing ionization energy.

a. Be, Mg, Sr Sr, Be, Mg
b. Bi, Cs, Ba Cs, Ba, Bi
c. Na, Al, S Na, Al, S

Which particle has the larger radius in each atom/ion pair?

A. Na, Na^+
B. S, S^{2-}
C. I, I^-
D. Al, Al^{3+}

Which element in ***each*** pair has a higher electronegativity value?

Options on next page

A. Cl, F
B. C, N
C. Mg, Ne ← no electronegativity
D. As, Ca

Why are noble gases not included in Table 6.2?

they have no desire to attract e^-.

When the elements in each pair are chemically combined, which element in ***each*** pair has a greater attraction for electrons?

A. Ca or O
B. O or F
C. H or O
D. K or S

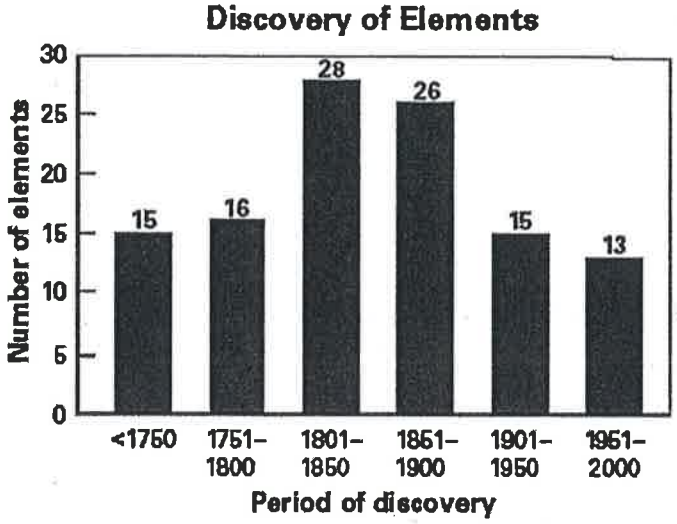
For which of these properties does lithium have a larger value than potassium?

A. first ionization energy
B. atomic radius
C. electronegativity
D. ionic radius

Understanding Concepts

The bar graph shows how many elements were discovered before 1750 and in each 50-year period between 1750 and 2000.

a. In which 50-year period were the most elements discovered? 1801-1850
b. How did Mendeleev's work contribute to the discovery of elements? Predicted properties.
c. What percent of the elements were discovered by 1900? 75 %



Write the symbol of the element or elements that fit each description.

a. a nonmetal in Group 4A C
b. the inner transition metal with the lowest atomic number La
c. all of the nonmetals for which the atomic number is a multiple of five 10, 15, 35
d. a metal in Group 5A Bi

In which pair of elements are the chemical properties of the elements most similar? Explain your reasoning.

a. sodium and chlorine
b. nitrogen and phosphorus - same group (5A).
c. boron and oxygen