

Section Review 8.2**Concept Review**

What is a period? A group?

Application

Classify each of the following elements as a main-group element, transition metal, or inner transition metal. If it is a main-group element, indicate whether it is a metal, a semimetal, or a nonmetal, and if applicable, provide the group name.

Element	Main-group, transition metal, or inner transition metal	If main-group, is it a metal, semimetal, or nonmetal	Group name (if applicable)
a. beryllium			
b. tin			
c. silicon			
d. tungsten			
e. iodine			
f. chromium			
g. sodium			
h. aluminum			
i. neon			
j. sulfur			
k. cerium			
l. americium			
m. arsenic			

Section Review 8.3

1. Molten lithium is one of the most reactive substances known, reacting with almost every other element except the noble gases. Predict the reaction of molten lithium with each of the following elements if it forms Li_2O when reacting with oxygen.

a. fluorine

b. sulfur

2. It took 7 tons of the mineral pitchblende to isolate 1 g of the radioactive element radium. Predict the reactions of radium with each of the below elements, and write the balanced chemical equation showing the reactions.

a. oxygen

b. liquid bromine

c. water

d. hydrogen

3. Predict the formulas of the products of the reaction between fluorine and each of the following, and write the balanced chemical equations showing the reactions.

a. rubidium

b. selenium

c. tin

d. barium

e. phosphorus

f. carbon

Section Review 8.4**Concept Review**

Why are valence electrons important?

Application

Give Lewis symbols for each of the following elements.

I	Co	Be	Fe	Ra	V
Se	Sb	K	O	Si	C

Section Review 8.5

- Which atom in each of the following pairs has the *lower* first ionization energy?
 - O, C
 - Ne, Na
 - P, N
 - B, N
- Which atom in each of the following pairs has the *larger* electronegativity?
 - O, F
 - Na, Cl
 - As, Bi
- Which is the more *metallic* element in each of the following pairs of elements?
 - Al, B
 - Na, Al
 - Li, C
- Which has the *smaller* radius of each pair?
 - Mg, Mg²⁺
 - Si, Al
 - O, O²⁻
 - Xe, Ne
- Using only the periodic table, list the following elements, Ca, Cs, F, Si, S, according to
 - increasing* atomic radii, and
 - increasing* electronegativities:
- Using only the periodic table, list the following elements according to *increasing* first ionization energy: Cs, Ga, Br, Sr, As, Ne.

Chapter 8 Review

Questions

1. What law states that the properties of elements are periodic functions of their atomic numbers?
2. What are the rows of the periodic table called?
3. Name the group of elements that have filled valence shells.
4. Give (a) two properties of alkali metals, and (b) two properties of alkaline earth metals.
 - a. alkali metals
 - i.
 - ii.
 - b. alkaline earth metals
 - i.
 - ii.
5. Use the electron structure of the atom to explain the observed trends in atomic radius and first ionization energy.
6. Explain why group 13 and group 16 elements have lower first ionization energies than group 2 and group 15 elements, respectively.
7. How do electron affinity and first ionization energy differ?

8. Define *electronegativity*.

Problems

1. Classify each of the following elements as a main-group element, transition metal, or inner transition metal. If it is a main-group element, indicate whether it is a metal, nonmetal, or semimetal, and provide the group name, if there is one.

Element	Main-group, transition metal, or inner transition metal	If main-group, is it a metal, semimetal, or nonmetal	Group name (if applicable)
a. curium			
b. lead			
c. rutherfordium			
d. francium			
e. radon			
f. gold			
g. radium			
h. selenium			
i. bromine			
j. hydrogen			

2. Write balanced equations showing an alkali metal and an alkaline earth metal reacting with fluorine.

3. For each of the following elements, predict both the combining capacity and the chemical formula of its compound with chlorine.

a. radium

b. iodine

c. thallium

d. tellurium

4. Give the number of valence electrons found in atoms of the following elements.

- a. K b. Ba c. H d. Cl
e. S f. C g. Al h. O

5. Give the Lewis symbol of each of the following elements.

Mg	Os	Fr	V	P	Ga	Zn

6. Indicate which member of each of the following pairs has a *larger* radius, provide a reason for your choice.

a. Al, Ar

b. F, Kr

c. H, H

d. H⁻, Be²⁺

e. Ca, As

f. Cu⁺, Au⁺

g. Sr²⁺, Rb⁺

h. Fe^{3+} , Fe^{2+}

i. N, F

j. Br, I

7. Which one of the following ions would you expect to have the *largest* radius?

Cr^{6+} , K^+ , Mn^{7+} , P^{3-} , S^{2-} , Sc^{3+} , Ti^{4+}

Explain.

8. Using only the periodic table, arrange the following sets of elements according to *increasing* first ionization energy, and according to *increasing* metallic character.

a. S, Sr, Se, O, Ba, Ca

b. Ar, Na, S, Al, K

9. Which of the following would you expect to have the *most negative* electron affinity?

Ar, Cl, Mg, Na, S, Si

10. Arrange the following sets of elements according to *increasing* electronegativity; use only the periodic table.

a. Zn, As, F, P, O

b. Sn, I, Sr, Cs

c. C, Li, F, N