

1. Determine the number of valence electrons and draw the Lewis electron dot structure for:
- a. sulfur
  - b. calcium
  - c. chlorine
  - d. arsenic

2. List, by number, both the period and group of each of these elements.

<u>Element</u>	<u>Period</u>	<u>Group</u>
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a. beryllium Be

b. iron Fe

c. lead Pb

3. Would you expect strontium to be, chemically, more similar to calcium or rubidium and WHY?
4. Where, generally, are the metals located on the periodic table?
5. Where, generally, are the nonmetals located on the periodic table?
6. What are the Group 1 elements called?
7. What are the Group 2 elements called?
8. What are the Group 17 elements called?
9. What are the Group 18 elements called?
10. What do we mean by the “atomic radius?”
11. Within a group, what happens to the atomic radius as you go down the column? Why does this occur?
12. Within a period, what happens to the atomic radius as the atomic number increases? Why does this occur?
13. What is meant by the phrase “increasing nuclear charge”? How is this related to atomic radius?

14. Metals usually form what type of ions? Nonmetals usually form what type of ions?

15. What is ionization energy?

16. What do we mean by the first, second, and third ionization energies for a particular atom?

17. Why does each successive ionization require more energy than the previous one?

18. What is the general trend of ionization energy as you go from left to right across the periodic table? Why does this occur?

19. What is the general trend of ionization energy as you go down a group on the periodic table? Why does this occur?

20. Which of these elements has the highest first ionization energy: Sn, As, or S?

21. What is electronegativity?

22. What is the general trend of electronegativity within a group? Why does this occur?

23. What is the general trend of electronegativity within a period? Why does this occur?

24. List the following atoms in order of increasing electronegativity: O, Al, Ca

25. List the following atoms in order of decreasing electronegativity: Cl, K, Cu

26. What is the shielding effect? How is it related to ionization energy and electronegativity?
27. When an atom becomes an anion, what happens to its radius? Why?
28. When an atom becomes a cation, what happens to its radius? Why?
29. For each of the following pairs, circle the atom or ion having the larger radius.
- a. S or O                      c.  $\text{Na}^{1+}$  or  $\text{K}^{1+}$                       e.  $\text{S}^{2-}$  or  $\text{O}^{2-}$
- b. Ca or  $\text{Ca}^{2+}$                       d. Na or K                      f. F or  $\text{F}^{1-}$
30. For each of the following pairs, identify the smaller ion.
- a.  $\text{K}^{1+}$  or  $\text{Ca}^{2+}$                       c.  $\text{C}^{4+}$  or  $\text{C}^{4-}$                       e.  $\text{O}^{2-}$  or  $\text{F}^{1-}$
- b.  $\text{F}^{1-}$  or  $\text{Cl}^{1-}$                       d.  $\text{S}^{2-}$  or  $\text{F}^{1-}$                       f.  $\text{Fe}^{2+}$  or  $\text{Fe}^{3+}$
31. What is the general trend of reactivity for metals within a group and a period? Why?
32. What is the general trend of reactivity for non-metals within a group and a period? Why?
33. Why are the trends for metals and non-metals opposites?

### Multiple Choice Practice

- In the modern Periodic Table, the elements are arranged according to
  - atomic number
  - mass number
  - oxidation number
  - atomic mass
- On the Periodic Table, an element classified as a semimetal (metalloid) can be found in
  - Period 6, Group 15
  - Period 4, Group 15
  - Period 3, Group 16
  - Period 2, Group 14

3. An atom of an element contains 20 protons, 20 neutrons, and 20 electrons.  
This element is
- an alkaline earth metal
  - a halogen
  - an alkali metal
  - a noble gas
4. The properties of silicon are characteristic of
- a nonmetal, only
  - a metal, only
  - neither a metal nor a nonmetal
  - both a metal and a nonmetal
5. The element in Period 2 with the largest atomic radius is
- an alkaline earth metal
  - a halogen
  - a noble gas
  - an alkali metal
6. What are two properties of most nonmetals?
- high ionization energy and poor electrical conductivity
  - high ionization energy and good electrical conductivity
  - low ionization energy and poor electrical conductivity
  - low ionization energy and good electrical conductivity
7. As the Group 1 elements of the Periodic Table are considered from top to bottom, the first ionization energy of each successive element decreases. One reason for this is that the
- nuclear charge is decreasing
  - number of principal energy levels is decreasing
  - number of neutrons is increasing
  - distance between the valence electron and the nucleus is increasing
8. Compared to atoms of metals, atoms of nonmetals generally have
- lower electronegativities and higher ionization energies
  - higher electronegativities and lower ionization energies
  - lower electronegativities and lower ionization energies
  - higher electronegativities and higher ionization energies
9. Which halogen has the least attraction for electrons?
- Br
  - I
  - F
  - Cl
10. Which two elements have chemical properties that are most similar?
- C and N
  - Li and Na
  - Cl and Ar
  - K and Ca
11. Which element is considered malleable?
- sulfur
  - radon
  - hydrogen
  - gold
12. In the Periodic Table of the Elements, all the elements within Group 16 have the same number of
- protons
  - neutrons
  - energy levels
  - valence electrons

