

8

13. What is the maximum number of electrons allowed in the $2p$ sublevel?
 a. 2
 b. 6
 c. 10
 d. 14
14. What is the maximum number of electrons that can occupy one orbital?
 a. 1
 b. 2
 c. 8
 d. 18
15. The electron configuration for fluorine is
 a. $1s^2 2s^2 2p^5$
 b. $1s^2 2s^2 2p^6$
 c. $1s^2 2s^2 2p^6$
 d. $1s^2 2s^2 2p^8 3s^2$
16. The first three electrons that enter into p orbitals must have be in
 a. parallel orbitals, the same orbital
 b. opposite spins, separate orbitals
 c. low energy levels.
 d. opposite charges.
17. The atom whose electron configuration is $1s^2 2s^2 2p^6 3s^2 3p^1$ is
 a. B.
 b. Na.
 c. Al.
 d. Ga.
18. The configuration for element # 20, Calcium is
 a. $3s^2$
 b. $4s^2$
 c. $2s^1$
 d. $4s^1$
19. The element having the same s and p configurations for principal energy level 3 as the element F has for its principal energy level 2 is
 a. Na.
 b. Al.
 c. P.
 d. Cl.
 Fluorine
20. The frequency and wavelength of all waves are
 a. directly related. (change in same way)
 b. inversely related. (opposites)
 c. unrelated.
 d. equal.
21. The SI unit of cycles per second is called a
 a. photon.
 b. quantum.
 c. hertz.
 d. hound.
22. Among the following groups of atoms, which have the same outer (valence) electron configurations?
 a. H, He
 b. Li, Be, N, Ne
 c. Mg, Al, Ca, Ga
 d. N, P, As, Bi
23. The wavelength of light with a frequency of $2.50 \times 10^{14} \text{ s}^{-1}$ is
 a. $1.20 \times 10^5 \text{ m}$.
 b. $8.33 \times 10^5 \text{ m}$.
 c. $1.20 \times 10^{-5} \text{ m}$.
 d. $8.33 \times 10^{-5} \text{ m}$.
24. When the electron in a hydrogen atom absorbs energy it
 a. is now in its ground state. (4145)
 b. is now in its excited state. (jumped)
 c. has released a photon. (falls)
 d. none of the above

C. Problems

Solve the following problems in the space provided. Show your work.

25. Write the electron configurations for the following atoms. (long and short)
 a. Mg
 b. P
 c. Br
 d. Xe
26. Identify the elements described below.
 a. Configuration = $1s^2 2s^2 2p^6 3s^2 3p^4$
 b. Contains a full second energy level (2s and 2p)
 c. Contains the first d electron (3d¹)
 d. Contains seven electrons in its fourth energy level (4s and 4p combined)
 e. Contains only two electrons in its fifth energy level (5s)
 f. Contains three unpaired electrons in its third energy level (3p)
 g. Contains five electrons in its 3d orbitals
 h. Has its outermost electron in 7s
- 27) What is the frequency of radiation whose wavelength is $6.25 \times 10^{-7} \text{ m}$?
- 28) What is # 27's Energy?

THE PERIODIC TABLE

Vocabulary Review

Match the correct vocabulary term to each numbered statement. Write the letter of the correct term on the line.

Column A

Column B

- | | |
|--|---|
| <p>1. The highest occupied <i>s</i> and <i>p</i> sublevels are partially filled. (<i>half occupied</i>)</p> <p>2. The <i>d</i> block.</p> <p>3. metals having only 2 electrons in the highest occupied energy level (<i>2 valence e⁻</i>)</p> <p>4. size of an atom.</p> <p>5) decreases for cations and anions from left to right across a period</p> <p>6. measures the ability of an atom to attract electrons when the atom is in a compound</p> <p>7. an atom or group of atoms that has a positive or negative charge</p> <p>8. elements in which the valence <i>s</i> and <i>p</i> sublevels are filled (<i>s²-p⁶</i>)</p> <p>9. nonmetals of Group 17</p> <p>10. The <i>f</i> block</p> <p>11. energy required to remove an electron from an atom</p> <p>12. positively charged ion</p> <p>13. Group 1 elements</p> <p>14. good conductors of heat and electric current</p> <p>15. negatively charged ion</p> <p>16. poor conductors of heat and electric current</p> | <p><input checked="" type="checkbox"/> representative elements</p> <p>b. electronegativity</p> <p>c. atomic radius</p> <p>d. metals</p> <p>e. ionization energy</p> <p>f. cation</p> <p>g. noble gases</p> <p>h. alkali metals</p> <p>i. lanthanides/actinides</p> <p>j. nonmetals</p> <p>k. ionic radius</p> <p>l. ion</p> <p>m. Group 2</p> <p>n. transition metal</p> <p>o. halogens</p> <p>p. anion</p> |
|--|---|

THE PERIODIC TABLE

Chapter Test B

A. Matching

Match each term in Column B with the correct description in Column A. Write the letter of the term on the line.

Column A

Column B

- | | |
|--|--|
| <p>1. size of an atom</p> <p>2. negatively charged ion</p> <p>3. the vertical columns of the periodic table</p> <p>4. the nonmetallic elements of Group 17.</p> <p>5. elements in which the highest occupied <i>s</i> and <i>p</i> sublevels are filled (<i>s²-p⁶</i>)</p> <p>6. the tendency for the atoms of an element to attract electrons when the atoms are in a compound</p> <p>7. positively charged ion</p> <p>8. the energy required to remove an electron from an atom</p> <p>9. the Group 1 elements</p> <p>10. When elements are arranged in order of increasing atomic number, there is a periodic repetition of their physical and chemical properties.</p> | <p>a. electronegativity</p> <p>b. groups</p> <p>c. atomic radius</p> <p>d. ionization energy</p> <p><input checked="" type="checkbox"/> periodic law</p> <p>e. alkali metals</p> <p>f. halogens</p> <p>h. noble gases</p> <p>i. anion</p> <p>j. cation</p> |
|--|--|
- B. Multiple Choice**
Choose the best answer and write its letter on the line.
11. The modern periodic table is arranged in order of increasing _____.
- a. atomic mass. c. atomic size.
- b. atomic number. d. atomic radius.
12. The elements in the full columns _____.
- a. alkali metals. c. transition metals.
- b. alkaline earth metals. d. representative elements.

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13. Which of the following is true concerning the noble gases?
 a. Their highest occupied *s* and *p* sublevels are filled.
 b. They belong to Group 18.
 c. They are sometimes referred to as the inert gases.
 d. all of the above
14. What is the number of ^{valence} electrons in the Nitrogen group?
 a. 5
 b. 3
 c. 8
 d. 18
15. Among the groups of elements listed below, which have the same number of valence e⁻s?
 a. Li, B, C, F
 b. Na, Mg, Al, S
 c. K, Ca, Rb, Sr
 d. N, P, As, Sb
16. An element that contains an electron in a d sublevel is
 a. Mg
 b. O
 c. Fe
 d. Ne
17. The elements that contain electrons in an f sublevel near the highest occupied energy level are referred to as
 a. alkali metals.
 b. alkaline earth metals.
 c. transition metals.
 d. inner transition metals. *(lanthanides/actinides)*
18. The electron configuration of the element chlorine ends in
 a. $3s^2$
 b. $3p^5$
 c. $3s^2 3p^5$
 d. $3s^2 3p^7$
19. The element with 9 electrons in its 3d sublevel is
 a. O
 b. Ne
 c. Ar
 d. Ni
20. As you move down a group in the periodic table, atomic size generally
 a. increases.
 b. decreases.
 c. remains the same.
 d. varies randomly.
21. The largest atom from among the following is
 a. Li
 b. Na
 c. Rb.
 d. Fr.
22. The smallest atom from among the following is
 a. Na
 b. Mg
 c. Si
 d. Cl
23. As the number of electrons added to the same principal energy level increases, atomic size generally _____ across a period. *(left to right)*
 a. increases.
 b. decreases.
 c. remains the same.
 d. varies randomly.
24. Removing one electron from an atom results in the formation of an
 a. ion with a 1+ charge.
 b. ion with a 1- charge.
 c. ion with a 7+ charge.
 d. ion with a 7- charge.

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32. Arrange the following elements as described below.
 Li, C, K, F, Cs
 a. In order of decreasing atomic size *(largest to smallest)*
 b. In order of increasing ionization energy
 c. In order of decreasing electronegativity
33. Among the following pairs of atoms, identify the larger of the two, the one with the greater first ionization energy, and the one with the lower electronegativity.
- | Atom | Larger Atomic Radius | Greater Ionization Energy | Lower Electronegativity |
|-----------|----------------------|---------------------------|-------------------------|
| a. Li, K | | | |
| b. C, F | | | |
| c. Mg, Ca | | | |
| d. O, S | | | |
34. The outermost energy level configurations for the theoretical elements A–E are listed below. Use the symbols A through E to answer each of the questions that follow.
 A = $3s^2$ B = $3s^1$ C = $2s^2 2p^6$ D = $2s^2 2p^5$ E = $2s^2 2p^3$
- a. Which has the lowest first ionization energy?
 b. Which is a noble gas?
 c. Which has the highest electronegativity?
 d. Which has the highest second ionization energy?
 e. Which is the largest atom?

D. Essay

Write a short essay for the following statement.

35) Explain why elements with high first ionization energies typically also have high electronegativity values.