

- B 1. Which statement best describes Group 2 elements as they are considered in order from top to bottom of the Periodic Table?
- (A) The number of principal energy levels increases, and the number of valence electrons increases.
 (B) The number of principal energy levels increases, and the number of valence electrons remains the same.
 (C) The number of principal energy levels remains the same, and the number of valence electrons increases.
 (D) The number of principal energy levels remains the same, and the number of valence electrons decreases.
- C 2. What is the total number of valence electrons in an atom of boron in the ground state?
- (A) 1 (C) 3
 (B) 7 (D) 5
- C 3. What is the total number of valence electrons in an atom of xenon, Xe?
- (A) 0 (C) 8
 (B) 2 (D) 18
- C 4. The elements calcium and strontium have similar chemical properties because they both have the same
- (A) atomic number
 (B) mass number
 (C) number of valence electrons
 (D) number of completely filled sublevels
- A 5. On the Periodic Table of the Elements, all the elements within Group 16 have the same number of
- (A) valence electrons (C) protons
 (B) energy levels (D) neutrons
- B 6. An element with a partially filled d sublevel in the ground state is classified as
- (A) a halogen (C) an alkali metal
 (B) a transition metal (D) an alkaline earth metal
- C 7. Which electron configuration represents a transition element?
- (A) $1s^2 2s^2 2p^5$ (C) $[\text{Ar}]3d^5 4s^2$
 (B) $[\text{Ne}]3s^2$ (D) $[\text{Ar}]3d^{10} 4s^2 4p^6$
- C 8. Which element in Period 5 of the Periodic Table is a transition element?
- (A) Sr (C) Ag
 (B) Sb (D) Xe
- B 9. Which of the following atoms has the largest atomic radius?
- (A) Na (C) Mg
 (B) K (D) Ca
- D 10. Which noble gas has the highest first ionization energy?
- (A) radon (C) neon
 (B) krypton (D) helium

- A 11. Which sequence of elements is arranged in order of decreasing atomic radii?
- (A) Al, Si, P (C) Cl, Br, I
 (B) Li, Na, K (D) N, C, B
- A 12. Which list of elements from Group 2 on the Periodic Table is arranged in order of increasing atomic radius?
- (A) Be, Mg, Ca (C) Ba, Ra, Sr
 (B) Ca, Mg, Be (D) Sr, Ra, Ba
- B 13. As each successive element in Group 15 of the Periodic Table is considered in order of increasing atomic number, the atomic radius
- (A) decreases (C) remains the same
 (B) increases
- A 14. The strength of an atom's attraction for the electrons in a chemical bond is the atom's
- (A) electronegativity (C) heat of reaction
 (B) ionization energy (D) heat of formation
- D 15. Which properties are most common in nonmetals?
- (A) low ionization energy and low electronegativity
 (B) low ionization energy and high electronegativity
 (C) high ionization energy and low electronegativity
 (D) high ionization energy and high electronegativity
- D 16. Which Group 17 element has the least attraction for electrons?
- (A) F (C) Br
 (B) Cl (D) I
- D 17. Which element in Group 16 has the greatest tendency to gain electrons?
- (A) Te (C) S
 (B) Se (D) O
- A 18. The Group 17 element with the highest electronegativity is
- (A) fluorine (C) bromine
 (B) chlorine (D) iodine
- A 19. As the elements of Group 1 on the Periodic Table are considered in order of increasing atomic radius, the ionization energy of each successive element generally
- (A) decreases (C) remains the same
 (B) increases
- A 20. The amount of energy required to remove the outermost electron from a gaseous atom in the ground state is known as
- (A) first ionization energy (C) conductivity
 (B) activation energy (D) electronegativity
- C 21. Which element is a member of the halogen family?
- (A) K (C) I
 (B) B (D) S

D 22. Which of the following Group 2 elements has the lowest first ionization energy?

- (A) Be (C) Ca
(B) Mg (D) Ba

D 23. As elements of Group 1 of the Periodic Table are considered in order from top to bottom, the ionization energy of each successive element decreases. This decrease is due to

- (A) decreasing radius and decreasing shielding effect
(B) decreasing radius and increasing shielding effect
(C) increasing radius and decreasing shielding effect
(D) increasing radius and increasing shielding effect

B 24. Which sequence correctly places the elements in order of increasing ionization energy?

- (A) $H \rightarrow Li \rightarrow Na \rightarrow K$ (C) $O \rightarrow S \rightarrow Se \rightarrow Te$
(B) $I \rightarrow Br \rightarrow Cl \rightarrow F$ (D) $H \rightarrow Be \rightarrow Al \rightarrow Ga$

A 25. Compared to the atomic radius of a sodium atom, the atomic radius of a magnesium atom is smaller. The smaller radius is primarily a result of the magnesium atom having

- (A) a larger nuclear charge
(B) a smaller nuclear charge
(C) more principal energy levels
(D) fewer principal energy levels

C 26. Which of these elements has the least attraction for electrons in a chemical bond?

- (A) oxygen (C) nitrogen
(B) fluorine (D) chlorine

D 27. The ability of carbon to attract electrons is

- (A) greater than that of nitrogen, but less than that of oxygen
(B) less than that of nitrogen, but greater than that of oxygen
(C) greater than that of nitrogen and oxygen
(D) less than that of nitrogen and oxygen

C 28. As the elements Li to F in Period 2 of the Periodic Table are considered in succession, how do the relative electronegativity and the covalent radius of each successive element compare?

- (A) The relative electronegativity decreases, and the atomic radius decreases.
(B) The relative electronegativity decreases, and the atomic radius increases.
(C) The relative electronegativity increases, and the atomic radius decreases.
(D) The relative electronegativity increases, and the atomic radius increases.

A 29. Which diagram correctly shows the relationship between electronegativity and atomic number for the elements of Period 3?

