

1. Metallic bonding occurs best when the atoms have _____ electrons in their outer shell.
- (A) 4 or more
(B) 1,2, or 7
(C) Less than 4
(D) 2 to 5
2. Metallic bonding entails atoms _____.
- (A) taking electrons from a sea of electrons
(B) sharing electrons with a sea of electrons
(C) releasing electrons into a sea of electrons
(D) surrounding a sea of electrons
3. Metal atoms are arranged as _____.
- (A) metal ions in rows and columns
(B) pairs of metal ions arranged in alternating directions
(C) individual groups of metal ions arranged in a circular pattern
(D) sheets of metal ions intersecting other sheets perpendicularly
4. The reason boron is not considered a metal is that _____.
- (A) boron has only three valence electrons
(B) boron will not release its electrons into a sea of electrons
(C) boron's electronegativity value is only 2.0
(D) boron's nucleus does not have enough protons to sufficiently attract any released electrons
5. The reasons tin, lead, and bismuth form metallic bonds includes all of the following except:
- (A) Tin, lead, and bismuth have fewer protons to hold the electron in their orbits.
(B) The outer electrons for tin, lead, and bismuth are far from the nucleus.
(C) The outer electrons are repelled by electrons in the inner rings.
(D) The outer electrons represent a small fraction of the total number of electrons.
6. Shell 3 can handle more than 8 electrons, 10 more electrons to be exact. These 10 elements are the _____.
- (A) softer metals
(B) extended metals
(C) harder metals
(D) transition metals
7. Which of these statements about electron orbits is untrue?
- (A) Each larger electron orbit requires more energy in the electron to orbit there.
(B) Each orbit has subshells.
(C) The number of the shell indicates how many subshells that orbit has.
(D) The order of the subshells is s, p, d, f, g, h, and each subshell is filled highest energy first.

8. Which of these statements about subshells is untrue?

- (A) The s subshell can hold four electrons.
- (B) The p subshell can hold six electrons.
- (C) The d subshell can hold ten electrons.
- (D) The f subshell can hold 14 electrons.

9. Shell 4 begins to receive electrons before Shell 3 has completely filled up because _____.

- (A) of Shell 4's peculiar shaped orbit
- (B) some of Shell 3's electrons repel other Shell 3 electrons into Shell 4
- (C) the electrons in ring 4 have too much energy to fit into Shell 3
- (D) some of Shell 4's subshell have a lower energy than some of Shell 3's subshells

10. Which statement is true?

- (A) An electron needs the same energy to orbit in Shell 3 of magnesium as it does to orbit in Shell 3 of sulfur.
- (B) In a shell completely filled with electrons, the electrons orbit in pairs, one electron spinning in one direction and the other spinning in the opposite direction.
- (C) An electron in Shell 1 needs to absorb less energy to jump up to Shell 2 than an electron in Shell 5 does to jump up to Shell 6.
- (D) In order to hold onto the outermost electrons, the nucleus must exert a greater attractive force on them.

11. Electrons can jump from a lower energy level to a higher energy level, but _____.

- (A) they can only jump to the next higher energy level; they cannot skip energy levels
- (B) they cannot jump back down to the same energy level they started from
- (C) they must jump to the lowest open energy level
- (D) they must have the exact amount of energy needed to reach the higher energy level

12. An atom with the electron configuration of $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^2 4p^6$ _____.

- (A) has ten electrons in its 3d subshell
- (B) has completely filled its Shell 4
- (C) needs two more electrons to fill its 4p subshell
- (D) will add the next electron to its 4d subshell

13. Which rule governing electrons is untrue?

- (A) Electrons must enter an empty slot before a half-filled slot
- (B) Electrons must fill the highest energy slot first
- (C) Electrons in half-filled slots must spin in the same direction
- (D) Electrons in the same slot must spin in opposite directions

14. Which statement is untrue? Atoms with low electron affinities and high ionization energies:

- (A) are electrically unstable
- (B) resist adding an electron
- (C) resist the removal of an electron
- (D) have half-filled subshells