

1. Which statement is true?

- (A) The atomic number indicates the number of protons and neutrons in the nucleus.
- (B) The atomic number indicates the number of electrons in an ion.
- (C) Changing the number of ions changes the element.
- (D) The valence electrons are the electrons in the outermost ring (or shell).

2. Changing the number of protons in the nucleus changes \_\_\_\_\_. (Choose the best answer.)

- (A) the element
- (B) the atomic weight
- (C) the atomic number
- (D) all the above

3. The atomic number \_\_\_\_\_.

- (A) refers to the number of protons and neutrons in the nucleus
- (B) refers to the number of protons in the nucleus
- (C) refers to the number of neutrons in the nucleus
- (D) refers to the molecular weight of an atom

4. Which statement about ionic bonds is untrue?

- (A) Ionic bonds involve one atom giving one or more electrons from an inner ring to another atom.
- (B) Ionic bonds are how sodium combines with chlorine.
- (C) An ionic bond between two atoms makes each atom ionic.
- (D) Ionic bonds keep atoms together because one atom becomes electrically positive and the other electrically negative.

5. The reason sodium and chlorine form crystals is that \_\_\_\_\_.

- (A) they immediately shed energy when bonding into sodium chloride molecules
- (B) they lose ionization energy when forming crystals
- (C) they shed lattice energy when forming crystals
- (D) they gain polarity when bonding into sodium chloride molecules

6. Which statement is untrue?

Sodium chloride molecules form crystals \_\_\_\_\_.

- (A) because of their polarity
- (B) and change from molecules to formula units
- (C) with properties similar to the properties of sodium and chloride atoms
- (D) that easily crack when struck

7. Crystals crack easily because

\_\_\_\_\_.

- (A) vibrations in the crystal lattice shatter the crystal
- (B) of their high lattice energy
- (C) electrons around sodium ions repel electrons around chloride ions
- (D) sodium ions are brought next to sodium ions and chloride ions next to chloride ions

8. Ionic bonding can be predicted using

\_\_\_\_\_.

- (A) the periodic table
- (B) Pauling's ionic force chart
- (C) Pauling's electronegativity chart
- (D) Pauling's valence chart

9. The easiest way to change an atom of one element into an atom of another element is to \_\_\_\_\_.

- (A) change the number of protons in the nucleus
- (B) change the number of neutrons in the nucleus
- (C) change the number of electrons in the nucleus
- (D) change the number of valence electrons

10. Which statement is untrue?

- (A) Each column of the periodic table refers to the number of valence electrons.
- (B) Each row of the periodic table refers to the ring around the nucleus.
- (C) Atoms at the end of each row in the periodic table have 8 electrons in their outer ring.
- (D) In each row of the periodic table, atomic diameter increases as protons are added.

11. How many electrons does chlorine have in its outer shell?

- (A) 5
- (B) 6
- (C) 7
- (D) 8

12. Ionic bonds tend to form \_\_\_\_\_.

- (A) crystals with low melting points that crack easily
- (B) crystals with high melting points that crack easily
- (C) crystals with low melting points that resist mechanical force
- (D) crystals with high melting points that resist mechanical force

13. Which element does not have a filled outer ring?

- (A) Be<sup>2+</sup> (beryllium)
- (B) Na (sodium)
- (C) Cl<sup>-</sup> (chlorine)
- (D) Ne (neon)

14. When Na and Cl ions join a growing crystal of sodium chloride, \_\_\_\_\_.

- (A) both atoms shed ionization energy
- (B) both atoms shed lattice energy
- (C) both atoms shed electron affinity energy
- (D) both atoms shed electronegativity

15. A negative chlorine ion has the same number of electrons as an argon atom and a positive potassium ion. The chlorine atom is the largest atom because \_\_\_\_\_.

- (A) chlorine has the fewest protons.
- (B) the potassium ion has most protons.
- (C) the argon atom, being electrically neutral, is able to maintain its size.
- (D) chlorine's nucleus has the fewest neutrons.

16. Which element has the highest ionization energy?

- (A) Cl (chlorine)
- (B) Br (bromine)
- (C) Na (sodium)
- (D) K (potassium)

17. Which element has the lowest ionization energy?

- (A) Li (lithium)
- (B) K (potassium)
- (C) Cl (chlorine)
- (D) Br (bromine)

18. Electron affinity is the energy shed when an atom \_\_\_\_\_.

- (A) bonds ionically with another atom
- (B) gains an electron to become an ion
- (C) loses an electron to become an ion
- (D) passes through a positive electrical field

19. Which element has a high ionization energy and a high negative electron affinity?

- (A) Li (lithium)
- (B) K (potassium)
- (C) Cl (chlorine)
- (D) Ne (neon)

20. In Row 2 of the periodic table (Li, Be, B, C, N, O, F, Ne), lithium and beryllium have a larger \_\_\_\_\_ than nitrogen, oxygen, fluorine, and neon.

- (A) atomic number
- (B) ionization energy
- (C) electron affinity
- (D) atomic radius

21. Which atom is the smaller atom in a crystal of sodium chloride (NaCl)?

- (A) neutral sodium atom
- (B) positive sodium ion
- (C) neutral chlorine atom
- (D) negative chloride ion