Module 2  Atomic Structure & Chemical Bonding

1. Ions are
   A) charged atoms (or groups of atoms).
   B) electrons.
   C) neutrons.
   D) electrodes.

2. A cation is a
   A) negatively charged ion.
   B) positively charged ion.
   C) negative electrode.
   D) positive electrode.

3. An anion is a
   A) negatively charged ion.
   B) positively charged ion.
   C) negative electrode.
   D) positive electrode.

4. Which of the following types of electromagnetic radiation has the highest energy?
   A) gamma rays
   B) infrared rays
   C) radio waves
   D) ultraviolet rays

5. Based upon the experiments of his co-workers, Rutherford proposed that
   A) atoms are mostly empty space.
   B) most of the mass of atoms is located in a dense, small volume nucleus.
   C) the nucleus is positively charged.
   D) all of the above.

6. Relative to the mass of the nucleus of an atom, the mass of the electron is
   A) always much smaller.
   B) always much larger.
   C) about the same.
   D) dependent upon the element.

7. The charge on the nucleus of a sodium atom is
   A) 0.
   B) 1+.
   C) 11+.
   D) 23+. 
8. The number of protons in an atom is called the
   A) atomic mass.
   B) atomic number.
   C) atomic weight.
   D) mass number.

9. Isotopes are atoms of the same element with
   A) different numbers of neutrons.
   B) different numbers of electrons.
   C) different numbers of protons.
   D) different atomic numbers.

10. How many protons are there in a silver atom?
    A) 16
    B) 38
    C) 47
    D) 79

11. The specific pattern of colors emitted by excited atoms is called a
    A) rainbow.
    B) line spectrum.
    C) continuous spectrum.
    D) cathode ray.

12. In attempting to explain the line spectrum of hydrogen, Bohr suggested that the energy of electrons in atoms is
    A) zero.
    B) infinite.
    C) continuous.
    D) quantized.

13. A horizontal row in the modern periodic table is called a
    A) period.
    B) group.
    C) branch.
    D) valence.

14. Which element is a nonmetal?
    A) calcium
    B) iron
    C) iodine
    D) mercury
15. The inertness of the noble gases is due to
A) the unique structure of their nuclei.
B) the special number of protons and neutrons.
C) the bonds they form with other elements.
D) the number and arrangement of their electrons.

16. A sodium ion, Na\(^+\), has the same electron configuration as a(n)
A) sodium atom.
B) chlorine atom.
C) neon atom.
D) argon atom.

17. The number of electrons in a chloride ion, Cl\(^-\), is
A) 16.
B) 17.
C) 18.
D) 35.

18. An electron-dot structure is a convenient method of representing
A) valence electrons of an atom.
B) core electrons of an atom.
C) all electrons of the atom.
D) the complete electron configuration of the atom.

19. The attraction between positive and negative ions is known as
A) covalent bonds.
B) crystal bonds.
C) ionic bonds.
D) molecular bonds.

20. An ionic bond is formed when electrons are
A) transferred.
B) shared.
C) split.
D) destroyed.

21. How many electrons are there in a double bond?
A) 1
B) 2
C) 4
D) 6

22. Covalent bonds generally form between
A) ions.
B) metals.
C) metals and nonmetals.
D) nonmetals.

23. What is the name of the compound with the formula CCl₄?
A) carbon chloride
B) carbon(IV) chloride
C) chlorine carbonide
D) carbon tetrachloride

24. Which substance has polar covalent bonds?
A) O₂
B) NH₃
C) Cl₂
D) Ca₂C

25. When two chlorine atoms combine with each other, the bond that forms is
A) ionic.
B) polar covalent.
C) nonpolar covalent.
D) ionic covalent.

26. In a polar covalent bond, electrons are
A) shared equally.
B) shared unequally.
C) transferred.
D) uncharged.