

**True/False.** *True = + and False = o.*

*If the statement is false, change the wording to make it true.*

- \_\_\_ 1. Sodium (metal) and chlorine (non-metal) form ions and an ionic bond holds them together.
- \_\_\_ 2. Atoms can only form chemical bonds by either gaining or losing electrons.
- \_\_\_ 3. Since oxygen has a valence of 6 it only needs to gain 2 more electrons to be stable.
- \_\_\_ 4. All of these substances possess covalent bonds: CH<sub>4</sub>, CO<sub>2</sub>, NaCl, H<sub>2</sub>O
- \_\_\_ 5. When an atom loses electrons it becomes a positive ion or cation.
- \_\_\_ 6. When an atom gains electrons it becomes a negative ion or anion
- \_\_\_ 7. Electrons are shared unequally in a polar covalent bond.
- \_\_\_ 8. Hydrogen has only 1 electron in the first shell although it could hold 2 electrons.
- \_\_\_ 9. Potassium forms an ion with a +1 charge.
- \_\_\_ 10. Ions are particles with an electric charge
- \_\_\_ 11. All cations have the same positive charge.
- \_\_\_ 12. Table salt, NaCl, is an example of an ionic substance.
- \_\_\_ 13. Atoms like magnesium in Group 2 usually form an ion with a minus 2 charge.
- \_\_\_ 14. Calcium usually forms ions with a +2 charge.
- \_\_\_ 15. Al<sup>3+</sup> and Cl<sup>1-</sup> form a substance with the formula Al<sub>3</sub>Cl
- \_\_\_ 16. Cations are formed when a particle gains electrons
- \_\_\_ 17. In forming a water molecule, the hydrogen atoms and oxygen atom share the electrons equally.
- \_\_\_ 18. The octet rule helps predict the number of electrons an atom will gain or lose.
- \_\_\_ 19. The metals typically form ions with a positive charge.
- \_\_\_ 20. Chlorine has seven valence electrons and forms a Cl<sup>1-</sup> ion
- \_\_\_ 21. Hydroxide ions are OH<sup>1-</sup> ions

### Multiple Choice.

22. In reactions to form ionic compounds, metals generally
- lose electrons
  - gain electrons
  - become non-metals
  - do not react
23. A covalent bond is formed when a pair of electrons is
- transferred
  - shared
  - split
  - destroyed
24. Which substance has ionic bonds?
- $K_2S$
  - $SO_3$
  - $CCl_4$
  - $N_2$
25. Which copper is in the compound  $Cu(NO_3)_2$ ?
- Copper I
  - Copper II
  - Copper III
  - Copper IV
26. When magnesium combines with oxygen, the bond formed is best classified as
- ionic
  - nonpolar covalent
  - polar covalent
  - metallic
27. Compound that is composed of two elements
- Binary compound
  - chemical bond
  - hydrate
  - ion
28. Each metal in Group 2 on the periodic table loses both its outer electrons in bonding, so each has an oxidation number of
- 0
  - 1+
  - 2+

29. Covalent bonds are formed by \_\_\_\_.
- the attraction between ions
  - loss and gain of electrons
  - production of electrons
  - sharing of electrons
30. An example of a binary compound is \_\_\_\_.
- $O_2$
  - $CaCl_2$
  - $H_2SO_4$
  - $Cu(NO_3)_2$
31. A(n) \_\_\_\_ indicates how many electrons an atom will gain, lose, or share when bonding.
- chemical symbol
  - chemical formula
  - periodic property
  - oxidation number
32. The oxidation number of Fe in  $Fe_2S_3$  is \_\_\_\_.
- 1+
  - 2+
  - 3+
  - 4+
33. The name  $CuO$  is \_\_\_\_.
- copper oxide
  - copper(I) oxide
  - copper(II) oxide
  - copper(III) oxide
34. The formula for copper(II) chlorate is \_\_\_\_.
- $Cu(ClO_3)_2$
  - $CuCl$
  - $CuCl_2$
  - $CuClO_3$
35. The number of electrons in the outer energy level of Group 17 elements is \_\_\_\_.
- 1
  - 2
  - 17
  - 7
36. An atom that has gained an electron is a \_\_\_\_.
- negative ion
  - positive ion
  - polar molecule
  - nonpolar molecule

37. The \_\_\_\_\_ for any compound tells what elements it contains and the ratio those elements.  
chemical symbol  
chemical formula  
oxidation number  
periodic property

38. A \_\_\_\_\_ is a force that holds together the atoms in a substance.  
chemical bond  
oxidation number  
binary compound  
polyatomic ion

39. How many dots are to be around He in its Lewis structure?  
1  
2  
8

40. The sum of the oxidation numbers in a neutral compound is always \_\_\_\_.  
a negative number  
a positive number  
zero

41. What is the total number of atoms in the following compounds?  
Ca(ClO<sub>3</sub>)<sub>2</sub>                      (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub>                      Zn(NO<sub>3</sub>)<sub>2</sub>

42. Identify the type of bond that each compound below would form (ionic or covalent).  
Potassium iodide                      aluminum sulfide                      MgCl<sub>2</sub>                      H<sub>2</sub>O                      N<sub>2</sub>

43. What is the oxidation number of Cu in CuO?

44. What is the oxidation number of Mn in MnCl<sub>2</sub>?

45. What is the oxidation number of phosphorus in H<sub>3</sub>PO<sub>4</sub>?

46. Write the correct formula for each of the following compounds.  
sodium hydroxide                      calcium chloride                      iron(II) sulfate                      lead (IV) phosphate

47. Write the correct chemical name for each of the following compounds.  
CaBr<sub>2</sub>                      CuCl                      K<sub>2</sub>CO<sub>3</sub>                      Al<sub>2</sub>(Cr<sub>2</sub>O<sub>7</sub>)<sub>3</sub>

48. What percent composition of copper is found in Cu(NO<sub>3</sub>)<sub>2</sub>?