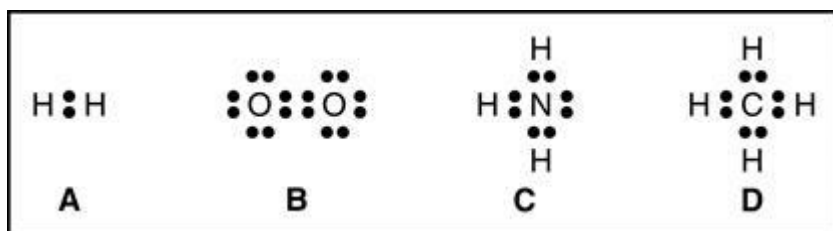


Unit 3 Test – Chemical Bonding and Nomenclature

- 1 In a water molecule, oxygen has two shared pairs of electrons and two unshared pairs of electrons, which bond with one valence electron in hydrogen. The arrangement of the valence electrons for oxygen and hydrogen when they bond show that the Lewis dot structure represents

A. a bent shape.
B. a linear shape.
C. a trigonal planar shape.
D. a tetrahedral shape.

- 2 The diagrams in the box represent the Lewis dot structures for different molecules.



Which molecule would be polar based on its Lewis dot structure?

A. A
B. B
C. C
D. D

- 3 Metallic bonding allows relatively free movement of electrons between atoms. This bonding results in the malleability of substances. A sample of which substance would MOST likely exhibit malleability?

A. ozone (O_3)
B. copper (Cu)
C. sodium chloride (NaCl)
D. hydrogen peroxide (H_2O_2)

- 4 The formation of an ionic bond involves the

A. transfer of electrons.
B. sharing of neutrons.
C. transfer of neutrons.
D. sharing of protons.

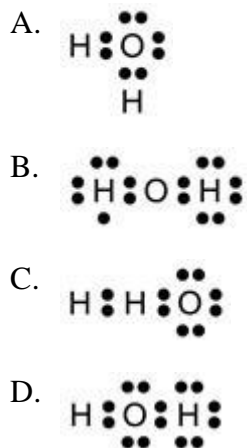
- 5 Which of the following is true about metallic bonds?

A. Electrons are highly stable.
B. Electrons are delocalized.
C. Electrons of metals are always shared.
D. Electrons are strongly attracted to the nucleus.

Unit 3 Test – Chemical Bonding and Nomenclature

- 6 How does a single covalent bond between two carbon atoms compare to a double covalent bond between two carbon atoms?
- A. A single covalent bond is stronger and has a longer bond length than a double covalent bond.
 - B. A single covalent bond is stronger and has a shorter bond length than a double covalent bond.
 - C. A single covalent bond is weaker and has a shorter bond length than a double covalent bond.
 - D. A single covalent bond is weaker and has a longer bond length than a double covalent bond.
- 7 A bond is formed when an electron is transferred from a sodium atom to a chlorine atom. What happens to the sodium atom during this process?
- A. The mass of the atom increases.
 - B. The atom becomes an isotope.
 - C. The atomic number decreases.
 - D. The atom becomes a positive ion.

- 8 Which of the following shows an acceptable way to illustrate the electron dot formula for water?



- 9 Which property allows carbon to form a variety of long-chain polymers?
- A. Carbon has six valence electrons used in multiple bonds.
 - B. Carbon forms strong ionic bonds with different molecules.
 - C. Carbon has four valence electrons, allowing for multiple bonds.
 - D. Carbon forms both ionic and covalent bonds with other carbon atoms.
- 10 Which molecule contains a triple bond?
- A. F_2
 - B. O_2
 - C. Cl_2
 - D. N_2

Unit 3 Test – Chemical Bonding and Nomenclature

- 11 Electronegativity values for elements in Group 1A are much lower than the values for elements in Group 7A. What type of bond forms if an element from Group 1A bonds with an element from Group 7A?
- A. ionic bond
 - B. hydrogen bond
 - C. polar covalent bond
 - D. nonpolar covalent bond

- 12 Which atom below would be MOST likely to form a compound with magnesium (Mg) in a ratio of one to one?

- A. nitrogen (N)
- B. calcium (Ca)
- C. oxygen (O)
- D. chlorine (Cl)

- 13 The diagram below represents the Lewis dot structure for fluorine.



Which statement BEST describes the Lewis dot structure for fluorine?

- A. Fluorine has a total of seven electrons.
- B. Fluorine generally forms an ion by losing one electron.
- C. Fluorine tends to form seven ionic bonds.
- D. Fluorine has one electron available to form a covalent bond.

- 14 Which statement explains why hydrogen gas, H_2 , ammonia, NH_3 , and ethylene, H_2CCH_2 , are similar?

- A. They all occur only as gases.
- B. They are all ionically bonded.
- C. They are all organic compounds.
- D. They all have covalently bonded elements.

- 15 Which statement describes what occurs when large biomolecules such as glucose ($C_6H_{12}O_6$) form?

- A. Polymerization is initiated.
- B. Oxygen and hydrogen will bond first.
- C. Electrons are shared to form covalent bonds.
- D. Electrons are transferred to form ionic bonds.

- 16 An ionic bond can best be described by which statement?

- A. Elements combined due to a large difference in electronegativity.
- B. Elements combined due to a small difference in electronegativity.
- C. Electrons are shared between all like atoms.
- D. Electrons are transferred within sublevels of an atom.

Unit 3 Test – Chemical Bonding and Nomenclature

- 17** Water moves by capillary action through soil from moist areas to dry areas. Which property of water is MOST responsible for this capillary action?
- A. Water is a polar molecule.
 - B. Water contains an oxygen atom.
 - C. Water has a high surface tension.
 - D. Water has a high specific heat.
- 18** As the dispersion forces of a substance increase, the boiling point of the substance also increases. Which set of noble gases is arranged in order from least to greatest boiling point?
- A. Ar, Kr, Ne, Xe
 - B. Kr, Ne, Xe, Ar
 - C. Ne, Ar, Kr, Xe
 - D. Xe, Kr, Ar, Ne
- 19** Which type of covalent bond is the strongest?
- A. Double
 - B. Triple
 - C. Single
 - D. None of the Above
- 20** Which type of covalent bond is the longest?
- A. Single
 - B. Double
 - C. Triple
 - D. None of the Above
- 21** Hydrogen bonding occurs between all of the following elements except:
- A. Chlorine
 - B. Fluorine
 - C. Nitrogen
 - D. Oxygen
- 22** Which statement best describes London dispersion forces?
- A. A universal force between all things composed of protons and neutrons
 - B. The strongest type of force
 - C. The weakest type of bond
 - D. A weak attraction between the electrons of one molecule and the protons of another molecule

Unit 3 Test – Chemical Bonding and Nomenclature

- 23** Which sequence has the forces listed from strongest to weakest?
- A. London Dispersion Forces, Hydrogen Bonding, Dipole-Dipole
 - B. Dipole-Dipole, London Dispersion Forces, Hydrogen Bonding
 - C. Hydrogen Bonding, Dipole-Dipole, London Dispersion Forces
 - D. Hydrogen Bonding, London Dispersion Forces, Dipole-Dipole
- 24** Which statement best describes why forces are weaker than bonds?
- A. Forces are weaker because they energy is dispersed among a greater number of electrons
 - B. Forces are a relatively new discovery which leads to them being misunderstood
 - C. Forces do not have the electron – proton interaction of a compound
 - D. Forces do not have electrons moving from one atom to another within a compound
- 25** Based on the positions of the elements on the periodic table, what is the chemical formula of aluminum sulfide?
- A. AlS
 - B. Al_2S
 - C. Al_2S_3
 - D. Al_3S_2
- 26** What is the IUPAC name of a compound with the chemical formula of $Mn_2(SO_3)_3$?
- A. dimanganese trisulfite
 - B. manganese(III) sulfite
 - C. trimanganese disulfide
 - D. manganese(II) sulfide
- 27** What is the correct name for the compound whose formula is Fe_2O_3 ?
- A. iron oxide
 - B. iron trioxide
 - C. iron(II) oxide
 - D. iron(III) oxide

Unit 3 Test – Chemical Bonding and Nomenclature

- 28 What is the chemical formula of magnesium fluoride?
- A. MgF
 - B. MgF_2
 - C. MgF_3
 - D. Mg_2F_2
- 29 What is the correct name for the compound whose formula is Na_2SO_4 ?
- A. disodium sulfate
 - B. sodium sulfoxide
 - C. sodium sulfate
 - D. sodium sulfite
- 30 What is the chemical formula of copper (I) sulfate?
- A. CuSO_4
 - B. Cu_2SO_4
 - C. $\text{Cu}(\text{SO}_4)_2$
 - D. $\text{Cu}_2(\text{SO}_4)_2$
- 31 What is the IUPAC name for the compound N_2O_3 ?
- A. nitric oxide
 - B. nitrous oxide
 - C. dinitrogen trioxide
 - D. trioxygen dinitride
- 32 What is the chemical formula of cobalt (II) hydroxide?
- A. $\text{Co}(\text{OH})_2$
 - B. $\text{CO}_2(\text{OH})$
 - C. CoH_2
 - D. $\text{Co}_2\text{H}_2\text{O}$
- 33 What is the IUPAC name of the compound whose formula is $(\text{NH}_4)_3\text{PO}_4$?
- A. ammonium phosphate
 - B. triammonium monophosphate
 - C. triammonium phosphate
 - D. ammonium phosphide
- 34 What is the IUPAC name for the compound with a chemical formula B_6Si ?
- A. hexasilicide boron
 - B. boron heptasilicide
 - C. hexaboron monosilicide
 - D. boron heptasilicon

Unit 3 Test – Chemical Bonding and Nomenclature

35. What is the chemical formula of a compound with the IUPAC name of aluminum cyanide?
- A. $\text{Al}(\text{CN})_3$
 - B. AlCN
 - C. Al_3CN
 - D. Al_3CN_3
36. Which of the following BEST explains the relationship between electrons and thermal conductivity in metals?
- A. Electrons move slower, which allows for thermal conductivity.
 - B. Electrons are less concentrated to allow for increased thermal conductivity.
 - C. Electrons form weak covalent bonds to allow for thermal conductivity.
 - D. Electrons are delocalized, which allows for thermal conductivity.
37. How are compounds with metallic bonds similar to ionic compounds?
- A. Both tend to have double and triple bonds.
 - B. Both tend to have low boiling points.
 - C. Both tend to have poor conductivity.
 - D. Both tend to have high melting points.
38. Metal atoms exist as a lattice of metal ions, which have lost their outer electrons only temporarily. When the electrons are loose, they all repel. Which of the following properties does this temporary repelling by electrons address?
- A. It helps explain the behavior of all atoms.
 - B. It helps explain the electron interaction with protons.
 - C. It helps explain how metals conduct electricity.
 - D. It helps explain why metals bond.
39. Which substance, when mixed with water, will produce the BEST conductor of electricity?
- A. table salt
 - B. granulated sugar
 - C. carbon dioxide
 - D. motor oil
40. Why do blacksmiths place metal into a fire before pounding it into shape to form horseshoes?
- A. The heat creates a more consistently blended metal alloy.
 - B. The fire combines the metallic atoms into a strong lattice structure.
 - C. The fire makes it easier to stretch metal before bending it into the shape of a horseshoe.
 - D. The heat increases electron activity, which increases the malleability of the metal.

Unit 3 Test – Chemical Bonding and Nomenclature

41. Which statement BEST explains why metals are ductile and malleable?
- A. Delocalized electrons shared in metal atoms form weak bonds that are easy to break.
 - B. The individual metallic atoms are stable and allow metals to be formed into various shapes.
 - C. The positive and negative ions in the metal can easily break local bonds and then form new ones.
 - D. Delocalized electrons in metallic bonds allow metal atoms to slide past one another instead of breaking the bonds.
42. All the following are properties of ionic bonds except:
- A. Conductive when melted or dissolved
 - B. High Melting and Boiling Point
 - C. High insulative properties
 - D. Brittle
43. All the following are properties of covalent bonding except:
- A. Poor electrical conductivity
 - B. Low Melting and Boiling Points
 - C. Mostly solid at room temperature
 - D. Polar Nature
44. All the following are properties of metallic bonding except:
- A. Low Melting and Low Boiling Point
 - B. High Conductivity
 - C. Malleability
 - D. Luster
45. Water, Graphite/Diamond, Polymers, and Proteins are all examples of:
- A. Macromolecules
 - B. Network Solids
 - C. Both A and B
 - D. Neither

Bonus – 1 Point Each, Fill in the Blank

1. $\frac{238}{92} \text{U} \rightarrow \text{_____} + \frac{4}{2} \text{He}$
2. $\frac{231}{53} \text{I} \rightarrow \text{_____} + \frac{0}{-1} \text{e}$
3. $\frac{238}{92} \text{U} \rightarrow \text{_____} + \frac{0}{0} \gamma$
4. $\frac{208}{84} \text{Po} \rightarrow \text{_____} + \frac{4}{2} \text{He}$
5. $\frac{66}{29} \text{Cu} \rightarrow \text{_____} + \frac{0}{-1} \text{e}$