

Unit 3: Molecule Structure & Bonding Test

70 points

Multiple Choice (2 points each)

Identify the letter of the choice that best completes the statement or answers the question.

- B 1. Why do atoms share electrons in covalent bonds?
- to become ions and attract each other
 - to attain a noble-gas electron configuration
 - to become more polar
 - to increase their atomic numbers
- D 2. Which of the following diatomic molecules is joined by a polar covalent bond?
- H₂
 - O₂
 - He₂
 - None of the above
- B 3. A molecule with a single covalent bond is ____.
- CO₂
 - Cl₂
 - CO
 - N₂
- D 4. In which of the following compounds is the octet expanded to include 12 electrons?
- H₂S
 - PCl₃
 - PCl₅
 - SF₆
- A 5. According to VSEPR theory, molecules adjust their shapes to keep which of the following as far apart as possible?
- pairs of valence electrons
 - inner shell electrons
 - mobile electrons
 - the electrons closest to the nuclei
- A 6. What causes water molecules to have a bent shape, according to VSEPR theory?
- repulsive forces between unshared pairs of electrons
 - interaction between the fixed orbitals of the unshared pairs of oxygen
 - ionic attraction and repulsion
 - the unusual location of the free electrons
- D 7. What is the shape of a molecule with a triple bond?
- tetrahedral
 - pyramidal
 - bent
 - linear
- C 8. A bond formed between a silicon atom and an oxygen atom is likely to be ____.
- ionic
 - coordinate covalent
 - polar covalent
 - nonpolar covalent
- A 9. Which of the following covalent bonds is the **type** polar?
- H—Cl
 - H—C
 - H—H
 - H—N
- A 10. How many valence electrons are in an atom of magnesium?
- 2
 - 3
 - 4
 - 5
- A 11. How many valence electrons does a helium atom have?
- 2
 - 3
 - 4
 - 5
- A 12. The octet rule states that, in chemical compounds, atoms tend to have ____.
- the electron configuration of a noble gas
 - more protons than electrons

- c. eight electrons in their principal energy level
d. more electrons than protons
- __A__ 13. How does oxygen obey the octet rule when reacting to form compounds?
a. It gains electrons.
b. It gives up electrons.
c. It does not change its number of electrons.
d. Oxygen does not obey the octet rule.
- __C__ 14. How many valence electrons are transferred from the calcium atom to iodine in the formation of the compound calcium iodide?
a. 0
b. 1
c. 2
d. 3
- __B__ 15. What is the formula for sodium sulfate?
a. NaSO_4
b. Na_2SO_4
c. $\text{Na}(\text{SO}_4)_2$
d. $\text{Na}_2(\text{SO}_4)_2$
- __B__ 16. Which of the following is NOT a characteristic of most ionic compounds?
a. They are solids.
b. They have low melting points.
c. When melted, they conduct an electric current.
d. They are composed of metallic and nonmetallic elements.
- __A__ 17. Covalent bond is a bond between ____.
a. the atoms of a metal and nonmetal
b. the atoms of nonmetals
c. the ions of two different metals
d. the ions of two different nonmetals
- __D__ 18. Which is a typical characteristic of an ionic compound?
a. Electron pairs are shared among atoms.
b. The ionic compound has a low solubility in water.
c. The ionic compound is described as a molecule.
d. The ionic compound has a high melting point.
- __A__ 19. What is shown by the Lewis Structure of a molecule or polyatomic ion?
a. the arrangement of bonded atoms
b. the number of ionic bonds
c. the number of metallic bonds
d. the shapes of molecular orbitals
- __D__ 20. An *-ate* or *-ite* at the end of a compound name usually indicates that the compound contains ____.
a. fewer electrons than protons
b. neutral molecules
c. only two elements
d. a polyatomic anion
- __C__ 21. Which set of chemical name and chemical formula for the same compound is correct?
a. iron(II) oxide, Fe_2O_3
b. aluminum fluoride, AlF_3
c. tin(IV) bromide, SnBr_4
d. potassium chloride, K_2Cl_2
- __C__ 22. What is the correct formula for potassium sulfite?
a. KHSO_3
b. KHSO_4
c. K_2SO_3
d. K_2SO_4
- __C__ 23. In naming a binary molecular compound, the number of atoms of each element present in the molecule is indicated by ____.
a. Roman numerals
b. superscripts
c. prefixes
d. suffixes
- __A__ 24. When naming acids, the prefix *hydro-* is used when the name of the acid anion ends in ____.
a. *-ide*
b. *-ite*
c. *-ate*
d. *-ic*
- __D__ 25. What is the name of H_2SO_3 ?

- a. hyposulfuric acid
b. hydrosulfuric acid
- c. sulfuric acid
d. sulfurous acid
- __D__ 26. Select the correct formula for sulfur hexafluoride.
a. S_2F_6
b. F_6SO_3
- c. F_6S_2
d. SF_6
- __B__ 27. What is the correct name for $Sn_3(PO_4)_2$?
a. tritin diphosphate
b. tin(II) phosphate
- c. tin(III) phosphate
d. tin(IV) phosphate
- __D__ 28. What is the element with the highest electronegativity value?
a. cesium
b. helium
- c. calcium
d. fluorine
- __D__ 29. Which statement is true about electronegativity?
a. Electronegativity is the ability of an anion to attract another anion.
b. Electronegativity generally increases as you move from top to bottom within a group.
c. Electronegativity generally is higher for metals than for nonmetals.
d. Electronegativity generally increases from left to right across a period.
- __A__ 30. The compound AX_2E_2 has an electron geometry of
a. tetrahedral
b. trigonal pyramid
- c. bent
d. trigonal planar
- __D__ 31. How many bonding domains does compound AX_3E_2 have
a. 1
b. 2
- c. 5
d. 3
- __B__ 32. How many lone pairs of electrons does a See Saw-shaped molecule have?
a. 0
b. 1
- c. 2
d. 3
- __C__ 33. The shape of an ammonia molecule is called _____.
a. linear
b. octahedral
- c. trigonal pyramid
d. T-shaped
- __B__ 34. Which bond would be considered most polar?
a. Cl-Cl
b. C-O
- c. C-N
d. P-O
- __C__ 35. Which element is an exception to the octet rule?
a. carbon
b. oxygen
- c. boron
d. sodium

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Answer Section

MULTIPLE CHOICE

- | | | | | |
|-----|-----------------------------|--|-----------------------------|-------------------|
| 1. | ANS: B
STO: 3.4.10.A.5 | DIF: L2 | REF: p. 217 | OBJ: 8.2.1 |
| 2. | ANS: A
STO: 3.4.10.A.5 | DIF: L2 | REF: p. 221 | OBJ: 8.2.3 |
| 3. | ANS: B
STO: 3.4.10.A.5 | DIF: L2 | REF: p. 222 | OBJ: 8.2.1, 8.2.4 |
| 4. | ANS: D
STO: 3.4.10.A.5 | DIF: L2 | REF: p. 229 | OBJ: 8.2.7 |
| 5. | ANS: A | DIF: L1 | REF: p. 232 | OBJ: 8.3.2 |
| 6. | ANS: A | DIF: L2 | REF: p. 233 | OBJ: 8.3.2 |
| 7. | ANS: D
STO: 3.4.10.A.5 | DIF: L2 | REF: p. 235 | OBJ: 8.3.3 |
| 8. | ANS: C
OBJ: 8.1.1, 8.4.1 | DIF: L2
STO: 3.4.10.A.5 | REF: p. 238, p. 239 | |
| 9. | ANS: A
OBJ: 8.4.1 | DIF: L3
STO: 3.4.10.A.5 | REF: p. 238, p. 239 | |
| 10. | ANS: A
STO: 3.4.10.A.1 | DIF: L1 | REF: p. 188 | OBJ: 7.1.1 |
| 11. | ANS: A
STO: 3.4.10.A.1 | DIF: L1 | REF: p. 188 | OBJ: 7.1.1 |
| 12. | ANS: A | DIF: L2 | REF: p. 188 | OBJ: 7.1.2 |
| 13. | ANS: A
STO: 3.4.10.A.5 | DIF: L1 | REF: p. 191 | OBJ: 7.1.4 |
| 14. | ANS: C
STO: 3.4.10.A.5 | DIF: L2 | REF: p. 194 | OBJ: 7.2.1 |
| 15. | ANS: B
OBJ: 7.2.1 | DIF: L2
STO: 3.4.10.A.6 | REF: p. 192, p. 195 | |
| 16. | ANS: B
OBJ: 7.2.2 | DIF: L1
STO: 3.4.10.A.5 | REF: p. 196, p. 198 | |
| 17. | ANS: A
STO: 3.4.10.A.5 | DIF: L1 | REF: p. 201 | OBJ: 7.2.1, 7.3.1 |
| 18. | ANS: D
STO: 3.4.10.A.5 | DIF: L2 | REF: p. 244 | OBJ: 8.1.1 |
| 19. | ANS: A
STO: 3.4.10.A.5 | DIF: L1 | REF: p. 215 | OBJ: 8.1.2 |
| 20. | ANS: D
STO: 3.4.12.A.1 | DIF: L2 | REF: p. 257 | OBJ: 9.1.2 |
| 21. | ANS: C
OBJ: 9.2.1 | DIF: L2
STO: 3.4.10.A.6, 3.4.12.A.1 | REF: p. 261, p. 262 | |
| 22. | ANS: C
OBJ: 9.2.2 | DIF: L2
STO: 3.4.10.A.6 | REF: p. 257, p. 261, p. 262 | |

23. ANS: C DIF: L1 REF: p. 269 OBJ: 9.3.2
STO: 3.4.12.A.1
24. ANS: A DIF: L2 REF: p. 272 OBJ: 9.4.1
STO: 3.4.12.A.1
25. ANS: D DIF: L2 REF: p. 272 OBJ: 9.4.1
STO: 3.4.12.A.1
26. ANS: D DIF: L2 REF: p. 270, p. 278
OBJ: 9.3.2, 9.5.2 STO: 3.4.10.A.6
27. ANS: B DIF: L3 REF: p. 264, p. 277
OBJ: 9.5.3 STO: 3.4.10.A.6
28. ANS: D DIF: L1 REF: p. 177 OBJ: 6.3.3
29. ANS: D DIF: L2 REF: p. 177 OBJ: 6.3.3
STO: 3.4.10.A.1
30. ANS: A
31. ANS: D
32. ANS: B
33. ANS: C
34. ANS: B
35. ANS: C