

Objective Test Section

Identify the choice that best completes the statement or answers the question. There is only one correct answer; please carefully bubble your choice on the scantron sheet.

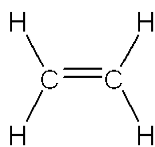
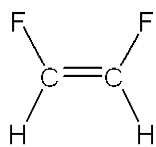
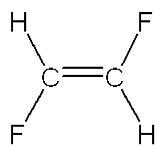
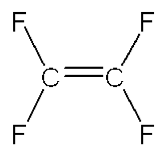
Self Assessment_Ochem I

- _____ 1. How many electrons can the shell with a principal quantum number of 1 hold?
- 1
 - 2
 - 4
 - 8
- _____ 2. How many electrons can the shell with a principal quantum number of 2 hold?
- 1
 - 2
 - 4
 - 8
- _____ 3. What is the ground-state electronic configuration of a nitrogen atom (nitrogen: atomic number 7)?
- $1s^2 2s^1 2p^4$
 - $1s^2 2s^2 2p^3$
 - $1s^1 2s^1 2p^5$
 - $1s^2 2s^2 2p^2$
- _____ 4. What is the ground-state electronic configuration of a fluorine atom (fluorine: atomic number 9)?
- $1s^1 2s^1 2p^7$
 - $1s^2 2s^2 2p^5$
 - $1s^2 2s^2 2p^6$
 - $1s^0 2s^2 2p^7$
- _____ 5. What is the ground-state electronic configuration of a fluoride anion (fluorine: atomic number 9)?
- $1s^2 2s^2 2p^2$
 - $1s^2 2s^2 2p^5$
 - $1s^2 2s^2 2p^6$
 - $1s^2 2s^2 2p^7$
- _____ 6. What is the ground-state electronic configuration of a sodium cation (sodium: atomic number 11)?
- $1s^2 2s^2 2p^6 3s^1$
 - $1s^2 2s^2 2p^5 3s^1$
 - $1s^2 2s^2 2p^6$
 - $1s^2 2s^2 2p^6 3s^2$
- _____ 7. Which of the following species has an atom that has an unfilled valence shell of electrons?
- molecular hydrogen, H_2
 - hydroxide anion, HO^-
 - boron trifluoride, BF_3
 - water, H_2O

- _____ 8. Which of the following species has an atom that has an unfilled valence shell of electrons?
- molecular bromine, Br_2
 - fluoride anion, F^-
 - ammonia, NH_3
 - aluminum trichloride, AlCl_3
- _____ 9. Which of the following species possesses a formal charge?
- CCl_4
 - SiCl_4
 - AlCl_4
 - PCl_3
- _____ 10. Which of the following is trigonal planar?
- boron trifluoride, BF_3
 - methyl anion, CH_3^-
 - methane, CH_4
 - ammonia, NH_3
- _____ 11. Which of the following molecules is not linear?
- H_2O
 - CO_2
 - $\text{HC}\equiv\text{CH}$
 - Cl_2
- _____ 12. What is the approximate value of the H–C–H bond angles in methane, CH_4 ?
- 90°
 - 109°
 - 120°
 - 180°
- _____ 13. What is the approximate H–C–O bond angle in formaldehyde, $\text{H}_2\text{C}=\text{O}$?
- 90°
 - 109°
 - 120°
 - 180°
- _____ 14. Which of the following elements has the highest electronegativity?
- N
 - C
 - O
 - S
- _____ 15. Which of the following elements has the highest electronegativity?
- C
 - P
 - Si
 - Cl

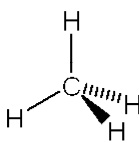
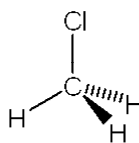
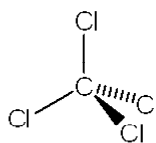
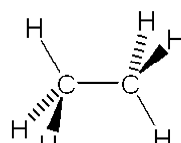
- _____ 16. Which of the following bonds is the most polar?
- F-F
 - H-F
 - C-H
 - C-Si
- _____ 17. Which of the following bonds is the most polar?
- O-H
 - C-H
 - C-C
 - H-H
- _____ 18. Which of the following is a polar covalent bond?
- Na-F
 - C-H
 - C-O
 - Cl-Cl
- _____ 19. Which of the following is a polar covalent bond?
- Na-Cl
 - C-Cl
 - C-H
 - Cl-Cl
- _____ 20. Which of the following is an ionic bond?
- Br-Br
 - C-Cl
 - C-S
 - Na-O
- _____ 21. Which of the following is an ionic bond?
- F-F
 - C-H
 - Li-O
 - C-N
- _____ 22. Which of the following bonds has the smallest dipole moment?
- C-N
 - C-O
 - C-F
 - O-H
- _____ 23. Which of the following bonds has the smallest dipole moment?
- Li-Cl
 - C-H
 - O-H
 - H-Cl

____ 24. Which of the following molecules has a molecular dipole?

**1****2****3****4**

- a. **1**
 b. **2**
 c. **3**
 d. **4**

____ 25. Which of the following molecules has a molecular dipole?

**1****2****3****4**

- a. **1**
 b. **2**
 c. **3**
 d. **4**

____ 26. Which of the following molecules has a molecular dipole?

- a. CO₂
 b. BF₃
 c. NH₃
 d. CH₄

____ 27. Which of the following molecules has a molecular dipole?

- a. H₂O
 b. CO₂
 c. HC≡CH
 d. Cl₂

____ 28. Which of the following best represents the shape of the 2s atomic orbital of carbon?

**1 2 3 4**

- a. **1**
 b. **2**
 c. **3**
 d. **4**

_____ 29. Which of the following best represents the shape of a $2p$ atomic orbital of carbon?



1 2 3 4

- a. **1**
- b. **2**
- c. **3**
- d. **4**

_____ 30. Which of the following best represents an sp^3 hybridized atomic orbital containing the lone pair of electrons of ammonia, NH_3 ?



1 2 3 4

- a. **1**
- b. **2**
- c. **3**
- d. **4**

_____ 31. Which of the following statements is *not* true regarding resonance structures?

- a. All resonance structures must have the same number of electrons
- b. Each atom in all of the resonance structures must have a complete shell of valence electrons
- c. All resonance structures must have the same arrangement of atoms
- d. All resonance structures must be valid Lewis structures

_____ 32. Which of the following statements is *not* true regarding resonance structures?

- a. Each resonance structure is in rapid equilibrium with all of the other structures
- b. The resonance structures may have different energies
- c. All resonance structures must have the same arrangement of atoms
- d. All resonance structures must have the same number of electrons

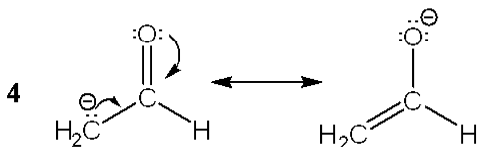
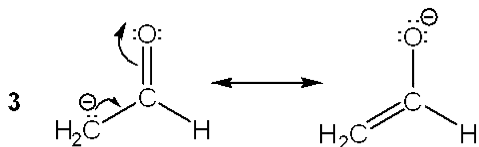
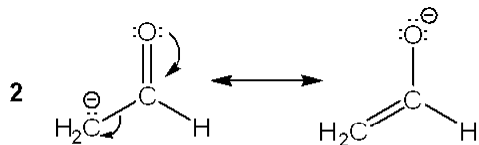
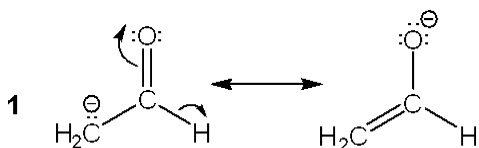
_____ 33. Which of the following statements is *not* true about the carbonate anion, CO_3^{2-} ?

- a. All of the oxygen atoms bear the same amount of charge
- b. All of the carbon-oxygen bonds are the same length
- c. The carbon atom bears the negative charge
- d. It is basic

_____ 34. Which of the following statements is *not* true about the acetate anion, CH_3CO_2^- ?

- a. The oxygen atoms bear the same amount of charge
- b. The two carbon-oxygen bonds are the same length
- c. The carbon atom bears the negative charge
- d. It is basic

- _____ 35. How many electrons are there in the valence shell of the carbon atom of a methyl cation, CH_3^+ ?
- 4
 - 5
 - 6
 - 7
- _____ 36. How many electrons are there in the valence shell of the carbon atom of the methyl anion, CH_3^- ?
- 2
 - 4
 - 6
 - 8
- _____ 37. How many electrons are there in the valence shell of the oxygen atom of water?
- 2
 - 4
 - 6
 - 8
- _____ 38. How many electrons are there in the valence shell of the nitrogen atom of ammonia?
- 4
 - 5
 - 6
 - 8
- _____ 39. Which of the following shows curved arrows that correctly accounts for the differences between the two structures?



- 1**
- 2**
- 3**
- 4**

Name: _____

ID: A

____ 40. Which of the following is/are tetrahedral?

1. methane, CH_4
 2. methyl carbocation, CH_3^+
 3. methyl carbanion, CH_3^-
 4. methyl radical, $\text{CH}_3\cdot$
-
- a. only 1 and 2
 - b. only 1 and 3
 - c. only 1 and 4
 - d. only 2 and 3

**Self Assessment_Ochem I
Answer Section****MULTIPLE CHOICE**

1. ANS: B PTS: 0
2. ANS: D PTS: 0
3. ANS: B PTS: 0
4. ANS: B PTS: 0
5. ANS: C PTS: 0
6. ANS: C PTS: 0
7. ANS: C PTS: 0
8. ANS: D PTS: 0
9. ANS: C PTS: 0
10. ANS: A PTS: 0
11. ANS: A PTS: 0
12. ANS: B PTS: 0
13. ANS: C PTS: 0
14. ANS: C PTS: 0
15. ANS: D PTS: 0
16. ANS: B PTS: 0
17. ANS: A PTS: 0
18. ANS: C PTS: 0
19. ANS: B PTS: 0
20. ANS: D PTS: 0
21. ANS: C PTS: 0
22. ANS: A PTS: 0
23. ANS: B PTS: 0
24. ANS: B PTS: 0
25. ANS: B PTS: 0
26. ANS: C PTS: 0
27. ANS: A PTS: 0
28. ANS: A PTS: 0
29. ANS: B PTS: 0
30. ANS: C PTS: 0
31. ANS: B PTS: 0
32. ANS: A PTS: 0
33. ANS: C PTS: 0
34. ANS: C PTS: 0
35. ANS: C PTS: 0
36. ANS: D PTS: 0
37. ANS: D PTS: 0
38. ANS: D PTS: 0
39. ANS: C PTS: 0
40. ANS: B PTS: 0