

TEST BANK



INTRODUCTION TO
Organic Chemistry
THIRD EDITION



William Brown · Thomas Poon

Test Bank

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INTRODUCTION TO ORGANIC CHEMISTRY

Third Edition

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Chapter 1 Covalent Bonding and Shapes of Molecules

Multiple Choice

1. Which is the electronic configuration that describes Mg^{2+} ? (Sec. 1.2)

- a) $1s^2, 2s^2$
- b) $1s^2, 2s^2, 2p^6$
- c) $1s^2, 2s^2, 2p^6, 3s^2$
- d) $1s^2, 2s^2, 2p^6, 3s^2, 3p^6$

2. Which is the electronic configuration that describes C? (Sec. 1.2)

- a) $1s^2, 2s^2, 2p^5$
- b) $1s^2, 2s^2, 2p^6, 3s^2$
- c) $1s^2, 2s^2, 2p^2$
- d) $1s^2, 2s^2, 2p^6$

3. Which ion is described by the electronic configuration $1s^2 2s^2 2p^6 3s^2 3p^2$? (Sec. 1.2)

- a) Mg^+
- b) Al^+
- c) Si^+
- d) P^+

4. Which atom is described by the electron configuration $1s^2 2s^2 2p^6 3s^2 3p^7$? (Sec. 1.2)

- a) S
- b) Se
- c) Cl
- d) Br

5. Which atom is described by the Lewis structure $\cdot \ddot{\text{A}} \cdot$? (Sec. 1.2)

- a) C
- b) P
- c) Se
- d) I

6. Which atom is described by the Lewis structure $\cdot \ddot{\text{A}} \cdot$? (Sec. 1.2)

- a) C
- b) P
- c) Se
- d) I

7. Which molecules contain both covalent and ionic bonds? (Sec. 1.3)



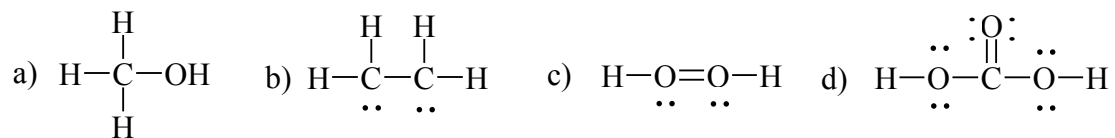
- a) I, II
- b) II, IV
- c) I, II, IV
- d) II, III

8. Arrange the bonds in increasing order of ionic character (least first). (Sec. 1.3)

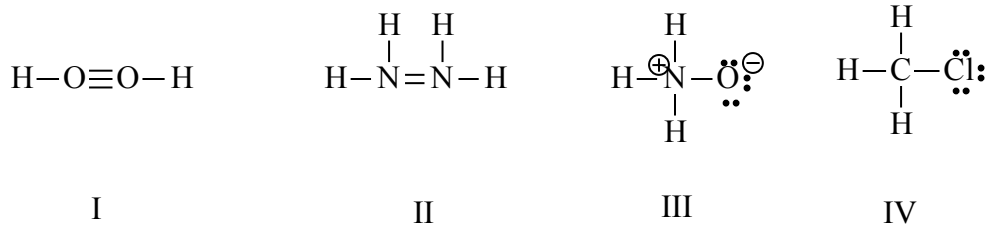


- a) III, I, IV, II, V
- b) V, III, I, II, IV
- c) I, III, V, IV, II
- d) I, III, II, IV, V

9. Which Lewis structure is correct? (Sec. 1.3)

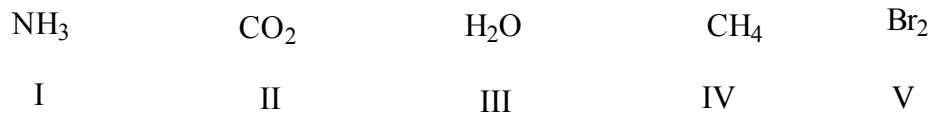


10. Which Lewis structures are correct? (Sec. 1.3)



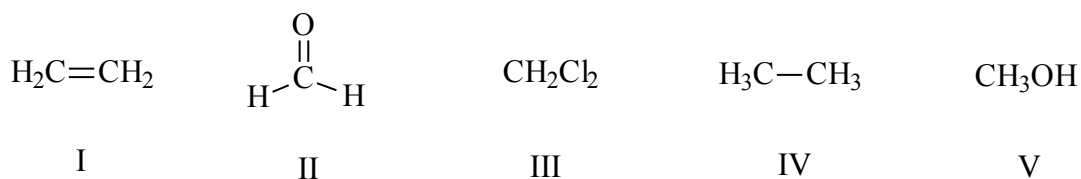
- a) I, II
- b) II, IV
- c) III, IV
- d) I, III

11. Which molecules are polar? (Sec. 1.5)



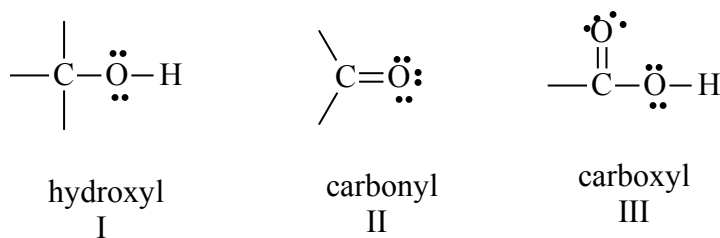
- a) I, IV
- b) I, III
- c) II, III, IV
- d) III, IV, V

12. Which molecules are polar? (Sec. 1.5)



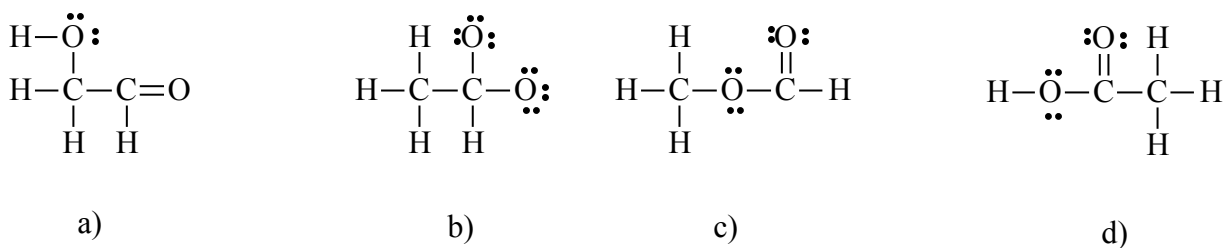
- a) III, IV, V
 b) I, IV
 c) II, III, V
 d) I, III

13. Which functional groups have correct Lewis structures? (Sec. 1.3)

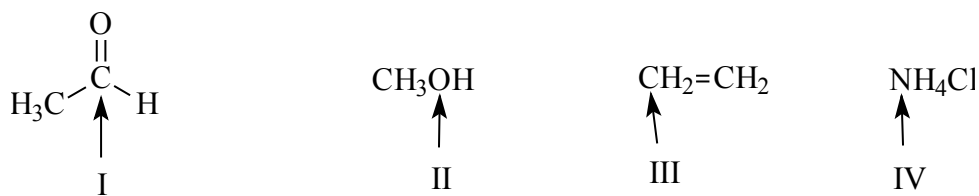


- a) I, II
 b) II, III
 c) I, II, III
 d) I, III

14. Which is the correct Lewis structure for acetic acid ($\text{CH}_3\text{CO}_2\text{H}$)? (Sec. 1.3)



15. Using the VSEPR model, predict which atoms have bond angles of about 120° . (Sec. 1.4)



- a) II, IV
 b) I, IV
 c) II, III
 d) I, III

Chapter 1 Covalent Bonding and Shapes of Molecules

16. According to VSEPR model, what is your prediction for the arrangement of electron pairs for CH_3^- ? (Sec. 1.4)

- a) linear
- b) tetrahedral
- c) bent
- d) trigonal

17. Using the VSEPR model, predict which species have bond angles of about 109° . (Sec. 1.4)

NH_3

CO_2

H_2O

H_3O^+

O_3

I

II

III

IV

V

- a) I, III, IV
- b) II, III, V
- c) I, IV
- d) III, IV, V

18. What is the correct structure for the aldehyde which has the formula $\text{C}_4\text{H}_8\text{O}$? (Sec. 1.3)

- a) $\text{CH}_3-\overset{\text{OH}}{\underset{|}{\text{CH}}}-\text{CH}=\text{CH}_2$ b) $\text{CH}_3-\overset{\text{O}}{\parallel}{\text{C}}-\text{CH}_2-\text{CH}_3$
- c) $\text{CH}_3-\text{CH}_2-\text{CH}_2-\overset{\text{O}}{\parallel}{\text{CH}}$ d) $\text{H}_2\text{C}=\text{CH}-\text{CH}_2-\text{O}-\text{CH}_3$

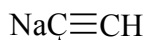
19. Nitrogen has a negative formal charge in which of the following compounds? (Sec. 1.3)

- a) NaNH_2
- b) N_2
- c) NH_4Cl
- d) HCN

20. What is the formal charge of oxygen in H_3O^+ ? (Sec. 1.3)

- a) -1
- b) 0
- c) +1
- d) +2

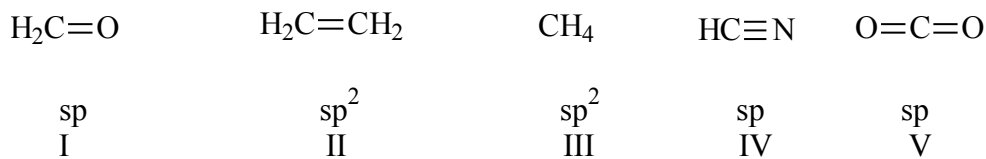
21. What is the formal charge of indicated carbon in,



(Sec. 1.3)

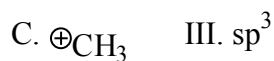
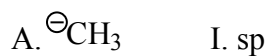
- a) -2
- b) -1
- c) 0
- d) +1

22. The carbon has the correct orbital hybridization in which structures? (Sec. 1.7)



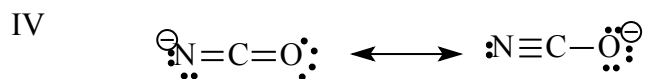
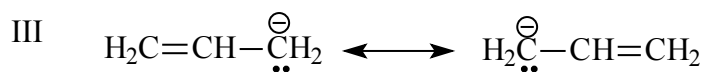
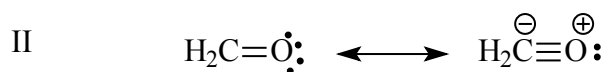
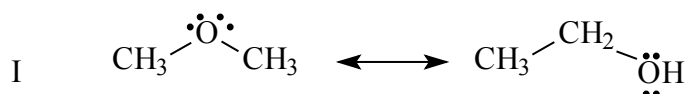
- a) II, IV, V
 b) II, III, IV
 c) I, II, III
 d) I, IV, V

23. What are the correct orbital hybridizations for carbon in the following species? (Sec. 1.7)



- a) A and I, B and III
 b) B and I, C and II
 c) A and III, C and II
 d) B and III, C and III

24. Which of the following are pairs of contributing resonance structures? (Sec. 1.6)



- a) II, IV
 b) I, II, III
 c) III, IV
 d) II, III, IV

25. Carbon has how many valence electrons? (Sec. 1.2)

- a) 2
- b) 4
- c) 6
- d) 8

26. Oxygen has how many valence electrons? (Sec. 1.2)

- a) 4
- b) 5
- c) 6
- d) 7

27. Nitrogen has how many valence electrons? (Sec. 1.2)

- a) 4
- b) 5
- c) 6
- d) 7

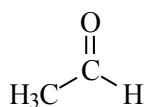
28. Which statement about orbitals is false? (Sec. 1.2)

- a) Orbitals are regions of space where electrons are found.
- b) Orbitals may contain up to two electrons.
- c) Orbitals are filled in order of decreasing energy.
- d) Orbitals of equivalent energy are half filled before adding two electrons to any one of them.

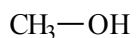
29. Which statement about resonance structures is false? (Sec. 1.6)

- a) All contributing resonance structures must have the same number of valence electrons.
- b) All contributing structures must obey the rules of covalent bonding.
- c) The position of nuclei may change.
- d) Third period atoms may have up to 12 electrons around them.

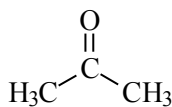
30. Which functional groups are named correctly? (Sec. 1.8)



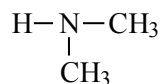
alcohol
I



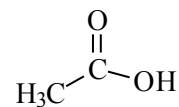
aldehyde
II



ketone
III



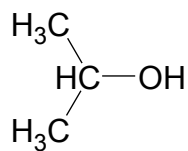
amine
IV



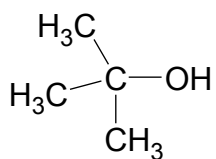
carboxylic acid
V

- a) III, IV, V
- b) II, III, IV
- c) I, III, V
- d) I, III, IV

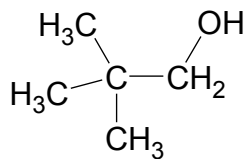
31. Which of the following compounds contains a tertiary (3°) alcohol? (Sec. 1.8)



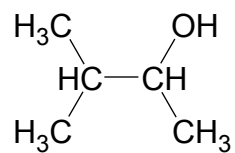
I



II



III



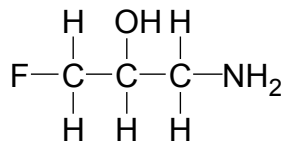
IV

- a) I
- b) II
- c) III
- d) IV

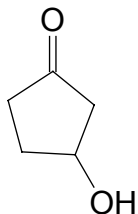
Chapter 1 Covalent Bonding and Shapes of Molecules

Fill in the Blanks

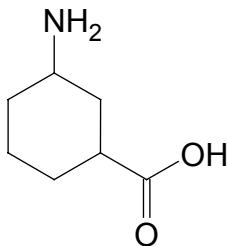
1. The spins of the electrons must be _____ in an orbital. (Sec. 1.2)
2. Outer shell electrons are called _____ electrons. (Sec. 1.2)
3. _____ is the number of valence electrons for S. (Sec. 1.2)
4. _____ is the number of valence electrons for Br. (Sec. 1.2)
5. The tendency of an element to react such that it achieves a noble gas configuration is called the _____. (Sec. 1.2)
6. The most polar bond in the following molecule is _____. (Sec. 1.3)



7. A _____ bond is characterized by the unequal sharing of electrons. (Sec. 1.3)
8. The following molecule contains the _____ and _____ functional groups. (Sec. 1.8)



9. The following molecule contains the _____ and _____ functional groups. (Sec. 1.8)



10. Functional groups undergo the same type of _____ in whatever compound they are found. (Sec. 1.8)
11. _____ are the basis for compound nomenclature. (Sec. 1.8)

True-False

1. Each shell can hold two electrons. (Sec. 1.2)
2. Orbitals make up the majority of the mass of an atom. (Sec. 1.2)
3. The group 7A elements react by losing an electron to achieve a noble gas configuration. (Sec. 1.3)
4. The group 2A elements react by losing two electrons to achieve a noble gas configuration. (Sec. 1.3)

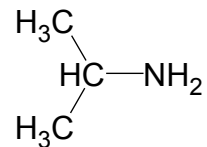
Chapter 1 Covalent Bonding and Shapes of Molecules

5. Carbon reacts by gaining 4 electrons to achieve a noble gas configuration. (Sec. 1.3)

6. An atom that gains electrons is called an anion. (Sec. 1.3)

7. Ionic bonds are characterized by the unequal sharing of electrons. (Sec. 1.3)

8. The following molecule is an example of a secondary amine. (Sec. 1.8)



9. $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{OH}$ is a polar molecule. (Sec. 1.5)

10. CH_3ONa contains only polar covalent bonds. (Sec. 1.3)

Chapter 1 Covalent Bonding and Shapes of Molecules

Answers

Multiple Choice

1. b
2. c
3. d
4. c
5. c
6. a
7. d
8. c
9. d
10. c
11. b
12. c
13. d
14. d
15. d
16. b
17. a
18. c
19. a
20. c
21. b
22. a
23. c
24. c
25. b
26. c
27. b
28. c
29. c
30. a
31. b

Fill in the Blank

1. paired
2. valence
3. 6
4. 7
5. octet rule
6. C-F
7. polar covalent
8. ketone, alcohol
9. 1° amine, carboxylic acid
10. reactions
11. Functional groups

True-False

1. F
2. F
3. F
4. T
5. F
6. T

Chapter 1 Covalent Bonding and Shapes of Molecules

- 7. F
- 8. F
- 9. T
- 10. F