1. What is the ground-state electronic configuration of a carbon atom?
2. 1s2, 2s2, 2p5
3. 1s2, 2s2, 2p2
4. 1s2, 2s2, 2p6
5. 1s2, 2s2, 2p4

*Accessibility: Keyboard Navigation*

*Bloom's Level: 2. Understand*

*Difficulty: Easy*

*Gradable: automatic*

*Section: 01.01*

*Subtopic: Periodic table trends*

*Topic: Structure and Bonding*

1. What is the ground-state electronic configuration of a fluorine atom?
2. 1s2, 2s2, 2p2
3. 1s2, 2s2, 2p3
4. 1s2, 2s2, 2p4
5. 1s2, 2s2, 2p5

*Accessibility: Keyboard Navigation*

*Bloom's Level: 2. Understand*

*Difficulty: Easy*

*Gradable: automatic*

*Section: 01.01*

*Subtopic: Periodic table trends*

*Topic: Structure and Bonding*

1. What is the ground-state electronic configuration of a magnesium cation (Mg2+)?
2. 1s2, 2s2, 2p6
3. 1s2, 2s2, 2p6, 3s1
4. C. 1s2, 2s2, 2p6, 3s2
5. D. 1s2, 2s2, 2p6, 3s2, 3p2

*Accessibility: Keyboard Navigation*

*Bloom's Level: 2. Understand*

*Difficulty: Easy*

*Gradable: automatic*

*Section: 01.01*

*Subtopic: Periodic table trends*

*Topic: Structure and Bonding*

1. What is the ground-state electronic configuration of a chlorine anion (Cl—)?
2. 1s2, 2s2, 2p6
3. 1s2, 2s2, 2p6, 3s2, 3p6
4. C. 1s2, 2s2, 2p6, 3s2, 3p5
5. D. 1s2, 2s2, 2p6, 3s2, 3p4
6. Which of the following statements about valence electrons is true?
7. They are the most tightly held electrons.
8. They do not participate in chemical reactions.
9. They are the outermost electrons.
10. They reveal the period number of a second-row element.
11. Which of the following statements about bonding is true?
12. Covalent bonds result from the transfer of electrons from one element to another.
13. Ionic bonds result from the transfer of electrons from a metal to a non-metal.
14. Ionic bonds result from the sharing of electrons between two non-metals.
15. Covalent bonds result from the sharing of electrons between two metals.

*Accessibility: Keyboard Navigation Bloom's Level: 2. Understand Difficulty: Easy Gradable: automatic Section: 01.01*

*Subtopic: Periodic table trends Topic: Structure and Bonding*

*Accessibility: Keyboard Navigation Bloom's Level: 2. Understand Difficulty: Easy Gradable: automatic Section: 01.01*

*Subtopic: Periodic table trends Topic: Structure and Bonding*

*Accessibility: Keyboard Navigation Bloom's Level: 1. Remember Difficulty: Easy Gradable: automatic Section: 01.02*

*Subtopic: Bond properties Subtopic: Types of bonds Topic: Structure and Bonding*

1. Which of the following would you expect to have ionic bonds?
2. CO
3. FBr
4. NF3
5. NaCl

*Accessibility: Keyboard Navigation*

*Bloom's Level: 3. Apply*

*Difficulty: Easy*

*Gradable: automatic*

*Section: 01.02*

*Subtopic: Bond properties*

*Subtopic: Types of bonds*

*Topic: Structure and Bonding*

1. Which of the following molecules has nonpolar covalent bonds?
2. HCl
3. N2
4. CHCl3
5. NO

9.

*Accessibility: Keyboard Navigation*

*Bloom's Level: 2. Understand*

*Difficulty: Easy*

*Gradable: automatic*

*Section: 01.12*

*Subtopic: Bond properties*

*Subtopic: Types of bonds*

*Topic: Structure and Bonding*

Which of the following molecules contain both covalent and ionic bonds?



1. I, II
2. I, IV
3. II, III
4. II, IV

*Bloom's Level: 3. Apply*

*Difficulty: Easy*

*Gradable: automatic*

*Section: 01.02*

*Subtopic: Bond properties*

*Subtopic: Types of bonds*

*Topic: Structure and Bonding*

10.

Arrange the following bonds in decreasing order of ionic character, putting the most ionic first.



1. I > II > III > IV
2. IV > II > I > III
3. IV > III > II > I
4. IV > II > III > I

*Bloom's Level: 3. Apply*

*Difficulty: Easy*

*Gradable: automatic*

*Section: 01.12*

*Subtopic: Bond properties*

*Subtopic: Types of bonds*

*Topic: Structure and Bonding*

1. Which of the following statements correctly describes the typical number of bonds for carbon, nitrogen, and oxygen in most neutral organic molecules?

A.

Carbon forms 4 covalent bonds, nitrogen forms 2 covalent bonds, and oxygen forms 3 covalent bonds.

**B.**

Carbon forms 4 covalent bonds, nitrogen forms 3 covalent bonds, and oxygen forms 2 covalent bonds.

C.

Carbon forms 4 covalent bonds, nitrogen forms 5 covalent bonds, and oxygen forms 2 covalent bonds.

D.

Carbon forms 4 covalent bonds, nitrogen forms 5 covalent bonds, and oxygen forms 4 covalent bonds.

*Accessibility: Keyboard Navigation*

*Bloom's Level: 1. Remember*

*Difficulty: Easy*

*Gradable: automatic*

*Section: 01.02*

*Subtopic: Bond properties*

*Topic: Structure and Bonding*

12.

Which is not an acceptable Lewis structure for the anion CH2NCO—?



1. I
2. II
3. III
4. IV

*Bloom's Level: 4. Analyze*

*Difficulty: Medium*

*Gradable: automatic*

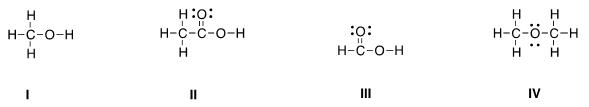
*Section: 01.03*

*Subtopic: Drawing Lewis structures*

*Subtopic: Resonance*

*Topic: Structure and Bonding*

13. Which of the following Lewis structures is correct?



1. I
2. II
3. III
4. IV

*Bloom's Level: 4. Analyze*

*Difficulty: Medium*

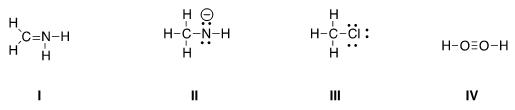
*Gradable: automatic*

*Section: 01.03*

*Subtopic: Drawing Lewis structures*

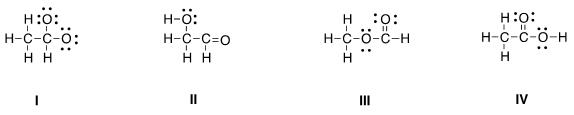
*Topic: Structure and Bonding*

14. Which of the following Lewis structures is correct?



1. I, II
2. I, III
3. II, III
4. III, IV

15. Which is the correct Lewis structure for acetic acid (CH3CO2H)?



1. I
2. II
3. III
4. IV

*Bloom's Level: 4. Analyze Difficulty: Medium Gradable: automatic Section: 01.03*

*Subtopic: Drawing Lewis structures Topic: Structure and Bonding*

*Bloom's Level: 4. Analyze Difficulty: Medium Gradable: automatic Section: 01.03*

*Subtopic: Drawing Lewis structures Topic: Structure and Bonding*

16. In which of the following ions does carbon have a formal charge?



1. I
2. II
3. III
4. None of these

*Bloom's Level: 1. Remember*

*Difficulty: Easy*

*Gradable: automatic*

*Section: 01.03*

*Subtopic: Formal charges*

*Topic: Structure and Bonding*

17. In which of the following ions does carbon have a formal charge?



1. I
2. II
3. III
4. None of these

*Bloom's Level: 1. Remember*

*Difficulty: Easy*

*Gradable: automatic*

*Section: 01.03*

*Subtopic: Formal charges*

*Topic: Structure and Bonding*

18. What is the formal charge of carbon in carbon monoxide (CO) when drawn with a triple bond?

1. 0
2. -2
3. -1
4. +1

*Accessibility: Keyboard Navigation*

*Bloom's Level: 4. Analyze*

*Difficulty: Medium*

*Gradable: automatic*

*Section: 01.03*

*Subtopic: Drawing Lewis structures*

*Subtopic: Formal charges*

*Topic: Structure and Bonding*

19. Which of the following statements about constitutional isomers is true?

A.

Constitutional isomers are different molecules having the different molecular formula.

**B.** Constitutional isomers are different molecules having the same molecular formula.

C.

Constitutional isomers are same molecules having the different molecular formula.

D. Constitutional isomers are same molecules having the same molecular formula.

*Accessibility: Keyboard Navigation*

*Bloom's Level: 1. Remember*

*Difficulty: Easy*

*Gradable: automatic*

*Section: 01.04*

*Subtopic: Constitutional isomers*

*Topic: Structure and Bonding*

20. How many constitutional isomers are there for a molecule having the molecular formula C2H6O?

1. 1
2. 2
3. 3
4. 4

*Accessibility: Keyboard Navigation*

*Bloom's Level: 4. Analyze*

*Difficulty: Easy*

*Gradable: automatic*

*Section: 01.04*

*Subtopic: Constitutional isomers*

*Topic: Structure and Bonding*

21. How many constitutional isomers are there for a molecule having the molecular formula C3H8O?

1. 1
2. 2
3. 3
4. 4

*Accessibility: Keyboard Navigation*

*Bloom's Level: 4. Analyze*

*Difficulty: Easy*

*Gradable: automatic*

*Section: 01.04*

*Subtopic: Constitutional isomers*

*Topic: Structure and Bonding*

22. How many constitutional isomers are there for a molecule having the molecular formula C3H6?

1. 1
2. 2
3. 3
4. 4

*Accessibility: Keyboard Navigation*

*Bloom's Level: 4. Analyze*

*Difficulty: Easy*

*Gradable: automatic*

*Section: 01.04*

*Subtopic: Constitutional isomers*

*Topic: Structure and Bonding*

23. How many constitutional isomers are there for a molecule having the molecular formula C2H4Cl2?

1. 1
2. 2
3. 3
4. 4

*Accessibility: Keyboard Navigation*

*Bloom's Level: 4. Analyze*

*Difficulty: Medium*

*Gradable: automatic*

*Section: 01.04*

*Subtopic: Constitutional isomers*

*Topic: Structure and Bonding*

24. How many different isomers are there for a compound having the molecular formula C3H6O?

1. 4
2. 5
3. 6
4. 7

*Accessibility: Keyboard Navigation*

*Bloom's Level: 4. Analyze*

*Difficulty: Medium*

*Gradable: automatic*

*Section: 01.04*

*Subtopic: Constitutional isomers*

*Topic: Structure and Bonding*

25. Which of the following molecules are constitutional isomers?



1. I, II, IV
2. II, III, IV
3. I, III, IV
4. I, II, III

*Bloom's Level: 4. Analyze*

*Difficulty: Easy*

*Gradable: automatic*

*Section: 01.04*

*Subtopic: Constitutional isomers*

*Topic: Structure and Bonding*

26. Which of the following compounds has an atom with an unfilled valence shell of electrons?

1. H2O
2. BCl3
3. CH4
4. CO2

*Accessibility: Keyboard Navigation*

*Bloom's Level: 4. Analyze*

*Difficulty: Medium*

*Gradable: automatic*

*Section: 01.05*

*Subtopic: Octet rule*

*Subtopic: Octet rule exception*

*Topic: Structure and Bonding*

27. Which of the following statements about resonance structures is true?

1. Resonance structures have the same placement of electrons but different arrangement of atoms.
2. Resonance structures have the same placement of atoms but different arrangement of electrons.
3. Resonance structures have the same placement of atoms and the same arrangement of electrons.
4. Resonance structures have different placement of atoms and different arrangement of electrons.

*Accessibility: Keyboard Navigation*

*Bloom's Level: 2. Understand*

*Difficulty: Easy*

*Gradable: automatic*

*Section: 01.06*

*Subtopic: Constitutional isomers*

*Subtopic: Resonance*

*Topic: Structure and Bonding*

28. Which of the following statements about resonance structures is *not* true?

1. There is no movement of electrons from one form to another.
2. Resonance structures are not isomers.
3. Resonance structures differ only in the arrangement of electrons.
4. Resonance structures are in equilibrium with each other.

*Accessibility: Keyboard Navigation*

*Bloom's Level: 2. Understand*

*Difficulty: Easy*

*Gradable: automatic*

*Section: 01.06*

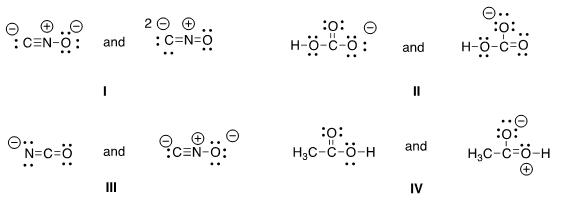
*Subtopic: Constitutional isomers*

*Subtopic: Resonance*

*Topic: Structure and Bonding*

29.

Which of the following pair does not represent resonance structures?



1. I
2. II
3. III
4. IV

*Bloom's Level: 4. Analyze*

*Difficulty: Medium*

*Gradable: automatic*

*Section: 01.06*

*Subtopic: Drawing Lewis structures*

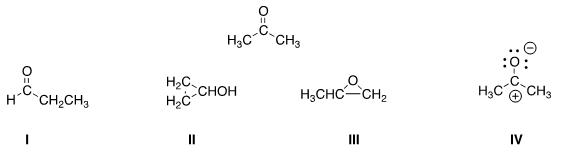
*Subtopic: Resonance*

*Topic: Structure and Bonding*

30. What 2 things will change between two resonance structures?

1. The position of multiple bonds and non-bonded electrons.
2. The position of multiple bonds and single bonds.
3. The placement of atoms and single bonds.
4. The placement of atoms and non-bonded electrons.

31. Which of the following is a resonance structure of the compound below?



1. I
2. II
3. III
4. IV

*Accessibility: Keyboard Navigation Bloom's Level: 2. Understand Difficulty: Easy Gradable: automatic Section: 01.06 Subtopic: Resonance*

*Topic: Structure and Bonding*

*Bloom's Level: 3. Apply Difficulty: Medium Gradable: automatic Section: 01.06*

*Subtopic: Drawing Lewis structures Subtopic: Resonance Topic: Structure and Bonding*

1. Which of the following resonance structures is the least important contributor to the resonance hybrid of the formate anion, HCOO—?



1. I
2. II
3. III
4. IV

*Bloom's Level: 3. Apply*

*Difficulty: Hard*

*Gradable: automatic*

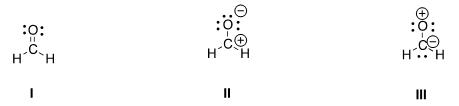
*Section: 01.06*

*Subtopic: Drawing Lewis structures*

*Subtopic: Resonance*

*Topic: Structure and Bonding*

1. Rank the following in order of decreasing importance as contributing structures to the resonance hybrid of formaldehyde, H2CO.



1. I > II > III
2. I > III > II
3. II > I > III
4. III > II > I

*Bloom's Level: 3. Apply*

*Difficulty: Hard*

*Gradable: automatic*

*Section: 01.06*

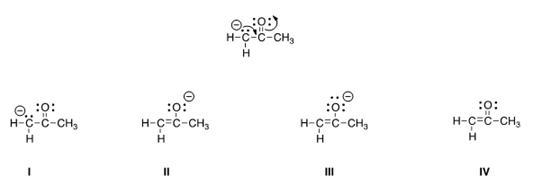
*Subtopic: Drawing Lewis structures*

*Subtopic: Resonance*

*Topic: Structure and Bonding*

34.

Follow the curved arrows to draw the second resonance structure for the ion below.



1. I
2. II
3. III
4. IV

*Bloom's Level: 2. Understand*

*Difficulty: Medium*

*Gradable: automatic*

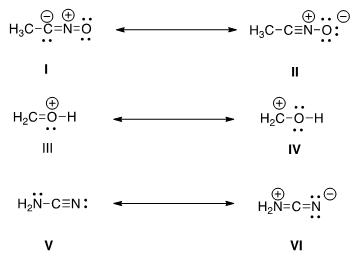
*Section: 01.06*

*Subtopic: Drawing Lewis structures*

*Subtopic: Resonance*

*Topic: Structure and Bonding*

35. Which is more important in each pair of contributing resonance structures?



1. II, IV, V
2. II, III, V
3. II, III, VI
4. I, IV, V

36. What is the approximate value of the H-C-H bond angle in methane, CH4?

1. 90°
2. 109.5°
3. 120°
4. 180°

*Bloom's Level: 4. Analyze Difficulty: Medium Gradable: automatic Section: 01.06*

*Subtopic: Drawing Lewis structures Subtopic: Resonance Topic: Structure and Bonding*

*Accessibility: Keyboard Navigation Bloom's Level: 1. Remember Difficulty: Easy Gradable: automatic Section: 01.07*

*Subtopic: Hybridization Subtopic: VSEPR theory Topic: Molecular Shape*

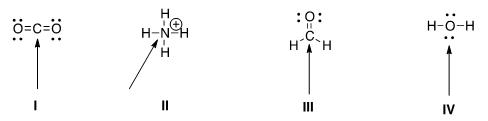
37. What is the approximate C-C-C bond angle in propene, CH3CH = CH2?

1. 90°
2. 109.5°
3. 120°
4. 180°

38. What is the approximate H-C-O bond angle in formaldehyde, H2CO?

1. 90°
2. 109.5°
3. 120°
4. 180°

39. Determine the geometry around the indicated atom in each species.



1. I = Linear; II = tetrahedral; III = trigonal planar; IV = tetrahedral
2. I = Linear; II = tetrahedral; III = trigonal planar; IV = linear
3. I = Trigonal planar; II = linear; III = tetrahedral; IV = trigonal planar
4. I = Tetrahedral; II = trigonal planar; III = linear; IV = tetrahedral

*Accessibility: Keyboard Navigation Bloom's Level: 2. Understand Difficulty: Easy Gradable: automatic Section: 01.07*

*Subtopic: Hybridization Subtopic: VSEPR theory Topic: Molecular Shape*

*Accessibility: Keyboard Navigation Bloom's Level: 2. Understand Difficulty: Medium Gradable: automatic Section: 01.07*

*Subtopic: Hybridization Subtopic: VSEPR theory Topic: Molecular Shape*

*Bloom's Level: 1. Remember Difficulty: Easy Gradable: automatic Section: 01.07*

*Subtopic: Hybridization Subtopic: VSEPR theory Topic: Molecular Shape*

40. What is the approximate bond angle for the C-C-N bond in acetonitrile, CH3CN?

1. 90°
2. 109.5°
3. 120°
4. 180°

*Accessibility: Keyboard Navigation*

*Bloom's Level: 4. Analyze*

*Difficulty: Medium*

*Gradable: automatic*

*Section: 01.07*

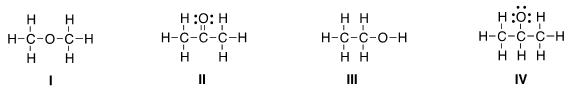
*Subtopic: Drawing Lewis structures*

*Subtopic: Hybridization*

*Subtopic: VSEPR theory*

*Topic: Molecular Shape*

41. Which of the following is the appropriate conversion of the condensed structure, CH3COCH3, to a Lewis structure?



1. I
2. II
3. III
4. IV

*Bloom's Level: 2. Understand*

*Difficulty: Medium*

*Gradable: automatic*

*Section: 01.08*

*Subtopic: Condensed formula*

*Subtopic: Drawing Lewis structure*

*Topic: Drawing Organic Molecules*

42. Which of the following is the appropriate conversion of (CH3)2CHCH2CHClCH3 to a skeletal structure?



1. I
2. II
3. III
4. IV

*Bloom's Level: 2. Understand*

*Difficulty: Medium*

*Gradable: automatic*

*Section: 01.08*

*Subtopic: Condensed formula*

*Subtopic: Skeletal/bond-line structures*

*Topic: Drawing Organic Molecules*

43. Which of the following is the appropriate conversion of (CH3)4C to a skeletal structure?



1. I
2. II
3. III
4. IV

*Bloom's Level: 2. Understand*

*Difficulty: Easy*

*Gradable: automatic*

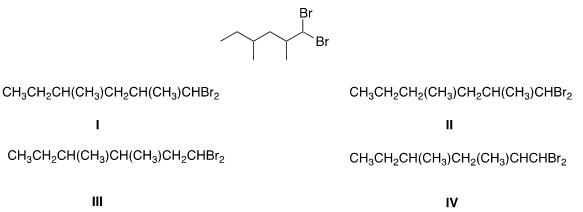
*Section: 01.08*

*Subtopic: Condensed formula*

*Subtopic: Skeletal/bond-line structures*

*Topic: Drawing Organic Molecules*

44. What is the condensed formula of the compound below?



1. I
2. II
3. III
4. IV

*Bloom's Level: 2. Understand*

*Difficulty: Medium*

*Gradable: automatic*

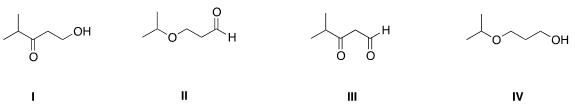
*Section: 01.08*

*Subtopic: Condensed formula*

*Subtopic: Skeletal/bond-line structures*

*Topic: Drawing Organic Molecules*

45. Which of the following is the appropriate conversion of (CH3)2CHOCH2CH2CH2OH to a skeletal structure?



1. I
2. II
3. III
4. IV

*Bloom's Level: 2. Understand*

*Difficulty: Medium*

*Gradable: automatic*

*Section: 01.08*

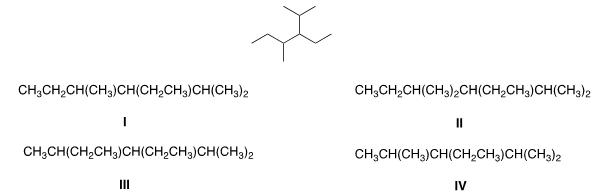
*Subtopic: Condensed formula*

*Subtopic: Skeletal/bond-line structures*

*Topic: Drawing Organic Molecules*

46.

Convert the following skeletal structure to a condensed structure.



1. I
2. II
3. III
4. IV

*Bloom's Level: 2. Understand*

*Difficulty: Medium*

*Gradable: automatic*

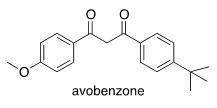
*Section: 01.08*

*Subtopic: Condensed formula*

*Subtopic: Skeletal/bond-line structures*

*Topic: Drawing Organic Molecules*

1. Avobenzone is an active ingredient in some common sunscreens. Which of the following is the correct molecular formula for avobenzone?



1. C22O22O3
2. C20H22O3
3. C21H23O3
4. C20H24O3

*Bloom's Level: 3. Apply*

*Difficulty: Medium*

*Gradable: automatic*

*Section: 01.08*

*Subtopic: Condensed formula*

*Subtopic: Skeletal/bond-line structures*

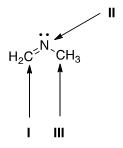
*Topic: Drawing Organic Molecules*

48. In which structure is the hybridization incorrect?



1. I
2. II
3. III
4. IV

49. What is the hybridization for each of the indicated atoms in the following compound?



1. I = *sp2*; II = *sp2*; III = *sp2*.
2. I = *sp2*; II = *sp3*; III = *sp3*.
3. I = *sp*; II = *sp2*; III = *sp3*.
4. I = *sp2*; II = *sp2*; III = *sp3*.

*Bloom's Level: 2. Understand Difficulty: Medium Gradable: automatic Section: 01.09*

*Subtopic: Hybridization Subtopic: Valence bond theory Topic: Molecular Shape*

*Bloom's Level: 2. Understand Difficulty: Medium Gradable: automatic Section: 01.09*

*Subtopic: Hybridization Subtopic: Valence bond theory Topic: Molecular Shape*

50. What is the hybridization of the carbon atom in the methyl cation, (CH3+)?

1. *sp3*
2. *sp2*
3. *sp*
4. *p*

*Accessibility: Keyboard Navigation*

*Bloom's Level: 2. Understand*

*Difficulty: Medium*

*Gradable: automatic*

*Section: 01.09*

*Subtopic: Hybridization*

*Subtopic: Valence bond theory*

*Topic: Molecular Shape*

51. What is the hybridization of the nitrogen atom in the ammonium cation, NH4+?

1. *sp3*
2. *sp2*
3. *sp*
4. *p*

*Accessibility: Keyboard Navigation*

*Bloom's Level: 2. Understand*

*Difficulty: Medium*

*Gradable: automatic*

*Section: 01.09*

*Subtopic: Hybridization*

*Subtopic: Valence bond theory*

*Topic: Molecular Shape*

52. Which atomic orbitals overlap to form the C-H s bonding molecular orbitals of ethane, CH3CH3?

1. C*sp2* + H1*s*
2. C*sp3* + H1*s*
3. C2*p* + H1*s*
4. C*sp* + H1*s*

*Accessibility: Keyboard Navigation*

*Bloom's Level: 3. Apply*

*Difficulty: Medium*

*Gradable: automatic*

*Section: 01.10*

*Subtopic: Atomic orbitals*

*Subtopic: Hybridization*

*Subtopic: Valence bond theory*

*Topic: Molecular Shape*

53. Which atomic orbitals overlap to form the C-H s bonding molecular orbitals of ethylene, H2C=CH2?

1. C2*p* + H1*s*
2. C*sp* + H1*s*
3. C*sp3* + H1*s*
4. C*sp2* + H1*s*

*Accessibility: Keyboard Navigation*

*Bloom's Level: 3. Apply*

*Difficulty: Medium*

*Gradable: automatic*

*Section: 01.10*

*Subtopic: Atomic orbitals*

*Subtopic: Hybridization*

*Subtopic: Molecular orbital theory*

*Topic: Molecular Shape*

54. Which atomic orbitals overlap to form the carbon-carbon s and p bonding molecular orbitals of ethylene, H2C=CH2?

1. C*sp3* + C*sp3*, and C2*p* + C2*p*
2. C*sp3* + C*sp3*, and C*sp2* + C*sp2*
3. C*.* C*sp2* + C*sp2*, and C2*p* + C2*p*
4. D*.* C*sp2* + C*sp2*, and C*sp2* + C*sp2*

*Accessibility: Keyboard Navigation*

*Bloom's Level: 3. Apply*

*Difficulty: Medium*

*Gradable: automatic*

*Section: 01.10*

*Subtopic: Atomic orbitals*

*Subtopic: Hybridization*

*Subtopic: Molecular orbital theory*

*Topic: Molecular Shape*

55. Which atomic orbitals overlap to form the C-H s bonding molecular orbitals of acetylene, C2H2?

1. C*sp* + H1*s*
2. C2*p* +H1*s*
3. C*sp3* + H1*s*
4. C*sp2* + H1*s*

*Accessibility: Keyboard Navigation*

*Bloom's Level: 3. Apply*

*Difficulty: Medium*

*Gradable: automatic*

*Section: 01.10*

*Subtopic: Atomic orbitals*

*Subtopic: Hybridization*

*Subtopic: Molecular orbital theory*

*Topic: Molecular Shape*

56. Which atomic orbitals overlap to form the carbon-carbon s bonding molecular orbital of acetylene, C2H2?

1. C*sp2* + C*sp2*
2. C*sp* + C*sp*
3. C*sp3* + C*sp3*
4. C2*p* + C2*p*

*Accessibility: Keyboard Navigation*

*Bloom's Level: 3. Apply*

*Difficulty: Medium*

*Gradable: automatic*

*Section: 01.10*

*Subtopic: Atomic orbitals*

*Subtopic: Hybridization*

*Subtopic: Molecular orbital theory*

*Topic: Molecular Shape*

1. When forming molecular orbitals from atomic orbitals, what is the order of increasing C-H bond strength for the following set?



1. II < I < III
2. III < I < II
3. III < II < I
4. I < II < III

*Bloom's Level: 3. Apply*

*Difficulty: Medium*

*Gradable: automatic*

*Section: 01.11*

*Subtopic: Atomic orbitals*

*Subtopic: Hybridization*

*Subtopic: Molecular orbital theory*

*Topic: Molecular Shape*

58.

What is the order of decreasing bond length for a C-C bond composed of the following molecular orbitals?



1. I > III > II
2. I > II > III
3. III > II > I
4. II > III > I

*Bloom's Level: 3. Apply*

*Difficulty: Medium*

*Gradable: automatic*

*Section: 01.11*

*Subtopic: Atomic orbitals*

*Subtopic: Hybridization*

*Subtopic: Molecular orbital theory*

*Topic: Molecular Shape*

59. Which of the following statements about electronegativity and the periodic table is true?

1. Electronegativity decreases across a row of the periodic table.
2. Electronegativity increases down a column of the periodic table.
3. Electronegativity increases across a row of the periodic table.
4. Electronegativity does not change down a column of the periodic table.

60.

*Accessibility: Keyboard Navigation*

*Bloom's Level: 2. Understand*

*Difficulty: Medium*

*Gradable: automatic*

*Section: 01.12*

*Subtopic: Dipole moments*

*Topic: Molecular Shape*

Rank the following atoms in order of increasing electronegativity, putting the least electronegative first.



1. I < II < III < IV
2. I < IV < II < III
3. III < II < IV < I
4. I < II < IV < III

*Bloom's Level: 3. Apply*

*Difficulty: Medium*

*Gradable: automatic*

*Section: 01.12*

*Subtopic: Dipole moments*

*Topic: Molecular Shape*

61. Rank the following atoms in order of decreasing electronegativity, putting the most electronegative first.



1. I > IV > II > III
2. II > III > IV > I
3. III > IV > II > I
4. III > II > IV > I

*Bloom's Level: 3. Apply*

*Difficulty: Medium*

*Gradable: automatic*

*Section: 01.12*

*Subtopic: Dipole moments*

*Topic: Molecular Shape*

62. Which molecule has the greatest difference in electronegativity (DE) between the two different elements?

1. CO2
2. H2S
3. NH3
4. H2O

*Accessibility: Keyboard Navigation*

*Bloom's Level: 3. Apply*

*Difficulty: Medium*

*Gradable: automatic*

*Section: 01.12*

*Subtopic: Dipole moments*

*Topic: Molecular Shape*

63. Which compound contains the most polar bond?



1. I
2. II
3. III
4. IV

*Bloom's Level: 3. Apply*

*Difficulty: Medium*

*Gradable: automatic*

*Section: 01.12*

*Subtopic: Dipole moments*

*Topic: Molecular Shape*

64. Which of the following compounds are non-polar?



1. I, IV
2. I, II
3. II, III
4. II, IV

*Bloom's Level: 3. Apply*

*Difficulty: Medium*

*Gradable: automatic*

*Section: 01.13*

*Subtopic: Dipole moments*

*Subtopic: Polarity of molecules*

*Topic: Molecular Shape*

65. Which of the following molecules has non-polar covalent bonds?

1. CO2
2. N2
3. CCl4
4. HF

*Accessibility: Keyboard Navigation*

*Bloom's Level: 2. Understand*

*Difficulty: Medium*

*Gradable: automatic*

*Section: 01.12*

*Subtopic: Dipole moments*

*Topic: Molecular Shape*

66. Which of the following molecules has polar covalent bonds?

1. MgO
2. NH3
3. Cl2
4. NaBr

*Accessibility: Keyboard Navigation*

*Bloom's Level: 2. Understand*

*Difficulty: Medium*

*Gradable: automatic*

*Section: 01.12*

*Subtopic: Dipole moments*

*Topic: Molecular Shape*

67. Which of the following covalent bonds has the largest dipole moment?

1. C-H
2. C-C
3. C-O
4. H-F

*Accessibility: Keyboard Navigation*

*Bloom's Level: 3. Apply*

*Difficulty: Medium*

*Gradable: automatic*

*Section: 01.12*

*Subtopic: Dipole moments*

*Topic: Molecular Shape*

68. Which of the following molecules has the smallest dipole moment?

1. CO2
2. HCl
3. H2O
4. NH3

*Accessibility: Keyboard Navigation*

*Bloom's Level: 2. Understand*

*Difficulty: Medium*

*Gradable: automatic*

*Section: 01.12*

*Subtopic: Dipole moments*

*Topic: Molecular Shape*

69. Which of the following molecules does *not* have a net dipole moment of zero?

1. CCl4
2. BF3
3. CO2
4. NH3

*Accessibility: Keyboard Navigation*

*Bloom's Level: 2. Understand*

*Difficulty: Medium*

*Gradable: automatic*

*Section: 01.13*

*Subtopic: Dipole moments*

*Subtopic: Polarity of molecules*

*Topic: Molecular Shape*

70.

Which of the following molecules has a net dipole moment of zero?



1. I
2. II
3. III
4. IV

*Bloom's Level: 4. Analyze*

*Difficulty: Medium*

*Gradable: automatic*

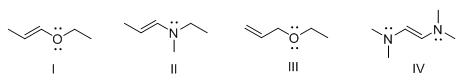
*Section: 01.13*

*Subtopic: Dipole moments*

*Subtopic: Polarity of molecules*

*Topic: Molecular Shape*

1. Consider compounds which contain both a heteroatom and a double bond. For which compound is no additional Lewis structure possible?



1. I
2. II
3. III
4. IV

*Bloom's Level: 4. Analyze*

*Difficulty: Hard*

*Gradable: automatic*

*Section: 01.06*

*Subtopic: Drawing Lewis structures*

*Subtopic: Resonance*

*Topic: Structure and Bonding*