Pool Canvas

Add, modify, and remove questions. Select a question type from the Add Question drop-down list and click **Go** to add questions. Use Creation Settings to establish which default options, such as feedback and images, are available for question creation.

Add Calculated Formula GO | Creation Settings

Name CHAPTER 1--COVALENT BONDING AND SHAPES OF MOLECULES
Description
Instructions

Modify

Add Question Here

Question 1 **Multiple Choice** **0 points** Modify Remove

Question How many electrons can the shell with a principal quantum number of 1 hold?
Answer
1
✓ 2
4
8

Add Question Here

Question 2 **Multiple Choice** **0 points** Modify Remove

Question How many electrons can the shell with a principal quantum number of 2 hold?
Answer
1
2
4
✓ 8

Add Question Here

Question 3 **Multiple Choice** **0 points** Modify Remove

Question What is the ground-state electronic configuration of a nitrogen atom (nitrogen: atomic number 7)?
Answer
$1s^2 2s^1 2p^4$
✓ $1s^2 2s^2 2p^3$
$1s^1 2s^1 2p^5$
$1s^2 2s^2 2p^2$

Add Question Here

Question 4 **Multiple Choice** **0 points** Modify Remove

Question What is the ground-state electronic configuration of a fluorine atom (fluorine: atomic number 9)?
Answer
$1s^1 2s^1 2p^7$
✓ $1s^2 2s^2 2p^5$
$1s^2 2s^2 2p^6$
$1s^0 2s^2 2p^7$

Add Question Here

Question 5 **Multiple Choice** **0 points** Modify Remove

Question What is the ground-state electronic configuration of a fluoride anion (fluorine: atomic number 9)?
Answer
$1s^2 2s^2 2p^2$
$1s^2 2s^2 2p^5$
✓ $1s^2 2s^2 2p^6$
$1s^2 2s^2 2p^7$

Add Question Here

Question 6 **Multiple Choice** **0 points** Modify Remove

Question What is the ground-state electronic configuration of a sodium cation (sodium: atomic number 11)?
Answer
$1s^2 2s^2 2p^6 3s^1$
$1s^2 2s^2 2p^5 3s^1$
✓ $1s^2 2s^2 2p^6$
$1s^2 2s^2 2p^6 3s^2$

Add Question Here

Question 7 **Multiple Choice** **0 points** Modify Remove

Question Which of the following species has an atom that has an unfilled valence shell of electrons?
Answer
molecular hydrogen, H_2
hydroxide anion, HO^-
✓ boron trifluoride, BF_3
water, H_2O

Add Question Here

Question 8 **Multiple Choice** **0 points** Modify Remove

Question Which of the following species has an atom that has an unfilled valence shell of electrons?

Answer

molecular bromine, Br_2

fluoride anion, F^-

ammonia, NH_3

✓ aluminum trichloride, $AlCl_3$

Add Question Here

Question 9 **Multiple Choice** **0 points** Modify Remove

Question Which of the following species possesses a formal charge?

Answer

BH_3

✓ BH_4

CCl_4

H_2S

Add Question Here

Question 10 **Multiple Choice** **0 points** Modify Remove

Question Which of the following species possesses a formal charge?

Answer

CCl_4

$SiCl_4$

✓ $AlCl_4$

PCl_3

Add Question Here

Question 11 **Multiple Choice** **0 points** Modify Remove

Question Which of the following compounds is an aldehyde?

Answer

$CH_3CH_2CH_2COOH$

✓ CH_3CH_2CHO

$CH_3CH_2CH_2OH$

$CH_3CH_2COCH_3$

Add Question Here

Question 12 **Multiple Choice** **0 points** Modify Remove

Question Which of the following compounds is an alcohol?

Answer

CH_3CH_2COOH

$CH_3CH_2OCH_3$

✓ $CH_3CH_2CH_2OH$

CH_3CH_2CHO

Add Question Here

Question 13 **Multiple Choice** **0 points** Modify Remove

Question Which of the following compounds is a carboxylic acid?

Answer

✓ CH_3CH_2COOH

$CH_3CH_2OCH_3$

$CH_3CH_2CH_2OH$

CH_3CH_2CHO

Add Question Here

Question 14 **Multiple Choice** **0 points** Modify Remove

Question Which of the following compounds is a ketone?

Answer

CH_3CH_2COOH

CH_3CH_2CHO

$CH_3CH_2CH_2OH$

✓ CH_3COCH_3

Add Question Here

Question 15 **Multiple Choice** **0 points** Modify Remove

Question Which of the following compounds is a ketone?

Answer

CH_3CH_2COOH

CH_3CH_2CHO

$CH_3CH_2CH_2OH$

✓ CH_3COCH_3

Add Question Here

Question 16 **Multiple Choice** **0 points** Modify Remove

Question Which of the following compounds is a carboxylic ester?

Answer

CH_3CH_2COOH

$CH_3CH_2OCH_3$

✓ $CH_3CH_2COOCH_3$

$CH_3CH_2COCH_3$

Add Question Here

Question 17 **Multiple Choice** **0 points** Modify Remove

Question Which of the following is a tertiary alcohol?

Answer

$CH_3CH_2OCH_3$

✓ $(CH_3)_3COH$

$(CH_3)_2CHOH$

$CH_3CH_2CH_2OH$

Add Question Here

Question 18 **Multiple Choice** **0 points** Modify Remove

Question Which of the following is a tertiary amine?

Answer

✓ $CH_3CH_2N(CH_3)_2$

$(CH_3)_3CNH_2$

$CH_3CH_2NHCH_3$

$CH_3CH_2NHCH(CH_3)_2$

Add Question Here

Question 19 **Multiple Choice** **0 points** Modify Remove

Question Which of the following is a primary amine?

Answer

$CH_3CH_2NHCH_3$

$CH_3CH_2NHCH(CH_3)_2$

$CH_3CH_2N(CH_3)_2$

✓ $(CH_3)_3CNH_2$

Add Question Here

Question 20 **Multiple Choice** **0 points** Modify Remove

Question Which of the following is trigonal planar?

Answer

✓ boron trifluoride, BF_3

methyl anion, CH_3^-

methane, CH_4

ammonia, NH_3

Add Question Here

Question 21 **Multiple Choice** **0 points** Modify Remove

Question Which of the following molecules is not linear?

Answer

✓ H_2O

CO_2

HC^oCH

Cl_2

Add Question Here

Question 22 **Multiple Choice** **0 points** Modify Remove

Question What is the approximate value of the H-C-H bond angles in methane, CH_4?

Answer

90°

✓ 109°

120°

180°

Add Question Here

Question 23 **Multiple Choice** **0 points** Modify Remove

Question What is the approximate C-C-C bond angle in propene, $CH_3CH=CH_2$?

Answer

90°

109°

✓ 120°

180°

Add Question Here

Question 24 **Multiple Choice** **0 points** Modify Remove

Question What is the approximate C-C-C bond angle in propyne, $HC^{o}CCH_3$?

Answer

90°
109°
120°
✓ 180°

Add Question Here

Question 25 **Multiple Choice** **0 points** Modify Remove

Question What is the approximate H-C-O bond angle in formaldehyde, $H_2C{=}O$?

Answer

90°
109°
✓ 120°
180°

Add Question Here

Question 26 **Multiple Choice** **0 points** Modify Remove

Question Which of the following elements has the highest electronegativity?

Answer

N
C
✓ O
S

Add Question Here

Question 27 **Multiple Choice** **0 points** Modify Remove

Question Which of the following elements has the highest electronegativity?

Answer

C
P
Si
✓ Cl

Add Question Here

Question 28 **Multiple Choice** **0 points** Modify Remove

Question Which of the following bonds is the most polar?

Answer

F-F
✓ H-F
C-H
C-Si

Add Question Here

Question 29 **Multiple Choice** **0 points** Modify Remove

Question Which of the following bonds is the most polar?

Answer

✓ O-H
C-H
C-C
H-H

Add Question Here

Question 30 **Multiple Choice** **0 points** Modify Remove

Question Which of the following is a polar covalent bond?

Answer

Na-F
C-H
✓ C-O
Cl-Cl

Add Question Here

Question 31 **Multiple Choice** **0 points** Modify Remove

Question Which of the following is a polar covalent bond?

Answer

Na-Cl
✓ C-Cl
C-H
Cl-Cl

Add Question Here

Question 32 **Multiple Choice** **0 points** Modify Remove

Question Which of the following is an ionic bond?

Answer

Br-Br
C-Cl
C-S
✓ Na-O

Add Question Here

Question 33 **Multiple Choice** **0 points** Modify Remove

Question Which of the following is an ionic bond?

Answer

F-F

C-H

✓ Li-O

C-N

Add Question Here

Question 34 **Multiple Choice** **0 points** Modify Remove

Question Which of the following bonds has the smallest dipole moment?

Answer

✓ C-N

C-O

C-F

O-H

Add Question Here

Question 35 **Multiple Choice** **0 points** Modify Remove

Question Which of the following bonds has the smallest dipole moment?

Answer

Li-Cl

✓ C-H

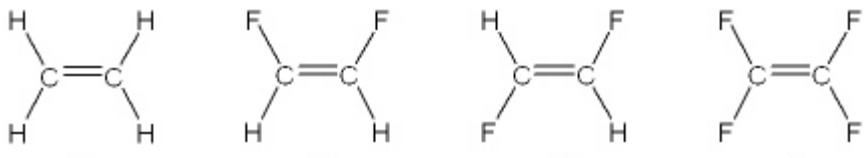
O-H

H-Cl

Add Question Here

Question 36 **Multiple Choice** **0 points** Modify Remove

Question Which of the following molecules has a molecular dipole?



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

Answer

1

✓ **2**

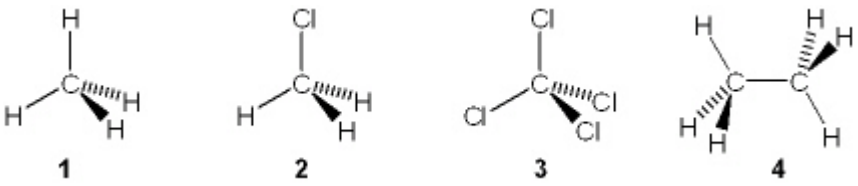
3

4

Add Question Here

Question 37 **Multiple Choice** **0 points** Modify Remove

Question Which of the following molecules has a molecular dipole?



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

Answer

1

✓ **2**

3

4

Add Question Here

Question 38 **Multiple Choice** **0 points** Modify Remove

Question Which of the following molecules has a molecular dipole?

Answer

CO_2

BF_3

✓ NH_3

CH_4

Add Question Here

Question 39 **Multiple Choice** **0 points** Modify Remove

Question Which of the following molecules has a molecular dipole?

Answer

✓ H_2O

CO_2

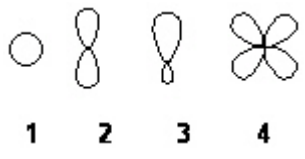
$HC^{o}CH$

Cl_2

Add Question Here

Question 40 **Multiple Choice** **0 points** Modify Remove

Question Which of the following best represents the shape of the 2*s* atomic orbital of carbon?



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

Answer

✓ **1**
2
3
4

Add Question Here

Question 41 **Multiple Choice** **0 points** Modify Remove

Question Which of the following best represents the shape of a 2*p* atomic orbital of carbon?

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

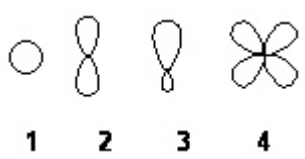
Answer

1
✓ **2**
3
4

Add Question Here

Question 42 **Multiple Choice** **0 points** Modify Remove

Question Which of the following best represents an sp^2 hybridized atomic orbital of carbon which overlaps with the 1*s* atomic orbital of hydrogen to form a C-H s bonding molecular orbital in ethene, $H_2C{=}CH_2$



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

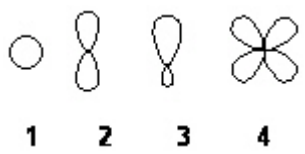
Answer

1
2
✓ **3**
4

Add Question Here

Question 43 **Multiple Choice** **0 points** Modify Remove

Question 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**

Answer

1
2
✓ **3**
4

Add Question Here

Question 44 **Multiple Choice** **0 points** Modify Remove

Question Which atomic orbitals overlap to form the C=O bond of acetone, $(CH_3)_2C{=}O$?

Answer

C $2sp^3$ + O $2sp^2$
C $2sp^2$ + O $2p$
✓ C $2sp^2$ + O $2sp^2$
C $2sp^3$ + O $2sp$

Add Question Here

Question 45 **Multiple Choice** **0 points** Modify Remove

Question Which atomic orbitals overlap to form the C-O bond of dimethyl ether, $(CH_3)_2O$?

Answer

C $2sp^3$ + O $2sp^2$
C $2sp^2$ + O $2p$
C $2sp^2$ + O $2sp^2$
✓ C $2sp^3$ + O $2sp^3$

Add Question Here

Question 46 **Multiple Choice** **0 points** Modify Remove

Question What is the approximate value of the length of the C=C bond in ethane, $CH_2{=}CH_2$?

Answer

121 pm
✓ 134 pm
142 pm
154 pm

Add Question Here

Question 47 **Multiple Choice** **0 points** Modify Remove

Question What is the approximate value of the length of the C°C bond in ethyne, HC°CH?

Answer

✓ 121 pm
134 pm
142 pm
154 pm

Add Question Here

Question 48 **Multiple Choice** **0 points** Modify Remove

Question Which of the following statements is *not* true regarding resonance structures?

Answer

All resonance structures must have the same number of electrons
✓ Each atom in all of the resonance structures must have a complete shell of valence electrons
All resonance structures must have the same arrangement of atoms
All resonance structures must be valid Lewis structures

Add Question Here

Question 49 **Multiple Choice** **0 points** Modify Remove

Question Which of the following statements is *not* true regarding resonance structures?

Answer

✓ Each resonance structure is in rapid equilibrium with all of the other structures
The resonance structures may have different energies
All resonance structures must have the same arrangement of atoms
All resonance structures must have the same number of electrons

Add Question Here

Question 50 **Multiple Choice** **0 points** Modify Remove

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

Answer

All of the oxygen atoms bear the same amount of charge
All of the carbon-oxygen bonds are the same length
✓ The carbon atom bears the negative charge
It is basic

Add Question Here

Question 51 **Multiple Choice** **0 points** Modify Remove

Question Which of the following statements is *not* true about the acetate anion, $CH_3CO_2^-$?

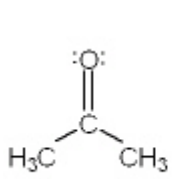
Answer

The oxygen atoms bear the same amount of charge
The two carbon-oxygen bonds are the same length
✓ The carbon atom bears the negative charge
It is basic

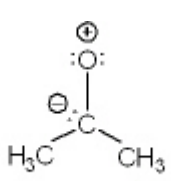
Add Question Here

Question 52 **Multiple Choice** **0 points** Modify Remove

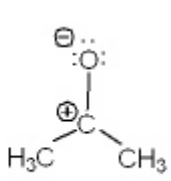
Question Rank the following in order of decreasing importance as a contributing resonance structure to the molecular structure of acetone, CH_3COCH_3 (more important > less important)



1



2



3

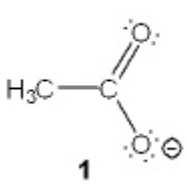
Answer

1 > 2 > 3
✓ **1 > 3 > 2**
2 > 1 > 3
3 > 1 > 2

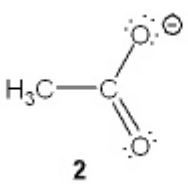
Add Question Here

Question 53 **Multiple Choice** **0 points** Modify Remove

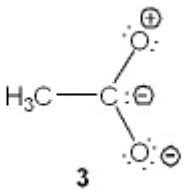
Question Which of the following resonance structures is the least important contributor to the resonance hybrid of the acetate anion, CH_3COO^-?



1



2



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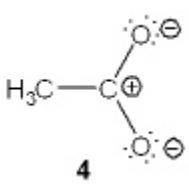


4

Answer

1
2
✓ **3**
4

Add Question Here

Question 54 **Multiple Choice** **0 points** Modify Remove

Question How many electrons are there in the valence shell of the carbon atom of a methyl cation, CH_3^+?

Answer

4
5
✓ 6
7

Add Question Here

Question 55 **Multiple Choice** **0 points** Modify Remove

Question How many electrons are there in the valence shell of the carbon atom of the methyl anion, CH_3^-?

Answer

2
4
6
✓ 8

Add Question Here

Question 56 **Multiple Choice** **0 points** Modify Remove

Question How many electrons are there in the valence shell of the oxygen atom of water?

Answer

2
4
6
✓ 8

Add Question Here

Question 57 **Multiple Choice** **0 points** Modify Remove

Question How many electrons are there in the valence shell of the nitrogen atom of ammonia?

Answer

4
5
6
✓ 8

Add Question Here

Question 58 **Multiple Choice** **0 points** Modify Remove

Question What is the approximate value of the H-C-H bond angles in a methyl cation, CH_3^+?

Answer

90°
109°
✓ 120°
180°

Add Question Here

Question 59 **Multiple Choice** **0 points** Modify Remove

Question What is the approximate value of the H-C-H bond angles in a methyl anion, CH_3^-?

Answer

90°
✓ 109°
120°
180°

Add Question Here

Question 60 **Multiple Choice** **0 points** Modify Remove

Question Which atomic orbitals overlap to form the carbon-hydrogen s bonding molecular orbitals of ethane, CH_3CH_3?

Answer

C2*p* + H1*s*
C2*sp* + H1*s*
C2sp^2 + H1*s*
✓ C2sp^3 + H1*s*

Add Question Here

Question 61 **Multiple Choice** **0 points** Modify Remove

Question Which atomic orbitals overlap to form the carbon-hydrogen s bonding molecular orbitals of ethene, $H_2C{=}CH_2$?

Answer

C2*p* + H1*s*
C2*sp* + H1*s*
✓ C2sp^2 + H1*s*
C2sp^3 + H1*s*

Add Question Here

Question 62 **Multiple Choice** **0 points** Modify Remove

Question Which atomic orbitals overlap to form the carbon-carbon s and p bonding molecular orbitals of ethene, $H_2C{=}CH_2$?

Answer

C2sp^3 + C2sp^3, and C2*p* + C2*p*
C2sp^2 + C2sp^2, and C2sp^2 + C2sp^2
✓ C2sp^2 + C2sp^2, and C2*p* + C2*p*
C2sp^3 + C2sp^3, and C2sp^2 + C2sp^2

Add Question Here

Question 63 **Multiple Choice** **0 points** Modify Remove

Question Which atomic orbitals overlap to form the carbon-hydrogen s bonding molecular orbitals of ethyne, HC°CH?

Answer

C2*p* + H1*s*

✓ C2*sp* + H1*s*

C2sp^2 + H1*s*

C2sp^3 + H1*s*

Add Question Here

Question 64 **Multiple Choice** **0 points** Modify Remove

Question Which atomic orbitals overlap to form the carbon-carbon s molecular bonding orbital of ethyne, HC°CH?

Answer

C2*p* + C2*p*

✓ C2*sp* + C2*sp*

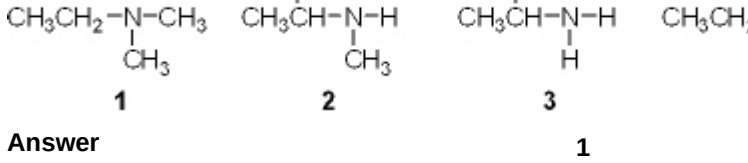
C2sp^2 + C2sp^2

C2sp^3 + C2sp^3

Add Question Here

Question 65 **Multiple Choice** **0 points** Modify Remove

Question Which of the following is a primary (1°) alcohol?



Answer

✓ **1**

2

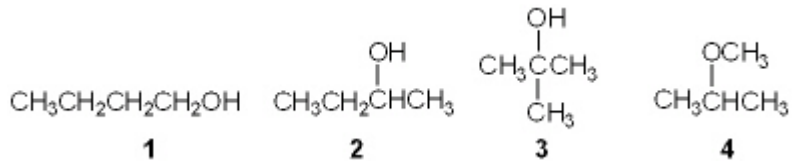
3

4

Add Question Here

Question 66 **Multiple Choice** **0 points** Modify Remove

Question Which of the following is a tertiary (3°) alcohol?



Answer

1

2

✓ **3**

4

Add Question Here

Question 67 **Multiple Choice** **0 points** Modify Remove

Question Which of the following is a primary (1°) amine?

Answer

1

2

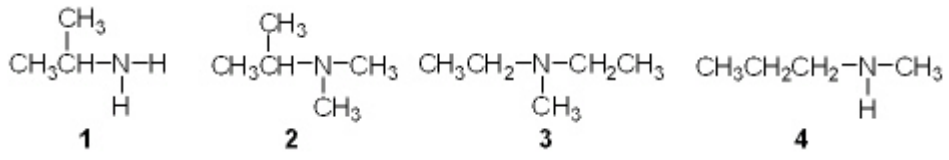
✓ **3**

4

Add Question Here

Question 68 **Multiple Choice** **0 points** Modify Remove

Question Which of the following is a secondary (2°) amine?



Answer

1

2

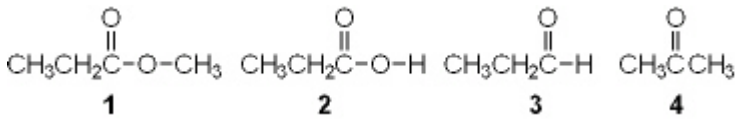
3

✓ **4**

Add Question Here

Question 69 **Multiple Choice** **0 points** Modify Remove

Question Which of the following is an ester?



Answer ✓ **1**
2
3
4

Add Question Here

Question 70 **Multiple Choice** **0 points** Modify Remove

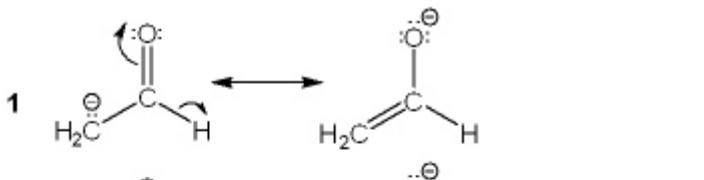
Question What is the approximate strength of the C-C bond of ethane?

Answer ✓ 376 kJ/mol (90 kcal./mol)
422 kJ/mol (101 kcal./mol)
556 kJ/mol (133 kcal./mol)
727 kJ/mol (174 kcal./mol)

Add Question Here

Question 71 **Multiple Choice** **0 points** Modify Remove

Question Which of the circled bonds is the strongest?

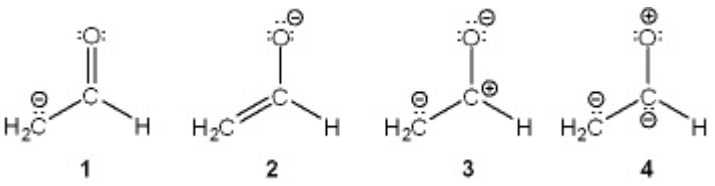


Answer ✓ **1**
2
3
4

Add Question Here

Question 72 **Multiple Choice** **0 points** Modify Remove

Question Which of the following resonance structures makes the largest contribution to the structure of $[H_2CCHO]^-$?

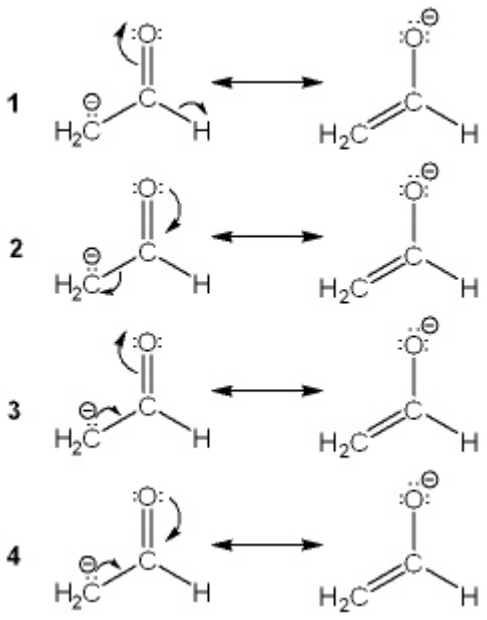


Answer **1**
✓ **2**
3
4

Add Question Here

Question 73 **Multiple Choice** **0 points** Modify Remove

Question Which of the following shows curved arrows that correctly accounts for the differences between the two structures?



Answer **1**
2
✓ **3**
4

Add Question Here

Question 74 **Multiple Choice** **0 points** Modify Remove

Question Which of the following statements is not true?

Answer The sp^3C-H bond of an alkane is weaker than the *sp*C-H bond of an alkyne.
The carbon-carbon triple bond of an alkyne is shorter than the carbon-carbon bond of alkenes.
✓ The carbon-carbon triple bond of an alkene is exactly three times as strong as a carbon-carbon single bond of an alkane.
The sp^3C-H bond of an alkane is longer than the *sp*C-H bond of an alkyne.

Add Question Here

Question 75 **Multiple Choice** **0 points** Modify Remove

Question Which of the following is/are tetrahedral?

1. methane, CH_4
2. methyl carbocation, CH_3^+
3. methyl carbanion, CH_3^-
4. methyl radical, $CH_3^\times$

Answer

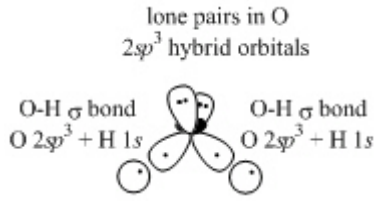
only **1** and **2**
✓ only **1** and **3**
only **1** and **4**
only **2** and **3**

Add Question Here

Question 76 **Essay** **0 points** Modify Remove

Question Provide a neatly drawn figure to show the atomic orbitals that overlap to form each of the bonds in water (H_2O) and which contain the lone pair of electrons. Label each orbital with its hybridization.

Answer

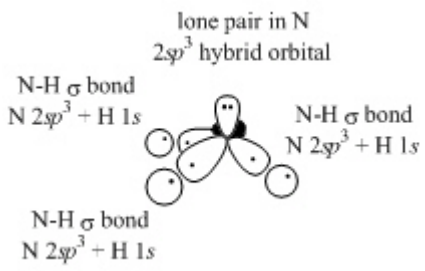


Add Question Here

Question 77 **Essay** **0 points** Modify Remove

Question Provide a neatly drawn figure to show the atomic orbitals that overlap to form each of the bonds in ammonia (NH_3) and which contain the lone pair of electons. Label each orbital with its hybridization.

Answer

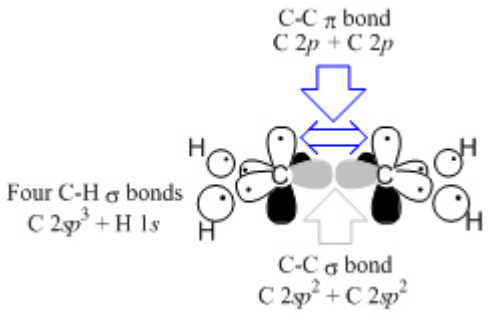


Add Question Here

Question 78 **Essay** **0 points** Modify Remove

Question Provide a neatly drawn figure to show the atomic orbitals that overlap to form each of the bonds in ethene (ethylene, $H_2C{=}CH_2$). Label each bond (e.g., C–H s bond) and indicate which atomic orbitals contribute to this bond (e.g., C $2sp^3$ + H 1s).

Answer

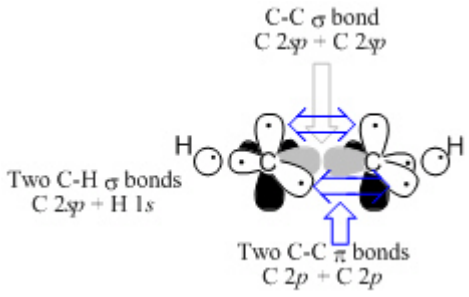


Add Question Here

Question 79 **Essay** **0 points** Modify Remove

Question Provide a neatly drawn figure to show the atomic orbitals that overlap to form each of the bonds in ethyne (acetylene, HC°CH). Label each bond (e.g., C–H s bond) and indicate which atomic orbitals contribute to this bond (e.g., C $2sp^3$ + H 1s).

Answer

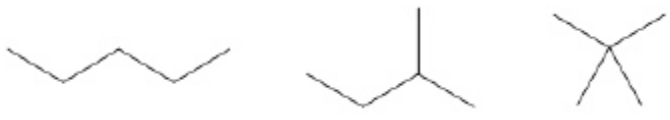


Add Question Here

Question 80 **Essay** **0 points** Modify Remove

Question Draw bond-line structures of all of the alkanes that have the formula C_5H_{12}.

Answer

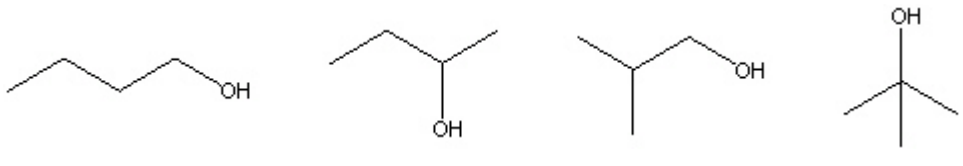


Add Question Here

Question 81 **Essay** **0 points** Modify Remove

Question Draw bond-line structures of all of the alcohols that have the formula $C_4H_{10}O$.

Answer

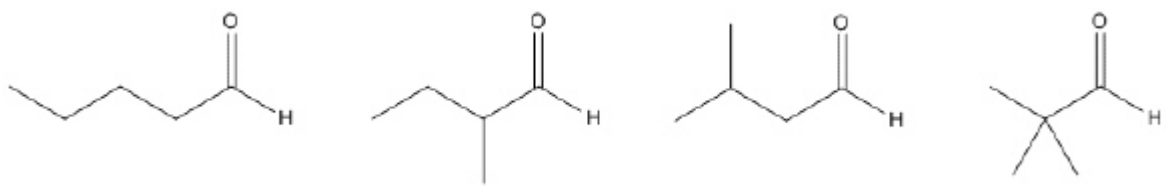


Add Question Here

Question 82 **Essay** **0 points** Modify Remove

Question Draw bond-line structures of all of the aldehydes that have the formula $C_5H_{10}O$.

Answer

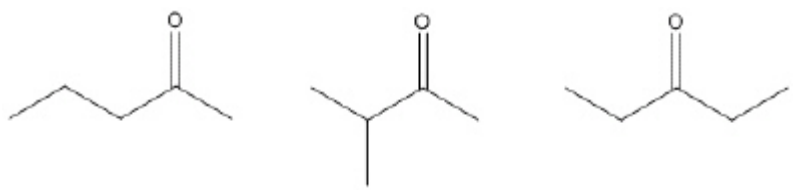


Add Question Here

Question 83 **Essay** **0 points** Modify Remove

Question Draw bond-line structures of all of the ketones that have the formula $C_5H_{10}O$.

Answer

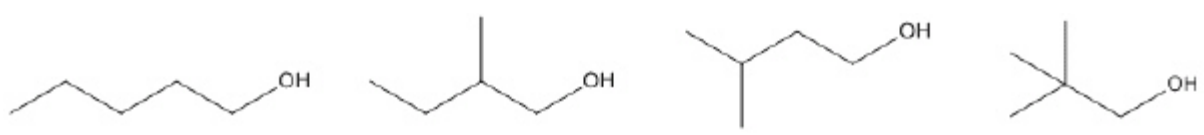


Add Question Here

Question 84 **Essay** **0 points** Modify Remove

Question Draw bond-line structures of all of the primary (1°) alcohols that have the formula $C_5H_{12}O$.

Answer

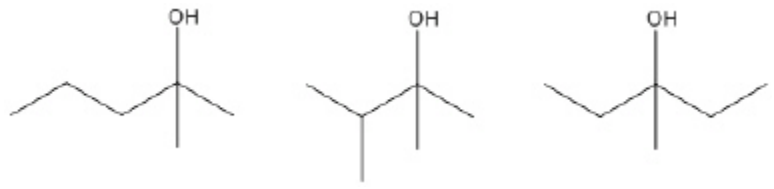


Add Question Here

Question 85 **Essay** **0 points** Modify Remove

Question Draw bond-line structures of all of the tertiary (3°) alcohols that have the formula $C_6H_{14}O$.

Answer

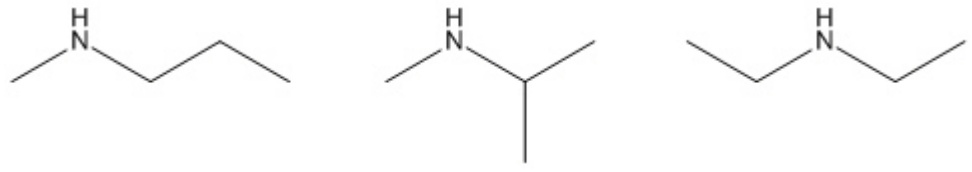


Add Question Here

Question 86 **Essay** **0 points** Modify Remove

Question Draw bond-line structures of all of the secondary (2°) amines that have the formula C_4H_9N.

Answer

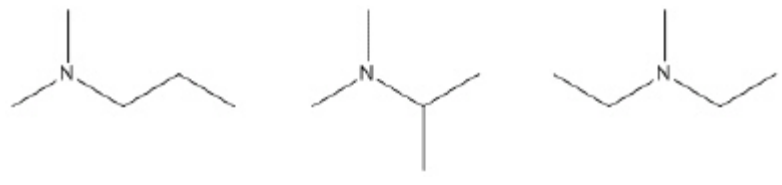


Add Question Here

Question 87 **Essay** **0 points** Modify Remove

Question Draw bond-line structures of all of the tertiary (3°) amines that have the formula $C_5H_{11}N$.

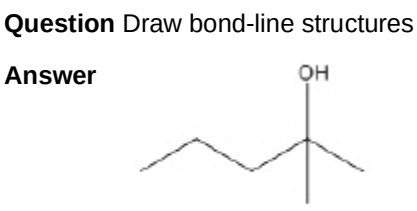
Answer



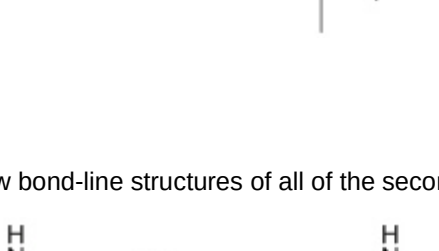
Add Question Here

Question 88 **Essay** **0 points** Modify Remove

Question Circle all of the sp^2 hybridized atoms in the following molecular structure.



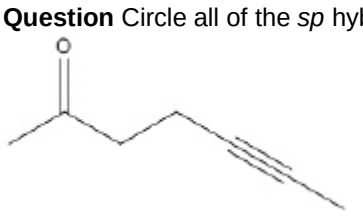
Answer



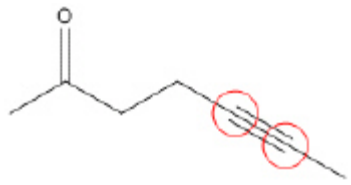
Add Question Here

Question 89 **Essay** **0 points** Modify Remove

Question Circle all of the *sp* hybridized atoms in the following molecular structure.



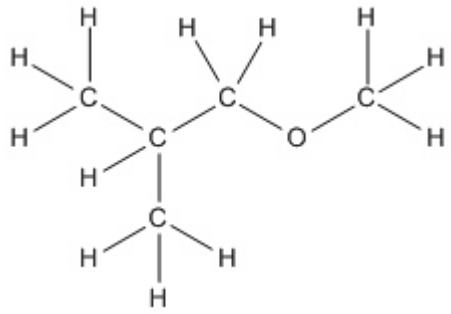
Answer



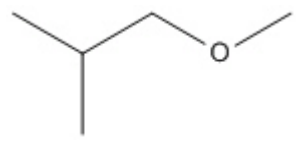
Add Question Here

Question 90 **Essay** **0 points** Modify Remove

Question Convert the following structure into a bond-line drawing.



Answer

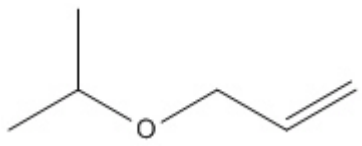


Add Question Here

Question 91 **Essay** **0 points** Modify Remove

Question Convert the following structure into a bond-line drawing.

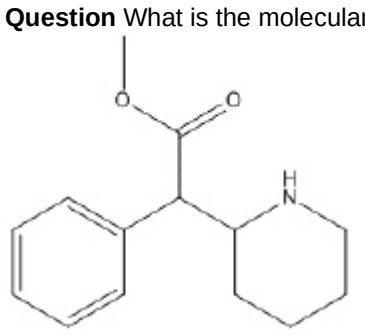
Answer



Add Question Here

Question 92 **Essay** **0 points** Modify Remove

Question What is the molecular formula of Ritalin, shown below?

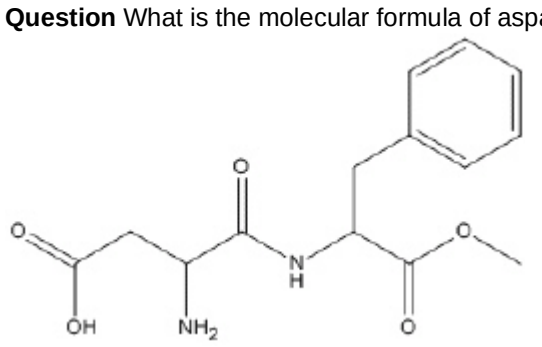


Answer $C_{14}H_{19}NO_2$

Add Question Here

Question 93 **Essay** **0 points** Modify Remove

Question What is the molecular formula of aspartame, shown below?

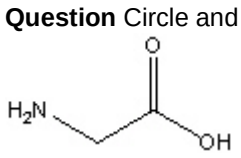


Answer $C_{14}H_{18}N_2O_5$

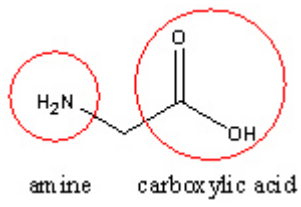
Add Question Here

Question 94 **Essay** **0 points** Modify Remove

Question Circle and name the functional groups in the following molecule.



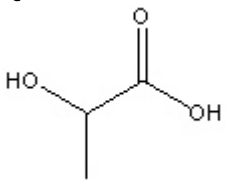
Answer



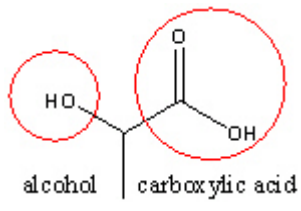
Add Question Here

Question 95 **Essay** **0 points** Modify Remove

Question Circle and name the functional groups in the following molecule.



Answer



Add Question Here

OK