1. Convert the following molecule from line bond notation to a Lewis structure that shows all the carbon and hydrogen atoms.

\[
\begin{array}{c}
\text{C} \\
\text{H} \\
\text{H} \\
\text{C} \\
\text{H} \\
\end{array}
\]

2. What is the official IUPAC name of the following molecule?

\[
\begin{array}{c}
\text{O} \\
\text{H} \\
\text{C} \\
\text{C} \\
\text{Br} \\
\end{array}
\]

3. Draw the more stable chair conformation of the following molecule:

\[
\begin{array}{c}
\text{Cl} \\
\text{Cl} \\
\text{Cl} \\
\text{C} \\
\text{Cl} \\
\text{C} \\
\end{array}
\]
1. Convert the following molecule from line bond notation to a Lewis structure that shows all the carbon and hydrogen atoms.

![Molecule](image)

2. What is the official IUPAC name of the following molecule?

![Molecule](image)

3. Draw the more stable chair conformation of the following molecule:

![Molecule](image)
1. Convert the following molecule from line bond notation to a Lewis structure that shows all the carbon and hydrogen atoms.

![Cyclohexane](https://via.placeholder.com/150)

2. What is the official IUPAC name of the following molecule?

![Alkene](https://via.placeholder.com/150)

3. Draw the more stable chair conformation of the following molecule:

![Cyclohexane](https://via.placeholder.com/150)
1. What is the formal charge on the nitrogen atom in the molecule shown below?

\[ \text{N} \]

2. Two resonance forms of the same molecule are shown below. Draw arrows to show how the structure on the left would covert to the structure on the right and how the structure on the right would covert to the structure to the left.

\[ \text{H}_3\text{C} \text{C} \text{O} \text{H} \quad \xrightarrow{\text{arrows}} \quad \text{H}_3\text{C} \text{C} \text{O} \text{H} \]

3a. Draw a resonance structure for the molecule shown below.
3b. If your resonance structure has any formal charges, be sure to show them clearly.

\[ \text{C} = \text{O} \text{H} \]
1. What is the formal charge on the oxygen atom in the molecule shown below?

\[ \text{H} \quad \text{O} \]  

2. Two resonance forms of the same molecule are shown below. Draw arrows to show how the structure on the left would covert to the structure on the right and how the structure on the right would covert to the structure to the left.

\[ \text{H}_3\text{C} \quad \text{C} \quad \text{NH} \quad \text{O} \quad \text{H}_3\text{C} \quad \text{C} \quad \text{NH} \]

3a. Draw a resonance structure for the molecule shown below.
3b. If your resonance structure has any formal charges, be sure to show them clearly.

\[ \text{=} \quad \text{O} \quad \text{=} \]
1. What is the formal charge on the carbon atom in the molecule shown below?

\[
\text{HO-}\text{C}=:\text{H}
\]

2. Two resonance forms of the same molecule are shown below. Draw arrows to show how the structure on the left would covert to the structure on the right and how the structure on the right would covert to the structure to the left.

\[
\begin{align*}
\text{H}_3\text{C} & \equiv \text{C} & \equiv \text{NH}_2 \\
\phantom{\text{H}_3\text{C}} & \text{O} & \phantom{\text{NH}_2}
\end{align*}
\]

3a. Draw a resonance structure for the molecule shown below.
3b. If your resonance structure has any formal charges, be sure to show them clearly.
1. What is the relationship between the following two molecules? Are they identical, enantiomers or diastereomers?

2. Label all chiral centers in the molecule shown below.

3. Determine the R/S configuration of the chiral center shown below. Make sure to clearly indicate the priority (1, 2, 3 or 4) of each group attached to the chiral carbon.
1. Give the product of the following reaction:

\[
\text{NaBH}_4, \text{ then H}_2\text{O}
\]

2. Which functional group (acetal or hemiacetal) is shown in the molecule below?

3. Draw the structures of the ketone and alcohol that were used to synthesize this compound:

\[
\text{CH}_3\text{O} \quad \text{CH}_3
\]

\[
\text{OCH}_3
\]
1. Give the product of the following reaction:

\[ \text{Ag(NH}_3\text{)}_2^+ \xrightarrow{} \]

2. Which functional group (acetal or hemiacetal) is shown in the molecule below?

3. Draw the structures of the ketone and alcohol that were used to synthesize this compound:
1. Give the product of the following reaction:

\[
\begin{align*}
&\text{CH}_3\text{H} \\
&\overset{\text{H}_2 + \text{catalyst}}{\longrightarrow} \\
&\text{O}
\end{align*}
\]

2. Which functional group (acetal or hemiacetal) is shown in the molecule below?

\[
\begin{align*}
&\text{O} \\
&\text{O}
\end{align*}
\]

3. Draw the structures of the ketone and alcohol that were used to synthesize this compound:

\[
\begin{align*}
&\text{O} \\
&\text{OH}
\end{align*}
\]
1. Convert the following sugar from the open form to the hemiacetal form.
   Draw a 6-membered ring.
   Draw the anomeric carbon with the OH group α (alpha).

   
   

2. Give the product of the following reaction:

   
   

3. Analyze the following disaccharide:
   a. Label the anomeric carbons with stars.
   b. Is the linkage between the two sugars an alpha or beta linkage?
   c. Is this compound a reducing sugar? In other words, does it undergo oxidation with Benedict’s or Tollens’ reagent?

   

4. Is the following compound a steroid, phospholipid or prostaglandin?

   

1. Convert the following sugar from the open form to the hemiacetal form.
   Draw a 6-membered ring.
   Draw the anomeric carbon with the OH group β (beta).

2. Give the product of the following reaction:

3. Analyze the following disaccharide:
   a. Label the anomeric carbons with stars.
   b. Is the linkage between the two sugars an alpha or beta linkage?
   c. Is this compound a reducing sugar? In other words does it undergo oxidation with
      Benedicts' or Tollens' reagent?

4. Is the following compound a steroid, phospholipid or prostaglandin?
1. Convert the following sugar from the open form to the hemiacetal form.
   Draw a 6-membered ring.
   Draw the anomeric carbon with the OH group β (beta).

2. Give the product of the following reaction:

\[ \text{CH}_2\text{OH} \quad \overset{\text{NaBH}_4}{\rightarrow} \quad \text{CH}_2\text{OH} \]

3. Analyze the following disaccharide:
   a. Label the anomeric carbons with stars.
   b. Is the linkage between the two sugars an alpha or beta linkage?
   c. Is this compound a reducing sugar? In other words does it undergo oxidation with Benedict's or Tollens' reagent?

4. Is the following compound a steroid, phospholipid or prostaglandin?
1. Draw the zwitterion form of the amino acid shown below:

\[
\begin{align*}
\text{CH}_2\text{OH} \\
\text{H}_2\text{N} & \quad \text{CO}_2\text{H} \\
\text{H} 
\end{align*}
\]

2. Construct a dipeptide LEU ASP from the amino acids shown below. Make sure to draw the dipeptide in the form it would take in your body (at physiological pH):

Leucine (Leu, \( L \))  
Aspartic acid (Asp, \( D \))

3a. What type of interaction is depicted by the dotted line in the following drawing: ionic bonding, covalent bonding, \( H \) bonding or a hydrophobic interaction?
3b. Does this interaction affect the primary, secondary or tertiary structure of a protein?
1. Draw the zwitterion form of the amino acid shown below:

\[
\begin{array}{c}
\text{CH}_2\text{CH}_2\text{SCH}_3 \\
\text{H}_2\text{N} - \text{CO}_2\text{H} \\
\text{H} \\
\end{array}
\]

\[\text{VAL LYS}\]

2. Construct a dipeptide \[\text{Val-lys}\] from the amino acids shown below. Make sure to draw the dipeptide in the form it would take in your body (at physiological pH):

\[\text{Valine (Val, V)}\]

\[\text{Lysine (Lys, K)}\]

3a. What type of interaction is depicted by the dotted line in the following drawing: ionic bonding, covalent bonding, H bonding or a hydrophobic interaction?

3b. Does this interaction affect the primary, secondary or tertiary structure of a protein?
1. Draw the zwitterion form of the amino acid shown below:

\[
\begin{align*}
\text{CH}_2\text{SH} \\
\text{H}_2\text{N} & \quad \text{CO}_2\text{H} \\
\text{H} & \\
\text{Glu-ALA}
\end{align*}
\]

2. Construct a dipeptide from the amino acids shown below. Make sure to draw the dipeptide in the form it would take in your body (at physiological pH):

\[
\begin{align*}
\text{COO}^- & \\
\text{H}_2\text{N} & \quad \text{C} \quad \text{H} \\
\text{CH}_2 & \\
\text{CH}_2 & \\
\text{COO}^- & \\
\text{H}_2\text{N} & \quad \text{C} \quad \text{H} \\
\text{CH}_3
\end{align*}
\]

Glutamic acid (Glu, E)  Alanine (Ala, A)

3a. What type of interaction is depicted by the dotted line in the following drawing: ionic bonding, covalent bonding, H bonding or a hydrophobic interaction?

3b. Does this interaction affect the primary, secondary or tertiary structure of a protein?
1. Convert the following molecule from line bond notation to a Lewis structure that shows all the carbon and hydrogen atoms.

\[
\begin{align*}
\text{CH}_3 & - C - C & \equiv & C - \text{CH}_3 \\
\text{CH}_3 & - \\
\end{align*}
\]

2. What is the official IUPAC name of the following molecule?

\[
\text{5-bromo-3-methylhexanoic acid}
\]

3. Draw the more stable chair conformation of the following molecule:
1. Convert the following molecule from line bond notation to a Lewis structure that shows all the carbon and hydrogen atoms.

2. What is the official IUPAC name of the following molecule?

3. Draw the more stable chair conformation of the following molecule:
1. Convert the following molecule from line bond notation to a Lewis structure that shows all the carbon and hydrogen atoms.

2. What is the official IUPAC name of the following molecule?

3. Draw the more stable chair conformation of the following molecule:
1. What is the formal charge on the nitrogen atom in the molecule shown below?

2. Two resonance forms of the same molecule are shown below. Draw arrows to show how the structure on the left would covert to the structure on the right and how the structure on the right would covert to the structure to the left.

3a. Draw a resonance structure for the molecule shown below.
3b. If your resonance structure has any formal charges, be sure to show them clearly.
1. What is the formal charge on the oxygen atom in the molecule shown below?

2. Two resonance forms of the same molecule are shown below. Draw arrows to show how the structure on the left would convert to the structure on the right and how the structure on the right would convert to the structure to the left.

3a. Draw a resonance structure for the molecule shown below. 
3b. If your resonance structure has any formal charges, be sure to show them clearly.
1. What is the formal charge on the carbon atom in the molecule shown below?

2. Two resonance forms of the same molecule are shown below. Draw arrows to show how the structure on the left would covert to the structure on the right and how the structure on the right would covert to the structure to the left.

3a. Draw a resonance structure for the molecule shown below.
3b. If your resonance structure has any formal charges, be sure to show them clearly.
1. What is the relationship between the following two molecules? Are they identical, enantiomers or diastereomers?

2. Label all chiral centers in the molecule shown below.

3. Determine the R/S configuration of the chiral center shown below. Make sure to clearly indicate the priority (1, 2, 3 or 4) of each group attached to the chiral carbon.
1. Give the product of the following reaction:

\[
\begin{array}{c}
\text{NaBH}_4, \text{ then } \text{H}_2\text{O} \\
\left(\begin{array}{c}
\text{OCH}_3 \\
\text{O}
\end{array}\right)
\end{array}
\]

2. Which functional group (acetal or hemiacetal) is shown in the molecule below?

3. Draw the structures of the ketone and alcohol that were used to synthesize this compound:
1. Give the product of the following reaction:

\[
\text{Cyclohexanone} \quad \text{Ag(NH}_3\text{)}_2^+ \quad \rightarrow \quad \text{No Reaction}
\]

2. Which functional group (acetal or hemiacetal) is shown in the molecule below?

3. Draw the structures of the ketone and alcohol that were used to synthesize this compound:
1. Give the product of the following reaction:

\[
\text{CH}_3\text{CHO} + \text{H}_2 + \text{catalyst} \rightarrow \text{CH}_3\text{CH(OH)}\text{CH}_3
\]

2. Which functional group (acetal or hemiacetal) is shown in the molecule below?

3. Draw the structures of the ketone and alcohol that were used to synthesize this compound:

\[
\begin{align*}
\text{Ketone} & : \\
\text{Alcohol} & :
\end{align*}
\]
1. Convert the following sugar from the open form to the hemiacetal form.
   Draw a 6-membered ring.
   Draw the anomeric carbon with the OH group α (alpha).

2. Give the product of the following reaction:

3. Analyze the following disaccharide:
   a. Label the anomeric carbons with stars.
   b. Is the linkage between the two sugars an alpha or beta linkage?
   c. Is this compound a reducing sugar? In other words, does it undergo oxidation with Benedict's or Tollens' reagent? yes

4. Is the following compound a steroid, phospholipid or prostaglandin?
1. Convert the following sugar from the open form to the hemiacetal form. 
   Draw a 6-membered ring. 
   Draw the anomeric carbon with the OH group β (beta).

2. Give the product of the following reaction:

3. Analyze the following disaccharide:
   a. Label the anomeric carbons with stars. 
   b. Is the linkage between the two sugars an alpha or beta linkage? 
   c. Is this compound a reducing sugar? In other words does it undergo oxidation with 
      Benedict's or Tollens' reagent? 

4. Is the following compound a steroid, phospholipid or prostaglandin?
1. Convert the following sugar from the open form to the hemiacetal form.
   Draw a 6-membered ring.
   Draw the anomeric carbon with the OH group β (beta).

2. Give the product of the following reaction:

3. Analyze the following disaccharide:
   a. Label the anomeric carbons with stars.
   b. Is the linkage between the two sugars an alpha or beta linkage?
   c. Is this compound a reducing sugar? In other words, does it undergo oxidation with Benedict’s or Tollens’ reagent?

4. Is the following compound a steroid, phospholipid or prostaglandin?
1. Draw the zwitterion form of the amino acid shown below:

\[
\begin{align*}
\text{CH}_2\text{OH} & \\
\text{H}_2\text{N} & \quad \text{CO}_2\text{H} \\
\text{H} &
\end{align*}
\]

\[
\begin{align*}
\text{CH}_2\text{OH} & \\
\text{H}_3\text{N}^+ & \quad \text{CO}_2^- \\
\text{H} &
\end{align*}
\]

2. Construct a dipeptide LEU ASP from the amino acids shown below. Make sure to draw the dipeptide in the form it would take in your body (at physiological pH):

Leucine (Leu, L)

Aspartic acid (Asp, D)

3a. What type of interaction is depicted by the dotted line in the following drawing: ionic bonding, covalent bonding, H bonding or a hydrophobic interaction?

3b. Does this interaction affect the primary, secondary or tertiary structure of a protein?
Quiz Vb
May 14, 2014

1. Draw the zwitterion form of the amino acid shown below:

   \[
   \begin{array}{c}
   \text{CH}_2\text{CH}_2\text{SCH}_2 \\
   \text{H}_2\text{N} - \text{CO}_2\text{H} \\
   \text{H}
   \end{array}
   \quad \text{CH}_2\text{CH}_2\text{SCH}_2 \\
   \text{H}_3\text{N} - \text{CO}_2^-
   \]

   VAL  LYS

2. Construct a dipeptide from the amino acids shown below. Make sure to draw the dipeptide in the form it would take in your body (at physiological pH):

   \[
   \begin{array}{c}
   \text{COO}^- \\
   \text{H}_3\text{N} - \text{C} - \text{H} \\
   \text{CH}_2 \\
   \text{CH}_3 \\
   \text{Valine (Val, V)}
   \end{array}
   \quad \begin{array}{c}
   \text{COO}^- \\
   \text{H}_3\text{N} - \text{C} - \text{H} \\
   \text{CH}_2 \\
   \text{CH}_3 \\
   \text{CH}_3 \\
   \text{CH}_3
   \end{array}
   \quad \begin{array}{c}
   \text{H} \\
   \text{N} - \text{C} - \text{C} - \text{N} - \text{H} - \text{C} - \text{C} - \text{O}^\ominus \\
   \text{CH}_3 \\
   \text{CH}_2 \\
   \text{CH}_2 \\
   \text{CH}_2 \\
   \text{Lysine (Lys, K)}
   \end{array}
   \]

3a. What type of interaction is depicted by the dotted line in the following drawing: ionic bonding, covalent bonding, H bonding, or a hydrophobic interaction?
3b. Does this interaction affect the primary, secondary or tertiary structure of a protein?
1. Draw the zwitterion form of the amino acid shown below:

\[ \text{H}_2\text{N}^-\text{CH}_2\text{SH} \quad \text{H} \quad \text{CO}_2\text{H} \quad \text{H}_3\text{N}^-\text{C}^+\text{H} \quad \text{CH}_2\text{SH} \]

\[ \text{H}_3\text{N}^-\text{C}^+\text{H} \quad \text{CO}_2\text{H} \quad \text{H}_2\text{N}^-\text{C}^+\text{H} \]

\[ \text{GLU} - \text{ALA} \]

2. Construct a dipeptide from the amino acids shown below. Make sure to draw the dipeptide in the form it would take in your body (at physiological pH):

\[ \text{COO}^- \quad \text{H}_3\text{N}^-\text{C}^+\text{H} \quad \text{CH}_2\text{SH} \quad \text{COO}^- \]

\[ \text{H}_3\text{N}^-\text{C}^+\text{H} \quad \text{CH}_2\text{SH} \quad \text{COO}^- \]

Glutamic acid (Glu, E)  Alanine (Ala, A)

3a. What type of interaction is depicted by the dotted line in the following drawing: ionic bonding, covalent bonding, H bonding or a hydrophobic interaction?

3b. Does this interaction affect the primary, secondary or tertiary structure of a protein?