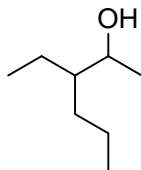


Question No. 1 of 10

Instructions: (1) Read the problem and answer choices carefully (2) Work the problems on paper as needed (3) Pick the answer (4) Go back to review the core concept tutorial as needed.

Question #01

Question 1. Determine the correct IUPAC name for the compound as shown:



- (A) 3-propyl-2-pentanol
 (B) 3-ethyl-2-hexanol
 (C) 4-ethyl-5-hexanol
 (D) 3-propyl-4-pentanol

Feedback on Each Answer Choice

A. Incorrect!

Pentanol indicates the longest parent chain is 5 carbons long. Go back and recount the carbons. See if you can find a longer chain.

B. Correct!

You correctly identified the molecule as an alcohol with a parent chain that is 6 carbons long. The parent chain should be numbered to give the alcohol the lowest possible number as it is here. This also ensures that the substituent is correctly numbered.

C. Incorrect!

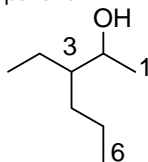
Remember that the parent chain should be numbered to give the alcohol the lowest possible number. Go back and recheck your work.

D. Incorrect!

Pentanol indicates the longest parent chain is 5 carbons long. Go back and recount the carbons. See if you can find a longer chain.

Solution

(1) Find the longest carbon chain and the main functional group in the molecule to determine the parent.



The longest carbon chain is comprised of six carbons. The molecule is an alcohol (the alcohol suffix is -anol) so the parent's name is hexanol.

When an alcohol functional group is present, the chain should be numbered so that the alcohol has the lowest possible number. If numbering the longest chain from bottom to top, the alcohol would have a number of 5. If numbering from top to bottom, the alcohol would have a number of 2. Therefore, the chain must be numbered from top to bottom in this case to give the parent as 2-hexanol.

(2) Determine the substituents and their correct location numbers.

In determining the names of the substituents, make a list of the substituents present in the molecule. There is an ethyl group in the molecule.

Since the alcohol determined the numbering of the chain, you already know the location number of the substituent: 3-ethyl.

(3) Put the substituents in alphabetical order (ignoring any numerical prefixes) and place in front of the parent name.

3-ethyl-2-hexanol

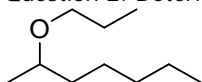
Therefore, the correct answer is (B).

Question No. 2 of 10

Instructions: (1) Read the problem and answer choices carefully (2) Work the problems on paper as needed (3) Pick the answer (4) Go back to review the core concept tutorial as needed.

Question #02

Question 2. Determine the correct IUPAC name for the compound shown:



- (A) propyl-2-heptyl ether
- (B) 6-propoxyheptane
- (C) decyl ether
- (D) 2-propoxyheptane

Feedback on Each Answer Choice

A. Incorrect!

Correct IUPAC nomenclature does not name an ether as a parent compound. As a result, when deciding between choices on the MCAT, you can eliminate any choice that ends in ether.

B. Incorrect!

Recall that the parent chain is numbered so that the substituent encountered first will have the lowest possible number. Review your work and determine if you can number the chain so that the propoxy group obtains a lower location number.

C. Incorrect!

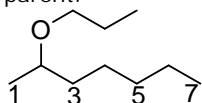
Correct IUPAC nomenclature does not name an ether as a parent compound. As a result, when deciding between choices on the MCAT, you can eliminate any choice that ends in ether.

D. Correct!

The molecule is an ether, but since ethers are name as substituents and do not have suffixes, the parent's name is determined from the longest alkyl chain attached to the ether's oxygen. The remainder of the molecule, the -OR group, is named as a substituent.

Solution

(1) Find the longest carbon chain and the main functional group in the molecule to determine the parent.



The longest carbon chain is comprised of seven carbons. The molecule is an ether, but since ethers are name as substituents and do not have suffixes, the parent's name is determined from the longest alkyl chain attached to the ether's oxygen. In this case, the parent chain is heptane.

(2) Determine the substituents and their correct location numbers.

With ethers, the -OR group is named as a substituent using the alkyl prefix followed by -oxy. The R group on the -OR is three carbons long so the substituent will be named as propoxy.

To determine the location number of the substituent, recall that the parent chain is numbered so that the substituent encountered first will have the lowest possible number. In the structure above, you can number the substituent the following ways:

Right to left numbering: 6

Left to right numbering: 2

Since the left to right numbering gives the propoxy group the lowest possible number, that numbering will be used to give the location number of the substituent.

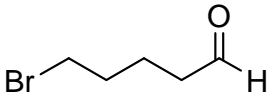
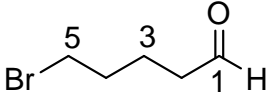
(3) Put the substituents in alphabetical order (ignoring any numerical prefixes) and place in front of the parent name.

2-propoxyheptane

Therefore, the correct answer is (D).

Question No. 3 of 10

Instructions: (1) Read the problem and answer choices carefully (2) Work the problems on paper as needed (3) Pick the answer (4) Go back to review the core concept tutorial as needed.

Question #03	<p>Question 3. Determine the IUPAC name for the following compound:</p>  <p>(A) 1-bromopentanal (B) 5-bromopentanone (C) bromopentanol (D) 5-bromopentanal</p>
Feedback on Each Answer Choice	<p>A. Incorrect! While the molecule has been correctly identified as an aldehyde, the location numbering of the parent chain is incorrect. Go back and review the rules for numbering a chain containing an aldehyde.</p> <p>B. Incorrect! The suffix –anone is indicative of a ketone being present in the molecule. There is no ketone in this molecule. Go back and review the different carbonyl containing functional groups.</p> <p>C. Incorrect! The suffix –anol is indicative of an alcohol being present in the molecule. There are no alcohol functional groups in this molecule. Go back and review the different oxygen containing functional groups.</p> <p>D. Correct! The molecule is a five carbon aldehyde and the numbering of the parent chain begins with numbering the carbonyl carbon as carbon 1. This numbering gives the bromine substituent a location number of 5.</p>
Solution	<p>(1) Find the longest carbon chain and the main functional group in the molecule to determine the parent.</p>  <p>The longest carbon chain is comprised of five carbons. The molecule is an aldehyde (the suffix for an aldehyde is –anal) so the parent chain's name is pentanal. No location number would be listed in front of the name pentanal because it is assumed since aldehydes are always on the end of the carbon chains that the aldehyde located at carbon 1.</p> <p>(2) Determine the substituents and their correct location numbers.</p> <p>The only substituent present in the molecule is a bromine atom.</p> <p>As stated above, the aldehyde functional group is given priority and the numbering of the parent chain begins at the carbonyl carbon of the aldehyde. This numbering results in the location number of the bromine being 5.</p> <p>(3) Put the substituents in alphabetical order (ignoring any numerical prefixes) and place in front of the parent name.</p> <p>5-bromopentanal</p> <p>Therefore, the correct answer is (D).</p>

Question No. 4 of 10

Instructions: (1) Read the problem and answer choices carefully (2) Work the problems on paper as needed (3) Pick the answer (4) Go back to review the core concept tutorial as needed.

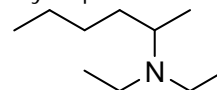
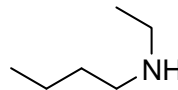
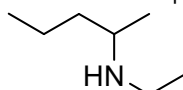
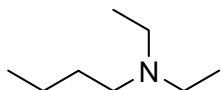
Question #04	<p>Question 4. Which structure shown corresponds to the IUPAC name 5-ethyl-4-methyl-3-heptanone?</p> <div style="display: flex; justify-content: space-around; align-items: center;"><div style="text-align: center;"> I</div><div style="text-align: center;"> II</div><div style="text-align: center;"> III</div><div style="text-align: center;"> IV</div></div> <p>(A) I (B) II (C) III (D) IV</p>
Feedback on Each Answer Choice	<p>A. Incorrect! While this choice has the correct number of carbons in its parent chain, the correct placement of the ketone functionality, and the correct substituents, the location numbers of the substituents do not match up with the name given in the problem.</p> <p>B. Correct! This molecule contains the correct number of carbons in its parent chain, the correct placement of the ketone functionality, and the correct substituents at the correct locations along the parent chain.</p> <p>C. Incorrect! This compound is an aldehyde. The suffix –anone indicates a different functional group is the answer. Go back and review your functional group suffixes.</p> <p>D. Incorrect! The longest chain in this ketone is 8 carbons long. The parent name given has an alkyl prefix of hept. How many carbons does hept indicate should be in the longest chain?</p>
Solution	<p>(1) Examine the IUPAC name given in the problem. Identify the functional group in the parent chain from the given name.</p> <p>Here, the parent ends in –anone. This is the suffix for ketones. Based on this fact, we can already eliminate one choice. III is an aldehyde and not a ketone so it can not be the correct answer. The other three choices are ketones so we can move forward with them.</p> <p>(2) Identify the number of carbons in the parent chain.</p> <p>In this problem the parent has a prefix of hept which means there are 7 carbons in the longest chain. Based on this fact, we can eliminate another choice. The longest chain in IV is 8 carbons so it can not be the correct answer. The other two choices, I and II, do have 7 carbons in their longest chains.</p> <p>(3) Identify the type of substituents present from the given name.</p> <p>Two substituents are given in the IUPAC name. We can expect the structure of the molecule to include both a methyl and an ethyl group. This fact does not help us eliminate any other choices though. Both I and II contain a methyl and ethyl group.</p> <p>(4) Identify the location of the substituents/functional groups from the given name.</p> <p>From the given name, we can determine the correct molecule will have a ketone at carbon 3, a methyl group on carbon 4, and an ethyl group on carbon 5. While the carbonyl of the ketone and the ethyl group are correctly located in both I and II, the methyl group's locations differ in I and II. In I, the methyl group is on carbon 2 (remember the chain should be numbered so that the ketone receives the lowest possible number). This fact eliminates I as a possible answer.</p> <p>This leaves II as the only possible answer.</p> <p>Therefore, the correct answer is (B).</p>

Question No. 5 of 10

Instructions: (1) Read the problem and answer choices carefully (2) Work the problems on paper as needed (3) Pick the answer (4) Go back to review the core concept tutorial as needed.

Question #05

Question 5. Which structure shown corresponds to the IUPAC name N-ethyl-2-pentanamine?



- (A) I
(B) II
(C) III
(D) IV

Feedback on Each Answer Choice

A. Incorrect!

The longest chain in this molecule is 4 carbons long. Can you determine how long the parent chain is in the given IUPAC name?

B. Correct!

This molecule has the correct number of carbons in its parent chain, the correct placement of the amine group, and the correct placement of the ethyl substituent on the nitrogen.

C. Incorrect!

The longest chain in this molecule is 4 carbons long. Can you determine how long the parent chain is in the given IUPAC name?

D. Incorrect!

The longest chain in this molecule is 6 carbons long. Can you determine how long the parent chain is in the given IUPAC name?

Solution

(1) Examine the IUPAC name given in the problem. Identify the functional group in the parent chain from the given name.

Here, the parent ends in –anamine. This is the suffix for amines. All the available choices are amines so we can not eliminate any just yet.

(2) Identify the number of carbons in the parent chain from the given name.

In this problem the parent has a prefix of pent which means there are 5 carbons in the longest chain. Based on this fact, we can eliminate three choices! The longest chain in both I and III is just 4 carbons long. In IV, the longest chain is 6 carbons long. These three choices can be eliminated.

This leaves II as the only choice but just to make sure it is correct, proceed to the next step.

(3) Identify the type of substituents present from the given name.

One substituent is given in the IUPAC name. We can expect the structure of the molecule to include an ethyl group. II does have an ethyl group so it is still a possibility.

(4) Identify the location of the substituents/functional groups from the given name.

From the given name, we can determine the correct molecule will have an amine attached at the second carbon in a five carbon chain. Also, the ethyl group should be directly attached to the nitrogen of the amine group. Compound II has both of these features so we can choose it as our final answer confidently.

Therefore, the correct answer is (B).

Question No. 6 of 10

Instructions: (1) Read the problem and answer choices carefully (2) Work the problems on paper as needed (3) Pick the answer (4) Go back to review the core concept tutorial as needed.

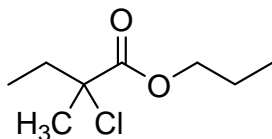
Question #06	Question 6. Which statement regarding IUPAC nomenclature rules is false? (A) The longest continuous carbon chain is the parent compound. (B) The suffix used to name aldehydes is "-anal." (C) Use numerical prefixes like di and tri when there are multiple identical groups present. (D) When alphabetizing the substituents, do not ignore their numerical prefixes.
Feedback on Each Answer Choice	A. Incorrect! This statement is true. The longest carbon chain is called the parent compound and is the basis of the name of the molecule. B. Incorrect! This statement is true. When naming an aldehyde, the suffix -anal must be used in the parent. C. Incorrect! This statement is true. Numerical prefixes indicate the number of each group present in a molecule. Do not get these prefixes mixed up with the alkyl prefixes as they differ somewhat. D. Correct! This statement is false. When alphabetizing substituents, you are not to consider any numerical prefixes that may be present.
Solution	(1) Recall the IUPAC nomenclature rules you have learned so far. Remember all the rules? It can be overwhelming but with some practice, these rules will become second nature to you. Go back and review the parts of an IUPAC name (substituents, parent, etc.). Review the functional group suffixes (-ane, -ene, -yne, etc). Review the possible alkyl prefixes (meth-, eth-, etc.) and the rules that dictate their use. Review the numerical prefixes (mono-, di- tri-, etc.) and the rules that dictate their use. Review the rules for determining functional group and substituent location numbers. And lastly review the rules that dictate the order of substituents and the numbering of the parent chains. (2) Read each statement carefully. You are looking for the false statement. After careful reading, one could eliminate the first three statements as possible answers because they are true. That last statement however is false. You are supposed to ignore numerical prefixes on substituents when alphabetizing them. Therefore, the correct answer is (D).

Question No. 7 of 10

Instructions: (1) Read the problem and answer choices carefully (2) Work the problems on paper as needed (3) Pick the answer (4) Go back to review the core concept tutorial as needed.

Question #07

Question 7. Determine the correct IUPAC name for the compound shown:



- (A) Propyl 2-chloro-2-methylbutanoate
- (B) 3-chloro-3-methyl-4-propoxybutanoate
- (C) 3-chloro-3-methyl-4-propoxybutanone
- (D) 2-chloro-2-methyl-propyl butanoate

Feedback on Each Answer Choice

A. Correct!

This answer gives the correct parent chain and suffix, the correct name and numbering of substituents and the correct ordering of the alkyl group attached to the oxygen.

B. Incorrect!

With esters, the -OR group is not name as an alkyl prefix + -oxy. Go back and review the IUPAC rules for naming esters.

C. Incorrect!

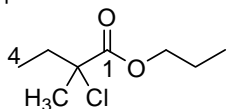
With esters, the -OR group is not name as an alkyl prefix + -oxy. Go back and review the IUPAC rules for naming esters.

D. Incorrect!

With esters, the alkyl group attached to the oxygen is named first before any substituents or the parent chain. Go back and review the IUPAC rules for naming esters and then try again.

Solution

(1) Find the longest carbon chain and the main functional group in the molecule to determine the parent.



The longest carbon chain is comprised of 4 carbons. The molecule is an ester (the ester suffix is -anoate) so the parent's name is butanoate.

(2) Determine the substituents and their correct location numbers.

There are two substituents: a methyl group and a chlorine atom.

An ester is named by numbering the longest alkyl chain starting at the carbonyl of the ester group. The alkyl group attached to the oxygen is named before the other substituents and does not have a number since it is assumed to be at carbon 1 in an ester.

The alkyl group in this example is a propyl group (3 carbons).

By numbering the carbonyl carbon as carbon 1, the chlorine and the methyl group will have each have a location number of 2.

(3) Place the name of the alkyl group attached the oxygen first followed by the other substituents in alphabetical order and the parent.

Propyl 2-chloro-2-methylbutanoate

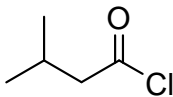
Therefore, the correct answer is (A).

Question No. 8 of 10

Instructions: (1) Read the problem and answer choices carefully (2) Work the problems on paper as needed (3) Pick the answer (4) Go back to review the core concept tutorial as needed.

Question #08

Question 8. Determine the correct IUPAC name for the compound shown:



- (A) isobutyl acid chloride
- (B) 1-chloro-4-methyl butanoic acid
- (C) 3-methyl butanoyl chloride
- (D) 4-chloro-2-methyl butanone

Feedback on Each Answer Choice

A. Incorrect!

Careful! The question asked for the IUPAC name. Go back and review the IUPAC rules for naming acid chlorides.

B. Incorrect!

The suffix –anoic acid is for naming carboxylic acids. Is this compound a carboxylic acid? Go back and review your functional group suffixes.

C. Correct!

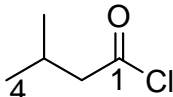
This name correctly identifies the parent chain, the functional group, its suffix, and the substituent.

D. Incorrect!

The suffix –anone is for naming ketones. Go back and review your functional group suffixes.

Solution

(1) Find the longest carbon chain and the main functional group in the molecule to determine the parent.



The longest carbon chain is comprised of 4 carbons. The molecule is an acid chloride (the acid chloride suffix is –anoyl chloride) so the parent's name is butanoyl chloride.

(2) Determine the substituents and their correct location numbers.

There is one substituent: a methyl group.

An acid chloride is named by numbering the longest alkyl chain starting at the carbonyl of the acid chloride group.

By numbering the carbonyl carbon as carbon 1, the methyl group will have a location number of 3.

(3) Put the substituents in alphabetical order (ignoring any numerical prefixes) and place in front of the parent name.

3-methyl butanoyl chloride

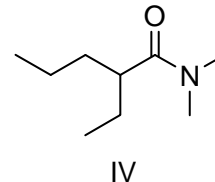
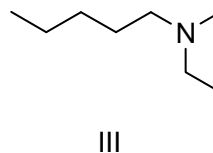
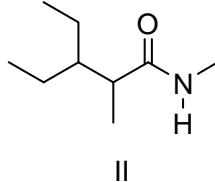
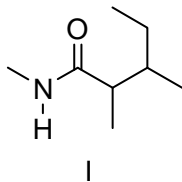
Therefore, the correct answer is (C).

Question No. 9 of 10

Instructions: (1) Read the problem and answer choices carefully (2) Work the problems on paper as needed (3) Pick the answer (4) Go back to review the core concept tutorial as needed.

Question #09

Question 9. Which structure shown corresponds to the IUPAC name 3-ethyl-N,2-dimethylpentanamide?



- (A) I
(B) II
(C) III
(D) IV

Feedback on Each Answer Choice

A. Incorrect!

According to the name given, the amide we are looking for has an ethyl and two methyl substituents. This amide has three methyl substituents and no ethyl group.

B. Correct!

This amide has the one methyl group attached to the nitrogen, the methyl group on carbon 2, and the ethyl group on carbon 3 as described. Also, the parent chain is 5 carbons long and contains an amide as described.

C. Incorrect!

Compound III is an amine. The given name ends in –amide indicating we are looking for an amide. Go back and review the rules for naming amides.

D. Incorrect!

According to the name given, the amide we are looking for will have one methyl group attached to the nitrogen of the amide. Compound IV has two methyls attached to the amide's nitrogen.

Solution

(1) Examine the IUPAC name given in the problem. Identify the functional group in the parent chain from the given name.

Here, the parent ends in –amide. This is the suffix for amides. Based on this fact, we are able to eliminate one of the possible answers. Compound III is an amine so it can not be the correct answer.

(2) Identify the number of carbons in the parent chain from the given name.

In this problem the parent has a prefix of pent which means there are 5 carbons in the longest chain. Unfortunately, all of the three remaining choices all have longest chains of 5 carbons.

(3) Identify the type of substituents present from the given name.

We can expect the structure of the molecule to include an ethyl group and two methyl groups. Based on this fact, we can eliminate one possible answer. Compound I contains three methyl substituents and no ethyl groups so it can not be the correct answer.

(4) Identify the location of the substituents/functional groups from the given name.

From the given name, we can determine the ethyl group will be located on carbon 3 of the parent chain. One of the methyl substituents will be located on carbon 2 while the other will be located on the nitrogen of the amide as described by the N. Now that we know what we should be looking for, go back to the remaining choices II and IV. Compound IV has two methyl groups on the nitrogen of the amide and the ethyl group is not on carbon 3 but on carbon 2. It can be eliminated as a possible choice.

Compound II has the correct substituents at the correct locations.

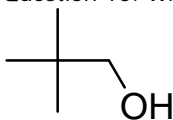
Therefore, the correct answer is (B).

Question No. 10 of 10

Instructions: (1) Read the problem and answer choices carefully (2) Work the problems on paper as needed (3) Pick the answer (4) Go back to review the core concept tutorial as needed.

Question #10

Question 10. What is the correct common name for the compound as shown?



- (A) Isopentyl alcohol
- (B) 2,2-dimethyl-1-propanol
- (C) *Sec*-pentyl alcohol
- (D) Neopentyl alcohol

Feedback on Each Answer Choice

A. Incorrect!

An iso group is described as two methyl groups attached to a –CH. This structure contains three methyl groups and no –CH group. Go back and review the common alkyl prefixes.

B. Incorrect!

Careful! The question asked for the common name. This is the IUPAC name for the molecule shown.

C. Incorrect!

There is no *sec*-pentyl group in common nomenclature. Go back and review the common alkyl prefixes.

D. Correct!

The alcohol group is attached to a carbon that is connected to a chain of 4 other carbons. The common name for this motif is neopentyl.

Solution

(1) When asked for common nomenclature, first determine the type of compound the given molecule is.

In this particular case, we have been given an alkyl chain with a -OH attached to it. This molecule must be an alcohol.

(2) Recall the common nomenclature for alcohols.

In alcohol common nomenclature, the name will be in two parts: the alkyl group followed by the word alcohol. Use all the carbons in the molecule to determine the alkyl name.

(3) Look for common structural motifs.

Look to see if the structure is a straight chain with no branching or if there is branching, determine where the branching occurs. You have approximately five choices to describe the structure of the alkyl group:

- (I) n- is used if the chain is straight and the functional group is on one end of the chain.
- (II) Iso- is used if the chain contains two methyl groups attached to a –CH with the functional group on the opposite end of the chain.
- (III) *Sec*- is used if the functional group is attached to the secondary carbon of the chain.
- (IV) *Tert*- is used if the functional group is attached to the tertiary carbon of the chain.
- (V) Neo- is used if the functional group is attached to a carbon that has 4 other carbons attached to it.

In the above structure, the alkyl portion of the chain has a total of 5 carbons and the alcohol is attached to a carbon that has 4 other carbons attached to it. This description is indicative of a neo-pentyl group.

(4) Put the alkyl name with the word alcohol.

The common name of the molecule is neo-pentyl alcohol.

Therefore, the correct answer is (D).