Organic nomenclature alkanes worksheet

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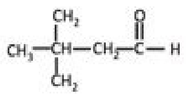
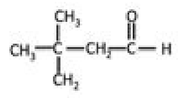
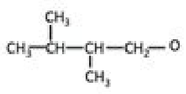
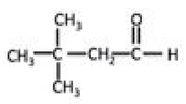
Quiz & Worksheet - Structural Formula

1. Which of the following shows the correct condensed structural formula of a compound that has five carbon (C) atoms, 12 hydrogen (H) atoms and one oxygen (O) atom?

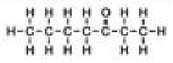


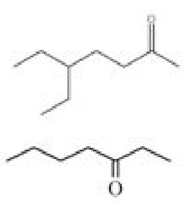




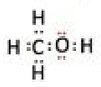


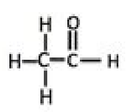
2. Which of the following is the correct skeletal structural formula for the following compound?

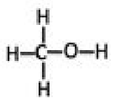


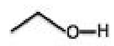


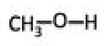
3. What is the correct line-bond structural formula for the compound shown below? (The black dots are bonding electrons between the atoms and the red dots are nonbonding electrons.) Hint: Since this is an organic compound, nonbonding electrons are, in general, not shown in the line-bond structural formula









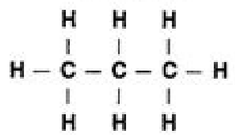


NAMING HYDROCARBONS

Name _____

Name the compounds below according to the IUPAC naming system

1.



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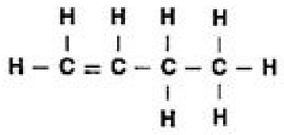

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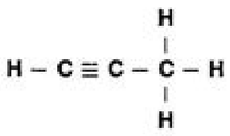

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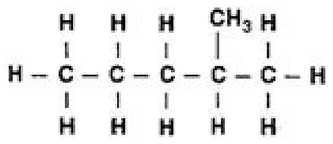

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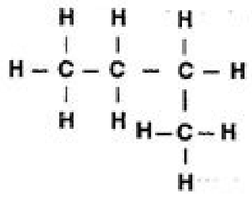

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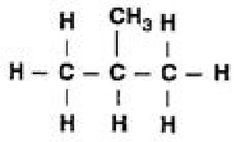

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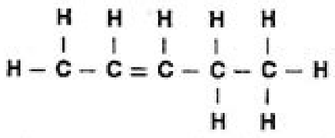

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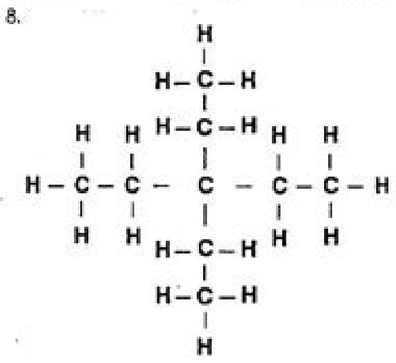
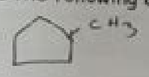
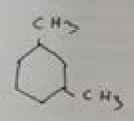


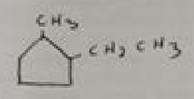
Organic Chemistry
Naming Alkanes Worksheet #2

Unit 1

Name the following compounds:

1. 

2. 

3. 

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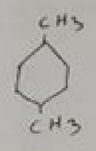
5. 

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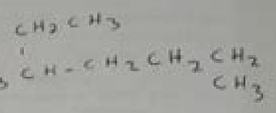
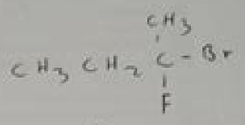
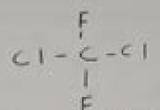
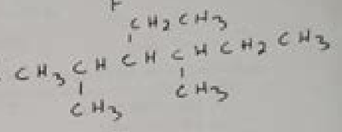
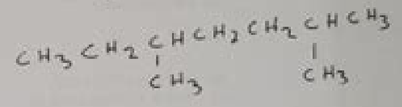
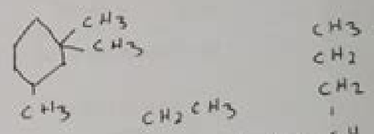
9. 

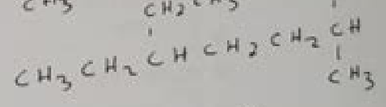
10. 

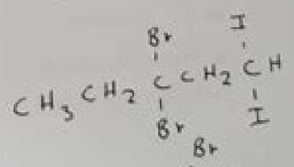
11. 

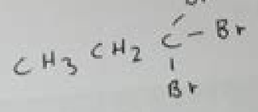
12. 

13. 

14. 

15. 

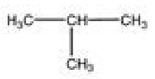
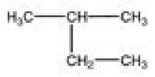
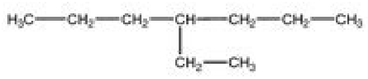
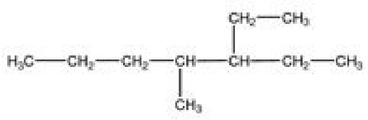
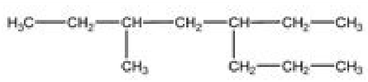
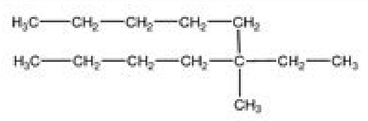
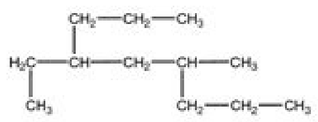
16. 

17. 

Name _____ Period _____

Naming Alkanes – Worksheet #1

Name the following branched alkanes:

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

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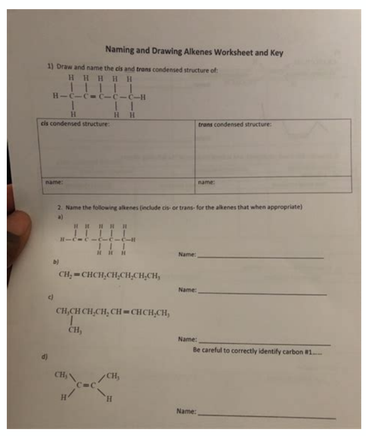
Naming and Drawing Alkenes Worksheet and Key

1) Draw and name the cis and trans condensed structure of:

cis condensed structure:	trans condensed structure:
name:	name:

2. Name the following alkenes (include cis- or trans- for the alkenes that when appropriate)

a)

Name: _____

b)

Name: _____

c)

Name: _____

Be careful to correctly identify carbon #1.....

d)

Name: _____

Naming organic compounds alkanes. How to name alkanes in organic chemistry. How to name organic compounds with examples.

Report this resourceto let us know if it violates our terms and conditions. Our customer service team will review your report and will be in touch. In today’s post, we will talk about the IUPAC rules of nomenclature for naming alkanes and alkyl halides.The first thing you need to do before learning the IUPAC rules for systematic nomenclature is making sure you know the names of the first ten alkanes:Assuming you have already mastered those, let’s draw a structure and name it simply based on the molecular formula:The compound has five carbons with no multiple bonds, therefore the formula is C5H12, and based on the common names, we can see that it is pentane.The complications and need for rules arise when the molecules get branched out. For example, what if we add a methyl (CH3) group to pentane?This group is considered a substituent; an additional group that is on the “main part” of the molecule called the parent chain.So, remember, we distinguish two units; the “main part” of the molecule, called the parent chain, and the additional group(s) known as substituents. There are certain rules for determining the parent chain and the substituent(s) so let’s discuss them one-by-one and name this molecule (let’ name it molecule A) in the course of doing that.Substituents and Alkyl groupsThe substituent can be a carbon fragment, and these are called alkyl groups, or any other functional group such as a halide, an OH, a nitro group, etc.Alkyl groups are formed by removing one hydrogen from the corresponding alkane and are named based on this alkane by simply changing the ending from –ane to -yl.Sec-, tert- and iso- prefixes Just like the constitutional isomers, it is possible to have different alkyl groups with the same chemical formula.For example, aside from the propyl group, there is also isopropyl. The difference is that in the isopropyl, a hydrogen, connected to a secondary carbon atom, is removed and it is this secondary carbon that is connected to the parent chain.Likewise, the butyl group can also be primary, secondary, and tertiary. It will be very helpful to memorize all these groups and below is a general scheme to visualize how the names of these alkyl groups are derived:You can also read this post about primary, secondary, and tertiary carbon atoms.Identifying the Parent ChainThe parent chain is determined based on the longest continuous carbon chain that is present in the molecule. As an example, let’s consider molecule A mentioned earlier:If we start numbering the carbon atoms from the methyl substituent, we can only have a continuous chain of four carbons. However, starting from any end allows making a five-carbon chain which is preferred since it makes a longer parent chain.Therefore, the parent chain is pentane and the substituent is a methyl group.If you run into a situation where there are two chains of equal length, then choose the one with the greater number of substituents:When a ring is present, the parent chain is determined based on the number of carbons. If the ring has more carbons than the chain, then it is the parent chain:Notice that the carbons in the ring belong to the ring only. I.e. you cannot count the carbon twice or include it in the carbon chain.If the ring and the chain have an equal number of carbon atoms, the ring gets a priority and is considered as the parent chain.Putting the parent chain and substituents togetherWhen naming a compound, the alkyl groups are listed first followed by the parent chain. No sign or space needed to separate two words.However, notice also that a number to specify the position of the alkyl groups is included in the final name. And this an important piece of information.To illustrate this, let’s look at this example.The following two compounds are both methylpentanes but they are clearly not identical:And, in order to distinguish them, we need to specify the location of the methyl group. For this, the parent chain is numbered, and the rule here is to always do it such that the alkyl group gets the lowest possible number:Starting from the left or the right side of the parent chain, we get two names and out of these, 2-methylpentane is better than 4-methylpentane. Therefore, 2-methylpentane is the correct IUPAC name of this compound.Notice that for the second compound, it does not matter where we start the numbering, since it is a symmetric molecule, and either way the methyl group gets number 3:A few additional details to point out when writing the name of a compound:1) Numbers and words are separated by a dashed line2) Words are not separated by any sing or a spaceParent chain with two substituentsNow, let’s add another methyl group next to the first one:Again, you have two options for numbering the parent chain. One gives the 3,4 and the other one 2,3 locants for the two methyl groups and 2,3 clearly beats 3,4.Therefore, the final name of our compound is going to be 2,3-dimethylpentane.Notice that numbers are separated by commas and because there are two methyl groups, we need to use the prefix “di” before the name of the alkyl groups.In general, if two or more identical substituents are present, the corresponding prefixes are used to indicate their number:Two

– diThree – triFour – tetraFive – pentaSix – hexaSeven – heptaEight – octaLet’s also consider the other option of having two methyl groups on pentane:Notice that, in this case, regardless of where we start the numbering, the first methyl gets locant 2, and the second one gets 4. Therefore, it is 2,4-dimethylpentane.Now, the question comes – what if there is a third substituent and it does matter where to start numbering?To answer this, let’s consider heptane with three methyl groups:Starting from left or right makes no difference as far as having the location of the first substituent. Either way, it is 2. However, if you start from the left, you are getting 2,5,6-trimethylheptane, while starting from the right, gives 2,3,6-trimethylheptane.And because 2,3,6 is better than 2,5,6, the correct name of this molecule is 2,3,6-trimethylheptane.To summarize this observation, when there is a tie for the location of the first substituent, compare the second one, then the third till you find a tiebreak if there is one.If numbering the alkyl groups does not break the tie, then the substituent with the alphabetical priority gets the lower locant:For example, having a bromine and chlorine on both ends of hexane brings up the need of prioritizing the substituents based on their alphabetical order.In this case, 1-bromo-6-chlorohexane beats 6-bromo-1-chlorohexane:If none of the rules discussed above give a tiebreak, then it is a symmetrical molecule and it does not matter where you start numbering the parent chain – as long as you do find the correct parent chain. Alphabetical order in IUPAC namingSo far, we have considered having identical alkyl groups. Now, suppose we need to name the following compound:Step 1. Find the parent chain. The longest possible chain here consists of nine carbons, so the parent chain is nonane.Step 2. Find the substituents. In this case, we have a methyl and an ethyl group.Step 3. Number the parent chain giving the lowest possible numbers to the substituents:Out of the two options, 2-methyl is better than 4-ethyl.Step 4. Put the parent chain and substituents together by placing the substituents in alphabetical order!This means that even though the methyl group is at position 2, the ethyl group with the locant 6 is still placed before it:The alphabetical priority of prefixesNone of the prefixes such as di, tri, tetra, sec-, tert- are considered for alphabetical priority except the -iso.For example:Still looking forward to finding out why -iso is privileged…Naming complex substituentsSometimes, we run out of the common names for the substituents such as sec-butyl, tert-butyl, iso-butyl but we still need to name a substituent that is larger than usual.For example, in the following molecule, it is easy to spot the ethyl group but a naming the second substituents needs to follow certain rules.The good news is that these rules are no different than what we use when naming a compound. Essentially, you need to look at the complex substituent as a separate molecule and find its “parent chain” and the alkyl groups on it.To do this, start numbering from the carbon directly connected to the actual parent chain of the molecule and list the alkyl groups alphabetically:Notice that at the end, the quasi parent chain gets the -yl suffix since it is still a substituent and the actual parent chain is placed at the end.This systematic approach for naming alkyl groups can also be applied for the ones with common names and you will likely need to know both options.In the following practice problems, we will go over naming alkanes using the IUPAC nomenclature rules which include finding the parent chain, numbering it to have the substituents in the correct positions, and finally putting all of this together to name the compound.The next exercise will teach you to draw the structure based on the IUPAC name. Live worksheets > English Finish!! Please allow access to the microphone Look at the top of your web browser. If you see a message asking for permission to access the microphone, please allow. Close Live worksheets > English > Chemistry > Organic > Alkanes Finish!! Please allow access to the microphone Look at the top of your web browser. If you see a message asking for permission to access the microphone, please allow. Close