

CHE 2060: IUPAC names of simple hydrocarbons WS – KEY

Part I: Branched alkanes and alkyl halides

Steps to naming alkanes and alkyl halides:

1. Find the longest C chain.
This becomes the root name of the alkane: _____ -ane.
2. Number the chain starting from the end closest to the first branch point
If there's a tie, start with the end closest to the first two substituents.
3. Name the substituents in alphabetical order and add them as the first part of the name.
Format: number at which the substituent branches off – hyphen – name of substituent. If there are more than one of each type of substituent, separate the multiple numbers with commas, and add a prefix to the type of substituent to indicate the number of that type of substituent.

3-ethyl-4,5-dimethylheptane

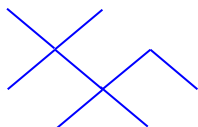
4. If a number is followed by parentheses with another branch, there is a branched branch attached at that number.

4-(1-fluoromethyl)-octane Here, there's a fluoromethane at carbon 4.

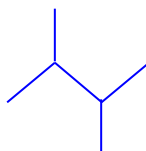
Create line-bond drawings of the following alkanes:

NOTE: Some names may be incorrect. If so, correct them!

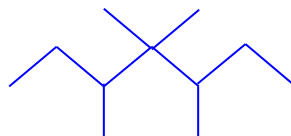
1. 2,2,3,3-tetramethylpentane

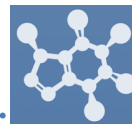


2. 2,3-dimethylbutane



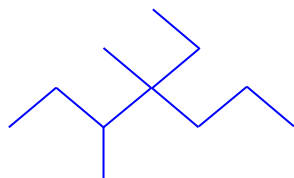
3. 3,4,4,5-tetramethylheptane





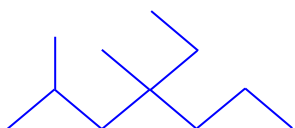
4. 3,4-dimethyl-4-ethylheptane

4-ethyl-3,4-dimethylheptane

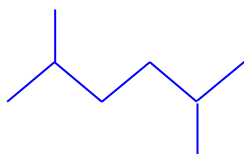


5. 2,4-dimethyl-4-ethylheptane

4-ethyl-2,4-dimethylheptane

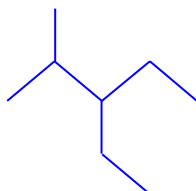


6. 2,5-dimethylhexane

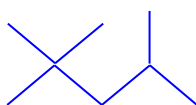


7. 2-methyl-3-ethylpentane

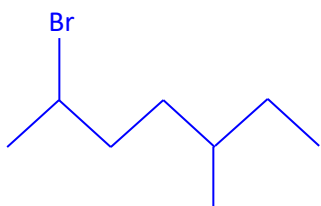
3-ethyl-2-methylpentane

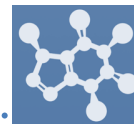


8. 2,2,4-trimethylpentane



9. 2-bromo-5-methylheptane





Part II: Branched cycloalkanes and halogenated cycloalkanes

Steps to naming cycloalkanes and halogenated cycloalkanes:

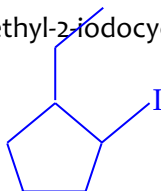
1. Find the number of carbons in the ring.
This becomes the root name of the cycloalkane: cyclo_____ -ane.
2. Number the ring starting from the end closest to the first substituent.
If there's a tie, pick one.
If there are multiple substituents, number so that all substituents have the lowest possible numbers.
3. Name the substituents in alphabetical order and add them as the first part of the name.
Format: number at which the substituent branches off – hyphen – name of substituent. If there are more than one of each type of substituent, separate the multiple numbers with commas, and add a prefix to the type of substituent to indicate the number of that type of substituent.

1-ethyl-4,5-dimethylcycloheptane

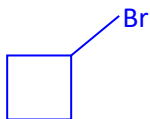
Create line-bond drawings of the following cycloalkanes:

NOTE: Some names may be incorrect. If so, correct them!

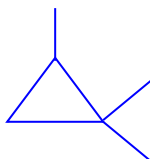
10. 1-ethyl-2-iodocyclopentane

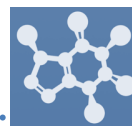


11. bromocyclobutane

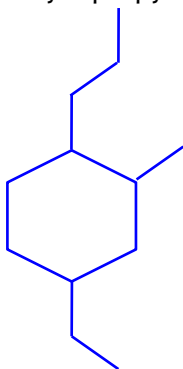


12. 1,1,2-trimethylcyclopropane





13. 4-ethyl-2-methyl-1-propylcyclohexane

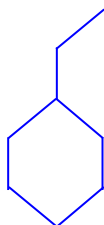


1-ethyl-2-methyl-4-propylcyclohexane

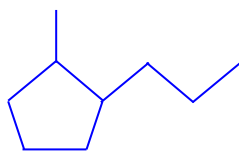
14. 1-chloro-5-methylhexane

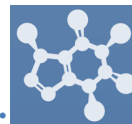


15. ethylcyclohexane



x16. 1-methyl-2-propylcyclopentane





Part III: Branched alkenes and halogenated alkenes

Steps:

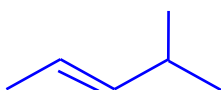
1. Identify the longest chain containing the double bond.
2. Number from the end closest to the double bond
This is the root name: _____ -ene.
3. Number and name the substituents in alphabetical order using the format for alkanes.
4. More than one double bond? It's a "diene", or "triene" and the position of each is numbered.

Create line-bond drawings of these alkenes:

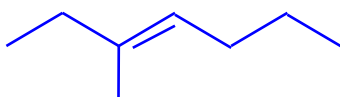
17. 1-butene



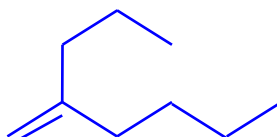
18. 4-methyl-2-pentene



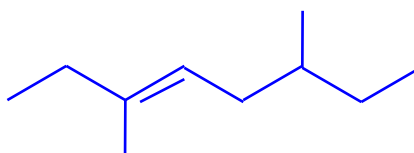
19. 3-methyl-3-heptene



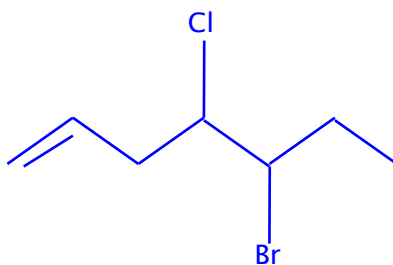
20. 2-propyl-1-hexene

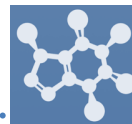


21. 3,6-dimethyl-3-octene

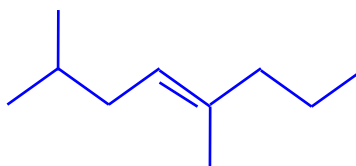


22. 5-bromo-4-chloro-1-heptene

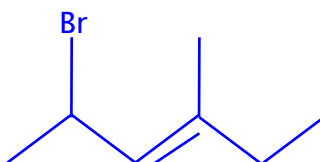




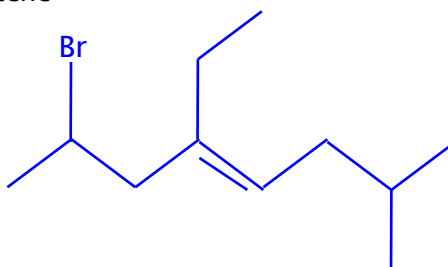
23. 2,5-dimethyl-4-octene



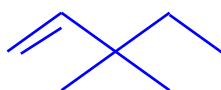
24. 2-bromo-4-methyl-3-hexene



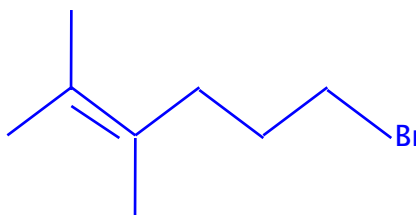
25. 2-bromo-4-ethyl-7-methyl-4-octene



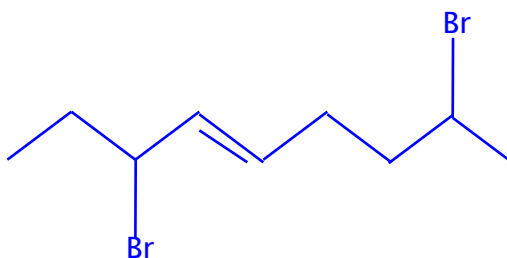
26. 3,3-dimethylpentene



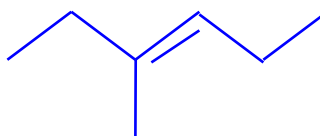
27. 6-bromo-2,3-dimethyl-2-hexene



28. 3,8-dibromo-4-nonene



29. 3-methyl-3-hexene





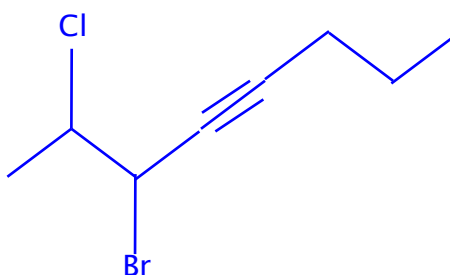
Part IV: Alkynes and halogenated alkynes

Steps:

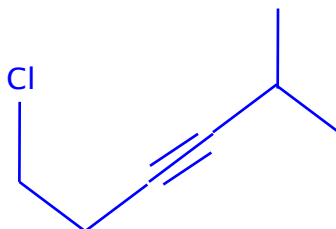
1. Identify the longest chain containing the triple bond.
2. Number from the end closest to the triple bond
The number of carbons creates the root name: _____ -yne.
3. Number and name the substituents in alphabetical order using the format for alkanes.
4. More than one triple bond? It's a "diyne", or "triyne" and the position of each is numbered.
5. If there are both double and triple bonds, the double bond takes precedence and gets the lowest number.

Create line-bond drawings of these alkynes:

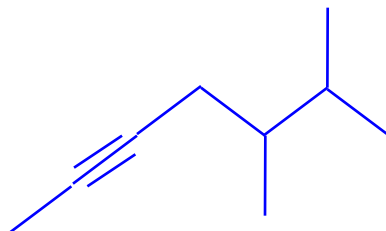
30. 3-bromo-2-chloro-4-octyne



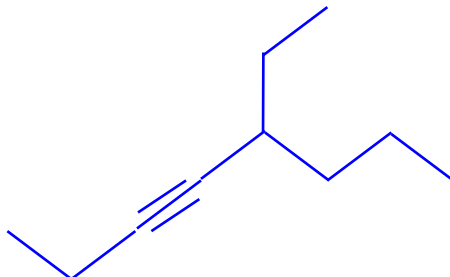
31. 1-chloro-5-methyl-3-hexyne

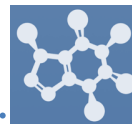


32. 5,6-dimethyl-2-heptyne

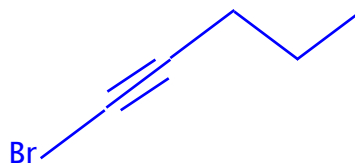


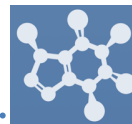
33. 5-ethyl-3-octyne





34. 1-bromo-1-pentyne





Part V: Lab homework

Create line-bond drawings of these alkanes; due next week.

1. 3-methylhexane
2. 5-propylnonane
3. 4-ethyl-5-methyloctane
4. 4-methylheptane
5. 4-ethylheptane
6. 1-propylcyclohexane
7. 2-amino-4-bromo-6-chloro-3-methylheptane
8. 1,3-dichloropropane
9. 4-ethyl-3-iodononane
10. 3-chloro-4-(1,1-dimethylethyl)-heptane
11. 4-(1-methylethyl)-octane
12. 2-bromo-2-iodopropane
13. 3-aminomethylhexane
14. 1-ethyl-3-methylcyclopentane
15. 3-ethyl-5-(1-methylethyl)-4-methyloctane
16. 1-butylcyclobutane
17. 1-bromo-3-chloro-4-methylcyclohexane
18. 1-ethyl-2-iodocyclopentane
19. 1,1,1,2,2,2-hexafluoroethane
20. 4-(1-fluoromethyl)-octane
21. 1-(1-methylethyl)-4-(1-methylbutyl)-cyclohexane
22. 2-chlor-4-fluor-3,3-dimethylhexane
23. 3-ethylhexane



Part V: Lab homework = KEY

Create line-bond drawings of these alkanes; due next week.

