**CHE 2060: IUPAC names of simple hydrocarbons WS – KEY 0.33 ea**

**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 then as the first part of the name.  
   Format: number at which the substituent branches of – 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

1. 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

Br

**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 then as the first part of the name.  
   Format: number at which the substituent branches of – 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

I

11. bromocyclobutane

Br

12. 1,2,2-trimethylcyclopropane

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

14. 1-chloro-5-methylhexane

Cl

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:**

1. 1-butene

1. 4-methyl-2-pentene

1. 3-methyl-3-heptene

1. 2-propyl-1-hexene
2. 3,6-dimethyl-3-octene
3. 5-bromo-4-chloro-1-heptene

Cl

Br

1. 2,5-dimethyl-4-octene
2. 2-bromo-4-methyl-3-hexene

Br

1. 2-bromo-4-ethyl-7-methyl-4-octene

Br

1. 3,3-dimethylpentene
2. 6-bromo-2,3-dimethyl-2-hexene

Br

1. 3,8-dibromo-4-nonene

Br

Br

1. 3-methyl-3-hexene

**Part IV: Alkynes and halogenated alkynes**

Steps:

1. Identify the longest chain containing the tripe 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:**

1. 3-bromo-2-chloro-4-octyne

Cl

Br

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

Cl

1. 5,6-dimethyl-2-heptyne

1. 5-ethyl-3-octyne
2. 1-bromo-1-pentyne

Br

**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.**

