### Homework - Chapter 4 Chem 2310

Name I. Types of Alkanes, Their Names and Formulas 1. Draw the line structure of a molecule fitting the description and molecular formula below. a)  $C_7H_{16}$  - straight chain alkane b) C<sub>7</sub>H<sub>16</sub> - branched chain alkane d)  $C_7H_{12}$  - fused bicyclic ring c)  $C_7H_{14}$  - branched, cyclic alkane f)  $C_7H_{12}$  - bicyclic bridged ring.

2. Tell whether the following molecular formulas could represent 1) a branched alkane, 2) a cyclic alkane, or 3) a bicyclic alkane. Then draw an example of a compound for each formula.

a)  $C_6H_{12}$ b) C<sub>6</sub>H<sub>14</sub>

e) C<sub>7</sub>H<sub>12</sub> - spiro bicyclic ring

- c)  $C_6 H_{10}$ d)  $C_5 H_{10}$
- e) C<sub>5</sub>H<sub>8</sub> f) C<sub>5</sub>H<sub>12</sub>

3. Draw four different, branched alkanes having 8 carbons. Give the molecular formula for each.

4. Draw four cyclic alkanes having 8 carbons. Give the molecular formula for each.

5. Give the molecular formula for each of the following compounds. Then classify each pair as constitutional isomers, not isomers, or identical compounds.





# II, Physical Properties, Sources, and Uses of Alkanes

- 6. Match the following compounds with the melting or boiling points given.
  - a) melting points: -63°C, -16°C







### IV. Nomenclature of Alkanes

7. Name the following compounds.

























9. The following are some incorrect answers that have been given by students in the past. Draw the molecule that you think they were trying to name, then analyze what went wrong. Which rule was not followed? Then write the correct name.

a) 1,3-dimethylbutane	b) 4-methylhexane		
c) 4-(1-methylethyl)-2-methylhexane	d) 1-cyclopentyl-2-methylbutane		
e) 1.2 dimethyl 3 ethylcyclopentane	f) 1 ethyl 3.5 dimethylheyane		
c) 1,2-uniterryi-5-ethyteyetopentalie	1) 4-curyr-5,5-unneurymexane		

g) 1,3-methyl-5-ethylcyclopentane

h) 2,2-diethylheptane

#### IV. Conformations of Straight and Branched Alkanes

10. Which conformation in each of the following pairs is <u>higher</u> in energy? Use a brief phrase to explain why.





11. Draw a series of Newmann projections to analyze the conformations of the  $C_2$  -  $C_3$  bond of 2-methylbutane.



12. Draw a potential energy diagram showing the energy of each of the conformations above.

I	I	I	I	I	I	I
0 <sup>o</sup>	60°	120°	180°	240°	300°	360°

13. Write the letter of each of the following compounds below the correct energy diagram. (The number of correct compounds is given in paranthesis).



# VI. Conformations of Cyclohexane

14. Draw a chair conformation in each box. Then draw the opposite one in the other box. This is just to practice drawing chairs!



15. Draw in all of the substituents matching the description on the first chair conformation, then show what will happen to them when the chair is flipped.



16. For each of the following compounds, draw the other chair conformation. Then circle the one that is lowest in energy, and briefly explain your choice.



HW Ch 4 p 10

17. For each conformation, draw the compound as it would be seen from the top (with a hexagon using wedges and dashes).



18. Draw both chair conformations of each of the following compounds. Circle the one that is lower in energy and briefly explain your choice.

