Midterm II Review Packet

Part A: Multiple Choice and Matching (12 questions)

1. Which of the following IR spectra contains an amine? Select all that apply

   a. 
   ![Image of IR spectrum a]

   b. 
   ![Image of IR spectrum b]
2. Which of the following descriptions best fit the IR spectra of a carboxylic acid? Select all that apply.

a. A medium intensity band at 2250 cm\(^{-1}\)
b. A strong and broad intensity band at 2500-3500 cm\(^{-1}\)
c. A medium intensity band at 3500-3300 cm\(^{-1}\)
d. A strong intensity band at 1710 cm\(^{-1}\)

3. Match the following molecules to their respective IR spectras.

![Molecules](image)

<table>
<thead>
<tr>
<th>Compound A</th>
<th>Compound B</th>
<th>Compound C</th>
</tr>
</thead>
</table>

![Spectra 1](image)
4. What is the correct IUPAC name for the following molecule?

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![Molecule Image]

a. 5-(sec-butyl)-6-(tert-butyl)-7-ethyl-2-methyldecane
b. 6-(sec-butyl)-5-(tert-butyl)-4-ethyl-9-methyldecane
c. 6-(tert-butyl)-5-(sec-butyl)-2-methyl-7-ethyldecane
d. 6-(tert-butyl)-5-(sec-butyl)-4-ethyl-9-methyldecane

5. Match the correct substituent butyl group to its name (some names may be used more than once).

<table>
<thead>
<tr>
<th>Name</th>
<th>Butyl Substituent Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Image 1]</td>
<td>![Image 2]</td>
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<tr>
<td>![Image 3]</td>
<td>![Image 4]</td>
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<td>![Image 5]</td>
<td>![Image 6]</td>
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<td>![Image 7]</td>
<td>![Image 8]</td>
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<tr>
<td>![Image 9]</td>
<td>![Image 10]</td>
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</tbody>
</table>

Word Bank: Butane, Isobutyl, Sec-butyl, Tert-butyl, n-butyl,
6. Rank the following Newman projections in order of increasing energy.

   ![Newman projections A, B, C, D]

   a. D, A, B, C
   b. D, B, A, C
   c. D, C, B, A
   d. D, B, A, C

7. Which of the following is an accurate depiction of a chair conformation for the following cyclohexane? (select all that apply)

   ![Cyclohexane conformations A, B, C, D]
8. What is the correct structure for (3R,5S,6R)-5-ethyl-3,6-dimethylnonane?

a.  

b.  

c.  

d.  

9. What is the relationship between these two compounds?

a. Enantiomers  
b. Diastereomers  
c. Neither  
d. Constitutional Isomers
10. How many stereogenic centers are there in the following molecule?

A. 5  
B. 4  
C. 7  
D. 8

11. Which of the following molecules are meso?

a.  

b.  

c.  
12. Walter White synthesizes (-)-methamphetamine, and measured its ee as 91%, what is the ratio of (-)-methamphetamine to the (+)-methamphetamine in the sample?

a. 91% L and 9% R  
b. 45.5% L and 45.5% R  
c. 95.5% L and 4.5% R  
d. 70% L and 4.5% R

Part B: Free Response Questions

World renowned music critic Anthony Fantano is writing a review for a new album, the album cover is as follows:

Answer the questions about the cyclohexane in the album cover

1a. Write the IUPAC name of the compound

1b. Draw two chair conformations for the compound, and circle the higher energy chair conformation

1c. Draw the structure of the enantiomer for the compound
The DEA busted the notorious Heisneberg and captured his supply of a new mystery compound. Unfortunately, they have no clue what this compound is, but they did find the name of the compound which is meso-4,5-dibromooctane.

2a. Draw the Newman projection of the most stable conformation about the bond between carbons 4 and 5 of meso-4,5-dibromooctane.

2b. Is the molecule drawn in 2a chiral?

2c. Draw one diastereomer of meso-4,5-dibromooctane

2d. Is the molecule in 2c chiral?