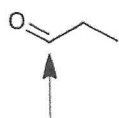


Section A: Choose the correct answer

1. A carbocation is

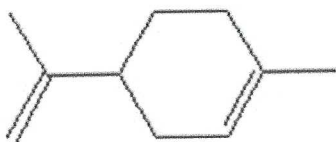
- A) a carbon with a negative charge
- B) a carbon with a positive charge
- C) a carbon with an unpaired electron
- D) a carbon with complete octet
- E) a carbon with five hydrogens

2. How many hydrogens are attached to the indicated carbon?



- A) 0
- B) 1
- C) 2
- D) 3
- E) 4

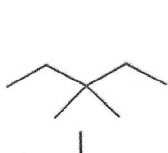
3. How many hydrogens are in limonene?



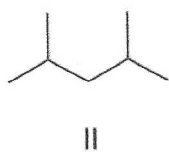
limonene

- A) 8
- B) 10
- C) 12
- D) 16
- E) 18

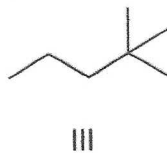
4. Which of the following are constitutional isomers?



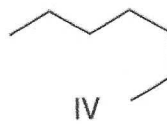
A) I and II



B) I and III



C) I and IV



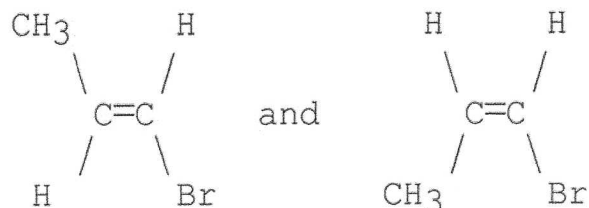
D) II and III

E) I, II, III and IV

5. If an acyclic alkane contains n carbon atoms, how many hydrogen does it contain?

- A) n B) $n + 2$ C) $n - 2$ D) $2n$ E) $2n + 2$

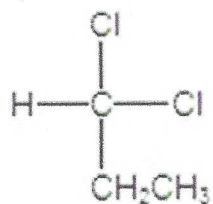
6. What is the relationship between the following compounds?



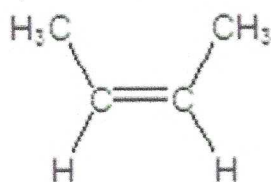
- A) configurational isomers B) conformational isomers C) constitutional isomers
D) structural isomers E) positional isomers

7. Which of the following compounds have an asymmetric center?

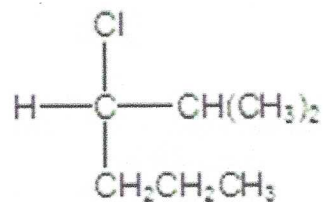
A)



B)



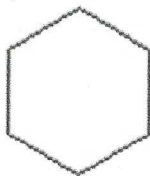
C)



D)



E)

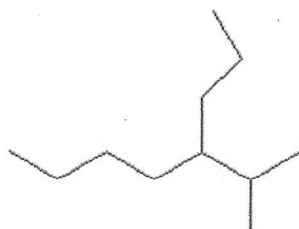
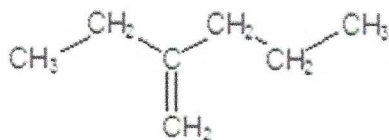


8. How many asymmetric centers does 2,4,6-trimethylheptane have?

- A) 0 B) 1 C) 2 D) 3 E) 4

Section B:

1. Write the IUPAC name of the following compounds 4X 2 pts = 8 pts)





2. Write the structure of the following compounds (2pts X 4 = 8 pts)

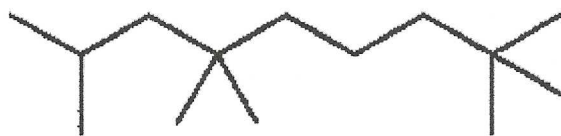
Methylcyclohexane

4,4-dimethyl-2 pentyne

1,2-dibromo-4 methylnonane

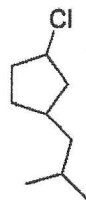
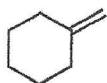
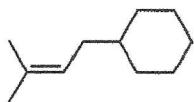
Pent -2 -ene 1-yne

3. Identify the number of 1^o, 2^o, 3^o and 4^o carbons present in the structure below (4pts)



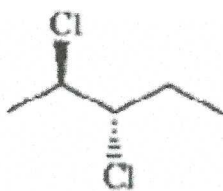
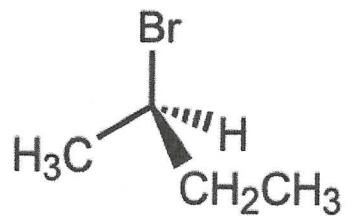
Section C:

1. For the structures below, circle the molecule has cis-trans isomer. Then write the cis and the trans isomer separately (2pt + 2 pt + 2pts = 6pts)



2. Write 3 possible isomers you can write for the compound with a molecular formula as C_5H_{10} and write the IUPAC name of each compound (2pts X 3 = 6 pts)

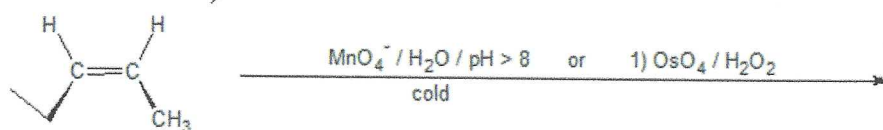
3. Determine the R, S configuration of the following molecules (2pts x 3 = 6 pts)



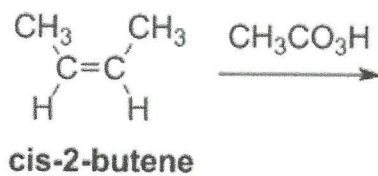
Section D:

1. Write the product of the following reactions: (4 X 2pts = 8 pts)

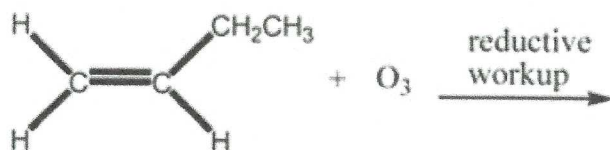
a.



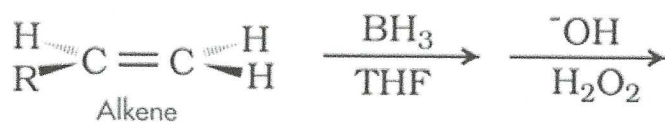
b.



c.

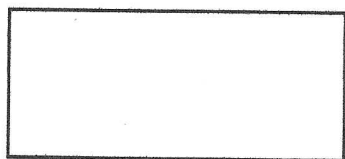


d.

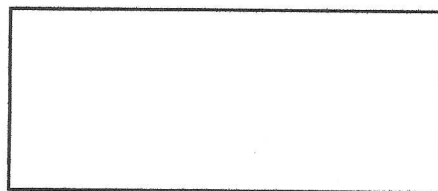


2. Write the structure of the substrate and the product of the following reactions.
Write the reagents and the reaction conditions for each reaction (4 pts X 4 = 16 pts)

1.

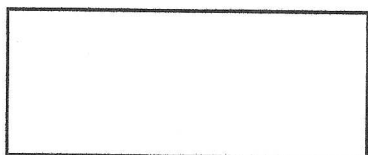


Alkene

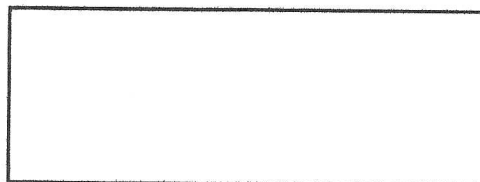


Secondary Alcohol

2

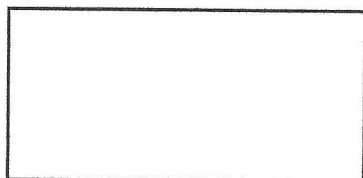


Alkene

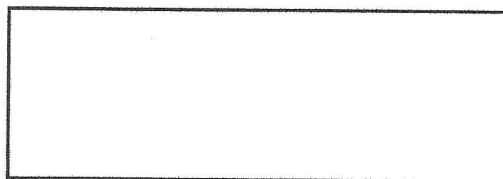


Alkane dihalide

3.

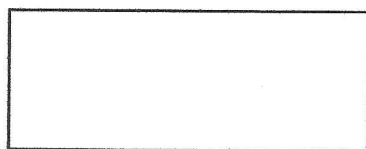


Alkene

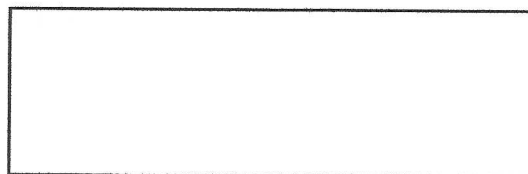


Primary alcohol

4.



Alkene

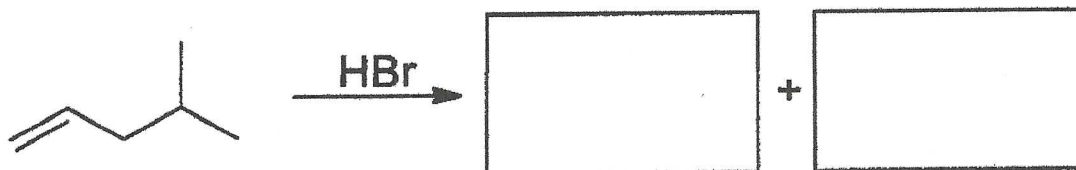


Aldehyde

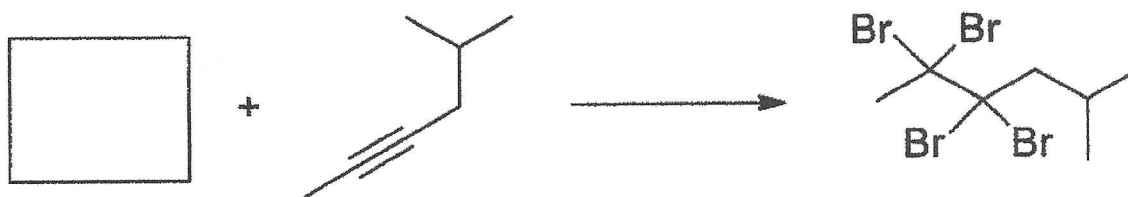
Section E:

Provide the missing starting materials, reactants and/or products for the chemical reactions below. Indicate the major and minor products as well as equivalents of reagents used where applicable. (2pts X 6 = 12pts)

1.



2.



3

