CHM 1321-D **Final Exam** **April 8– 2014**
(prof. S. Gambarotta)

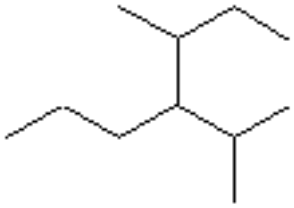
Your Name: _____ **Student #: _____**

1. Solution key will be posted today on the web today.
2. You must respond correctly to all exercises (1 mark each) to get the full mark.
3. There are 3 bonus questions at the end (4 mark each). In case of correct answers, each will add 4 marks to whatever you scored from the non-bonus questions.
4. **Deliver the entire booklet. No re-grading for exams written in pencil**

Good luck with your studies!!!!

Question 1

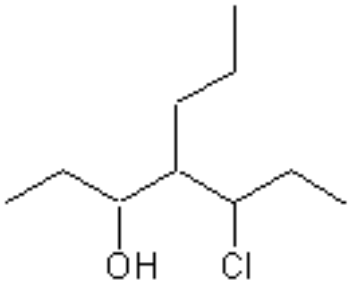
Give the IUPAC name for :



3-Methyl-4-(1-methylethyl)heptane

Question 2

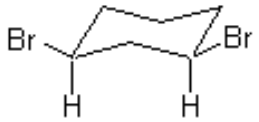
A correct IUPAC name for the following compound is:



Answ. 5-chloro-4-propyl-3-heptanol

Question 3

Draw the structure of cis-1,3-Dibromocyclohexane :



I

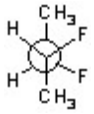
Question 4

Which cycloalkane has the greatest ring strain?

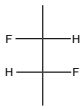
Cyclopropane

Question 5

Without any change in conformation, translate the Newman projection shown below to a perspective structure and to a Fisher projection. State if the compound is a *meso* or an enantiomer and give the correct label R or S to each chiral center.



Answer:



Question 6

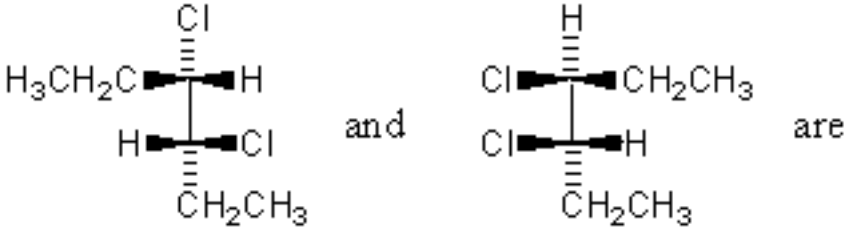
Draw the most stable conformation of cis-1-tert-butyl-2-methylcyclohexane

Answ.:

the methyl group is axial and the tert-butyl group is equatorial.

Question 7

The molecules shown:



Answ. diastereomers.

Question 8

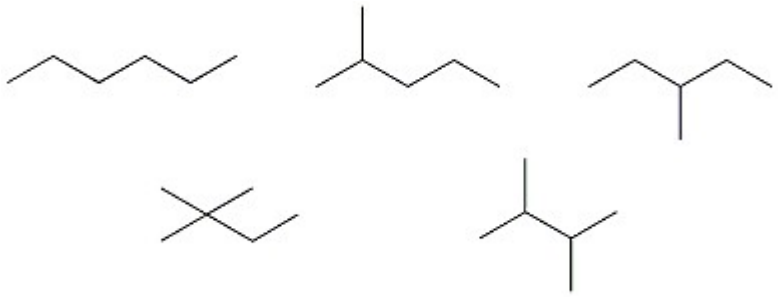
What is the relationship between :

(2R,4S) –2,6–dibromoheptane and (2S,4R)-2,6-dibromoheptane

Answ: meso form (identical)

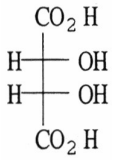
Question 9

Provide the skeletal structures of the constitutional isomers with molecular formula C_6H_{14}.
Answer:



Question 10

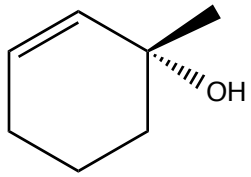
How many asymmetric carbons are present in the compound below?



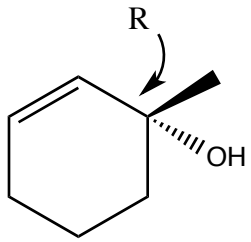
Answer: 2

Question 11

Label each asymmetric carbon in the compound below as *R* or *S*.

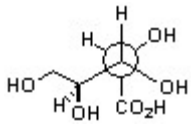


Answer:

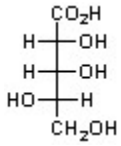


Question 12

Translate the Newman structure below to a Fischer projection.

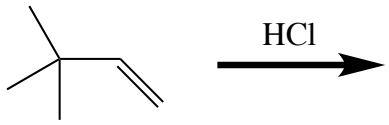


Answer:

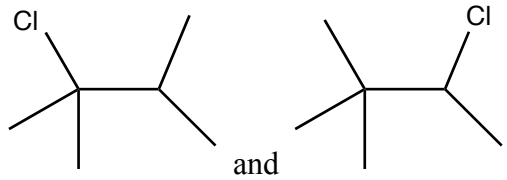


Question 13

Draw the structure of the two products generated in the reaction below. Identify the major product. Pay particular attention to regio- and stereochemical details and ….. bear in mind the mechanism.

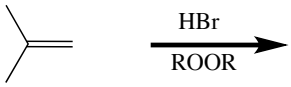


Answer:

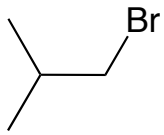


Question 14

Provide the structure of the major organic product of the reaction below.



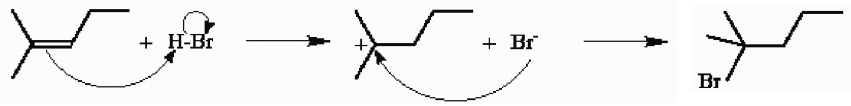
Answer:



Question 15

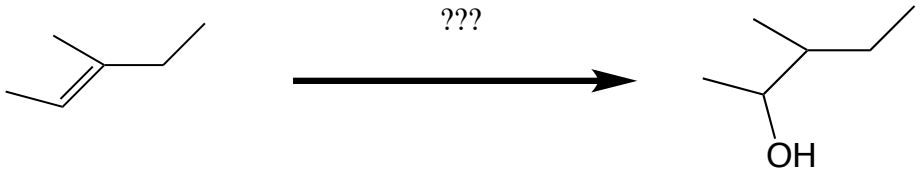
Provide a step by step mechanism for the addition of HBr to 2-methylpent-2-ene.

Answer:



Question 16

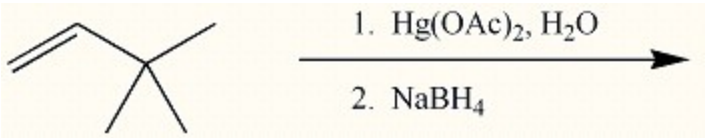
Provide the reagents necessary to complete the following transformation.



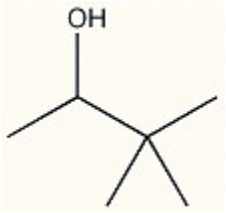
Answ. 1) BH_3, 2) H_2O_2

Question 17

Draw the major organic product generated in the reaction below.



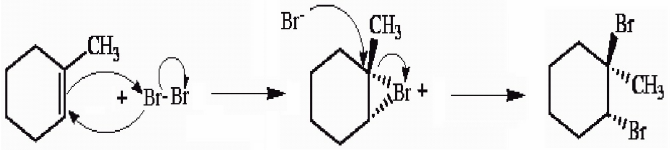
Answer:



Question 18

Provide a detailed, step-by-step mechanism for the addition of bromine to 1-methylcyclohexene.

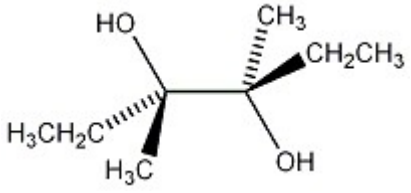
Answer:



Question 19

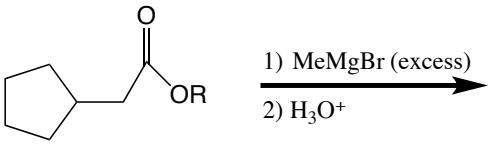
Provide the major organic product of the treatment of 3,4,-dimethylhex-3-ene with peroxy-acid followed by acidic hydrolysis. Specify whether the product is a racemate or a meso form

Answer:

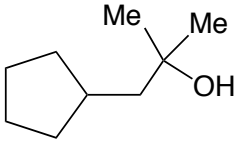


Question 20

Predict the correct product of the following reaction.

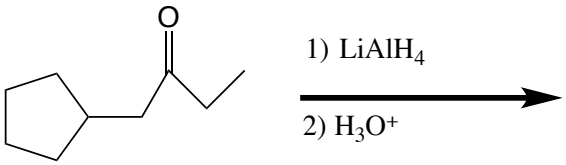


Answer:

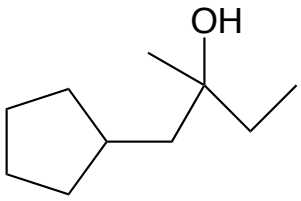


Question 21

What isd the product of the following reaction?

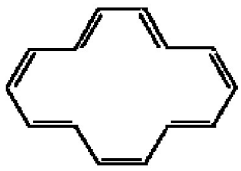


Answer:



Question 22

Classify the compound below as aromatic antiaromatic, or nonaromatic. Assume planarity of the π network.

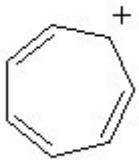


Answer: aromatic

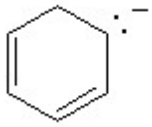
Question 23

Which of the following structures is aromatic?

A)



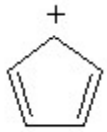
B)



C)

D)

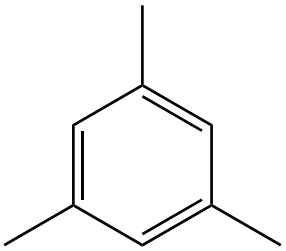
E)



Answer: A

Question 24

Name the compound below.

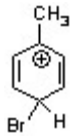


Answer: 1,3,5-trimethylbenzene or 3,5-dimethyltoluene

Question 25

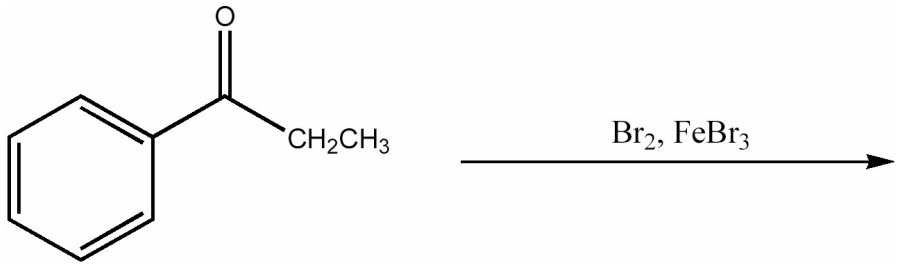
Draw the structure of the intermediate in the bromination of toluene.

Answer:

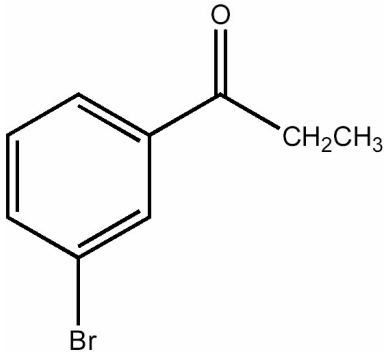


Question 26

Provide the major organic product of the following reaction.



Answer:



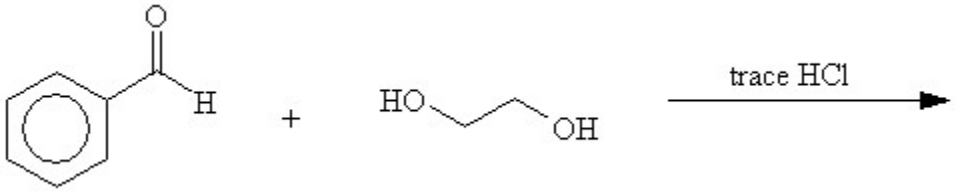
Question 27

Provide the major organic product which results when $CH_3CH_2CH_2CHOHCH_3$ is treated with a chromate (strong oxidant).

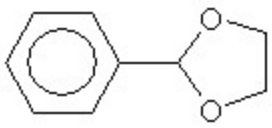
Answer: $CH_3CH_2CH_2COCH_3$

Question 28

What would be the product of the following reaction?

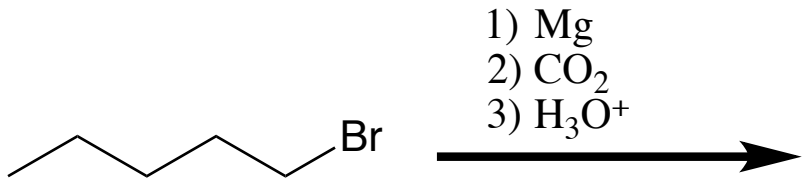


Answer:

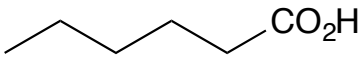


Question 29

Provide the major organic product of the following reaction sequence.



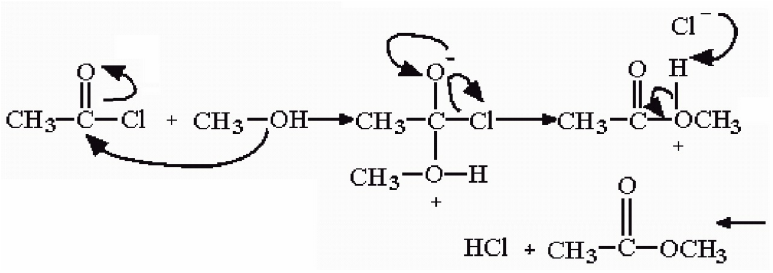
Answer:



Question 30

Provide a detailed, stepwise mechanism for the reaction of an acyl chloride with alcohol .

Answer:



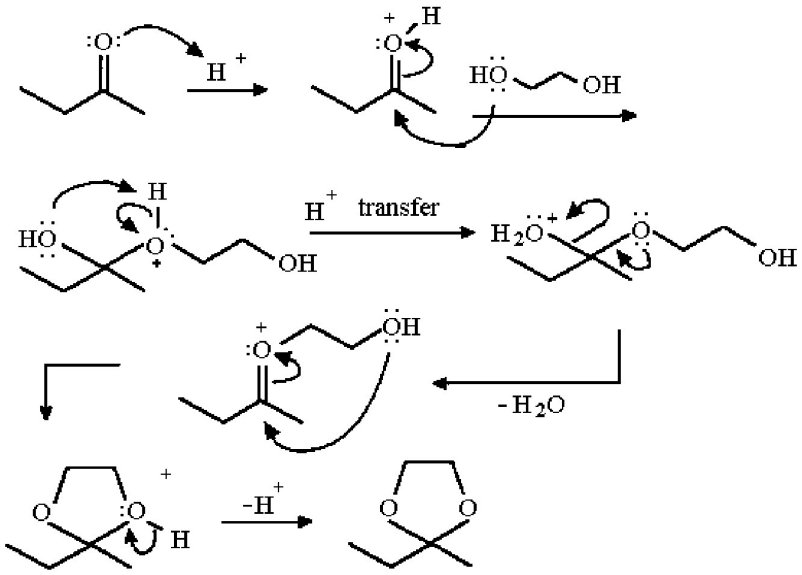
BONUS Questions (4 marks each)!!!

1) Draw the complete mechanism of the hydroboration/ oxidation of an alkene affording a racemate. Show the stereochemistry.

2) Draw an alkene that will yield a racemic dihalide when reacted with Br_2/CCl_4 at room temperature. Show the mechanism.

3) Provide a detailed, stepwise mechanism for the acid-catalyzed reaction of 2-butanone with ethylene glycol ($HOCH_2CH_2OH$) to produce an acetal.

Answer:


H+
H+ transfer
-H2O
-H+