CHEM-1110 TEST # 1 FEB. 28,2002 NAME:_____

PLEASE BE VERY NEAT. MESSY WORK WILL BE IGNORED.

1. Draw structres for the following. Show all bonds on carbon atoms.

a) cis-2,5-dichloro-3-hexene

b) 4-phenyl-6-isopropyl-4-octanol
0r 4-phenyl-6-1-methylethyl-4-octanol

c) 5-ethyl-6,6-dimethyl-2-nonyne

d) tert-butyl isobutyl ether
or 1,1-dimethylethyl 2-methylpropyl ether

e) p-bromophenol

f) 2-ethyl-4-isopropylcyclopentanol

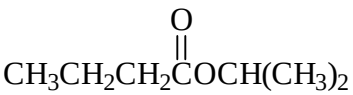
g)4,5-diethyl-2-methylheptanal

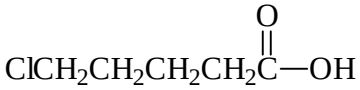
h) 4,4-dimethyl-1,6-octadiene

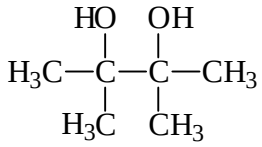
i) m-nitrobenzaldehyde

j) 3,5-dinitromethylbenzene

2. Name the following, using IUPAC or other reasonably acceptable names.

a)  _____

b)  _____

C) 

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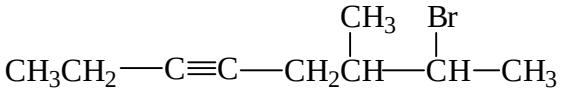
d) 

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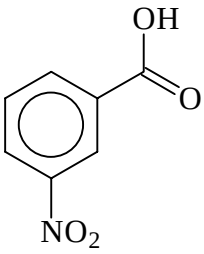
e) 

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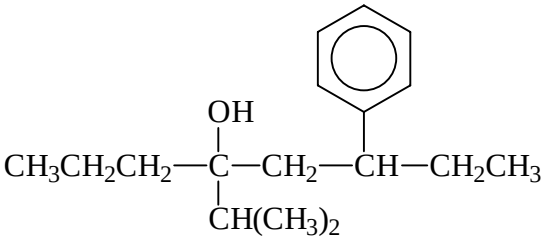
f) 

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3. a) Draw the structures for the **4** structural isomers of $C_5H_{10}O$ that contain a **four-membered** cyclic ring and an **alcohol.** Label your structures using letters or numbers.

b) Indicate which of the **4** structural isomers can have geometric (cis-trans) isomers.

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c) Indicate which of the **4** structural isomers can have optical isomers and label all **chiral** carbon atoms with an asterisk.

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4. Draw the structural formula for an unsaturated alkyl chloride of molecular formula C_5H_9Cl that shows

a) neither geometric nor optical isomers.

b) both geometric and optical isomers. Mark chiral C with a *****.

c) geometric but not optical isomers.

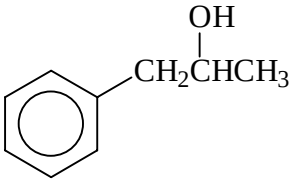
d) optical but not geometric isomers. Mark chiral C with a star.

5. Write the structure of an alkane, MM=72, that would yield three monochloro derivatives on chlorination.

6. Write the structure of an alkene that on oxidation with hot and conc. $KMnO_4$ would yield 2-pentanone and CO_2.

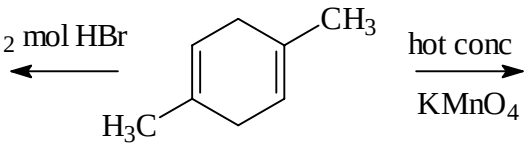
7. Draw the structure(s) for the main organic product(s)for the following reactions.

a) $(CH_3)_4C + Br_2$ (1 mol) $\xrightarrow[\text{light}]{\text{heat or}}$

b) 

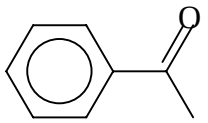
$\xrightarrow[\text{heat}]{\text{conc } H_2SO_4}$

c) $\xleftarrow[KMnO_4]{\text{hot conc}}$ 1,4-dipropylbenzene $+ Br_2 \xrightarrow{FeBr_3}$

d) 

e) 2-chloropentanoic acid + 2-fluoro-1-butanol $\xrightarrow{H^+}$

f) 2-methyl-1,4-pentanediol $\xrightarrow{KMnO_4}$

g)  + H_2 $\xrightarrow{Pt}$

8. Using the formula $C_7H_{12}O$, provide structures to satisfy each of the following requirements:

a) a compound which will react with both Na and H_2/Pt.

b) a compound which will react with $KMnO_4$ but not Na

c) a compound which will react with H_2/Pt but not $KMnO_4$

9. How would you prepare isopropyl propanoate (1-methylethyl propanoate) starting with only 1-propanol? Inorganic reageants are available.

10. In the dichlorination of propane four products with the formula $C_3H_6Cl_2$ were isolated and labeled **A**, **B**,**C**, and **D**. Each was separated and further chlorinated to give one or more trichlorinated propanes, $C_3H_5Cl_3$. **A** and **B** gave three, **C** gave one, and **D** gave two. Give the structures for **C** and **D**. One of the products from **A** was identical with the product from **C**. Give the structure for **A** and **B**.