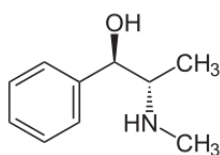
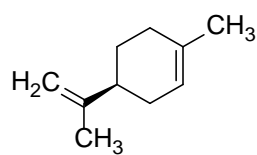


1. Write the **IUPAC names** of the following compounds. (12 pts)

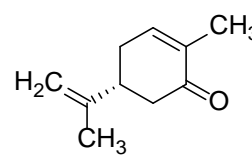
(a)



(b)



(c)



2. Answer the following questions. (12 pts)

(a) Draw all the stereoisomers of 4-amino-3-chlorohexan-2-ol, and name them.

(b) How many chiral carbons exist in 4-amino-3-chlorohexan-2-ol?

(c) Draw all the resonance structures of *N,N*-dimethylamino-4-nitrobenzene.

3. Answer the following questions as true (T) or false (F). (-1 pts per error) (15 pts)

1) _____ *cis*-1,3-Dimethylcyclohexane is more stable than *trans*-1,3-dimethylcyclohexane.

2) _____ 2,3-Pentadiene is chiral, and has two enantiomers.

3) _____ 3-Nitrophenol is more acidic than 4-nitrophenol.

3) _____ *trans*-2-Butene, when brominated, makes chiral compounds.

5) _____ *cis*-2-Butene, when hydrogenated, releases more heat than *trans*-2-butene does.

4. Describe two methods to synthesize 1) *trans*-2-butene or 2) *cis*-2-butene from 2-butyne. (6 pts)

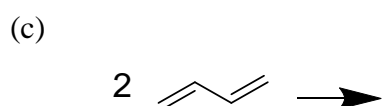
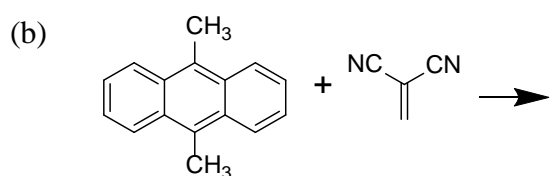
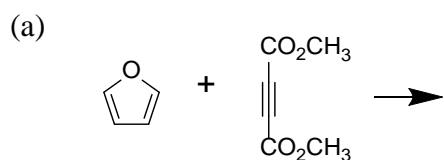
5. Show how following compounds could be synthesized from acetylene and bromoethane. (18 pts)

(a) 4-bromo-3-hexanol

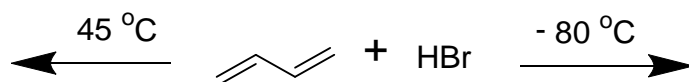
(b) 3-hexanone

(c) *cis*-2,3-diethyloxirane

6. Draw the **major** product(s) for each of the following reactions. (12 pts)



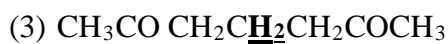
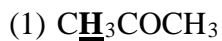
7. (a) Draw the major products in each reaction conditions. (13 pts)



(b) Among the products of (a), which one is the kinetic-controlled product? By drawing a reaction coordination diagram, and explain.

8. Rank the following compounds for acidity: (most acidic) > > > (least acidic)

And, explain properly by drawing resonance structures of conjugate base, if necessary. (9 pts)



9. Explain the following observations by drawing proper mechanisms (6 pts)

