

NAME _____

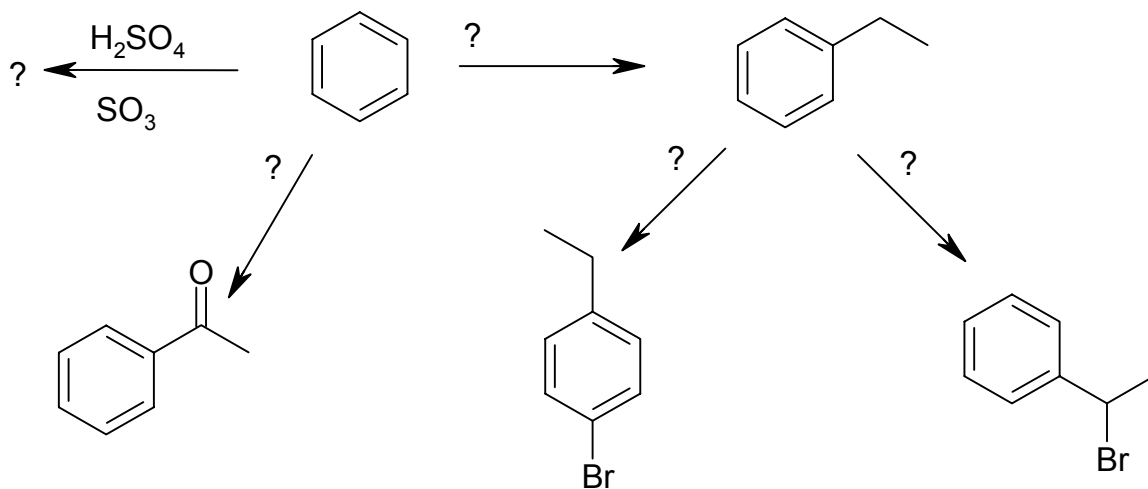
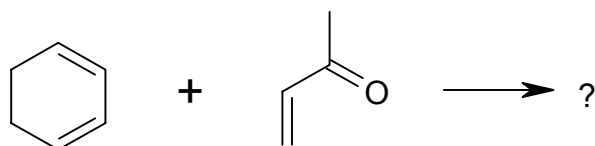
Organic Chemistry II, CHEM 332

Sections 003, Dr. Sweeting

Exam 1, March 1, 2002

Full credit: 100 points, maximum with bonuses: 114

1. Please complete the following reactions by inserting a sketch of the missing reactant or product as indicated by the question mark. (4 points each, 24 total)



2. Please identify (for 14 points)

a) whether the following compounds are terpenes (YES / NO)

b) any isoprene units in the molecule by circling or otherwise marking them

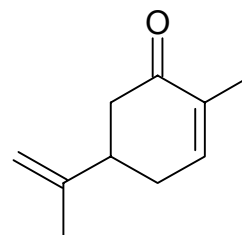
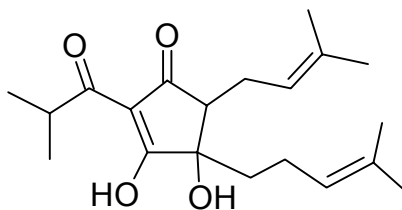
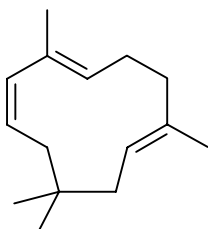
flavor components in beer from hops

humulene

isocohumulone

flavor in spearmint

carvone



3. Please make a sketch which shows the shapes and relative energies of the molecular orbitals of benzene. To get full credit for this question, I suggest you plan the layout of your answer before you start – you will not need the whole page. (18 points)

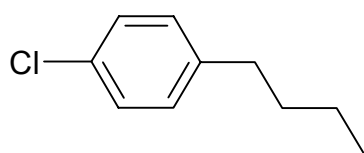
4. This question explores your knowledge of the electrophilic nitration of benzene:

a) Please outline the mechanism of the reaction of nitric acid with sulfuric acid to create the nitronium ion. (8 points)

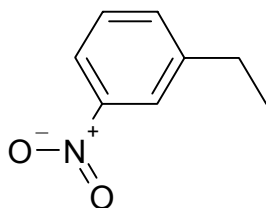
b) Please outline the mechanism of the reaction of the electrophilic nitronium ion with benzene. (8 points)

c) By reference to the mechanism above, explain why the nitration of chlorobenzene occurs almost exclusively in the positions *ortho* and *para* to the chlorine. You will probably need to draw some structures to answer this question. (8 points)

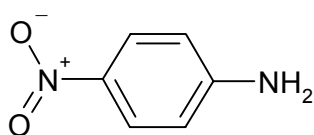
5. Outline a practical laboratory synthesis of TWO of the following from the reagent indicated. Extra credit for additional syntheses solved. (10 points each)



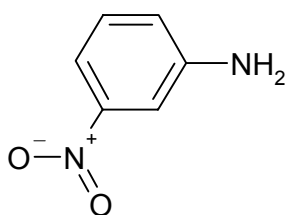
from benzene



from benzene



from aniline



from aniline