Name: _____ *Organic Chemistry II* ***CHEM 335***
Student ID# _____ **EXAM 1.0** *Sept. 24, 1999*

Read all questions ***carefully*** . ***Proofread*** your work. ***Artwork*** can be as important as the answer itself, especially for *partial credit*, so please ***be clear*** in your drawings. You may use the reverse side of pages for scratch work.

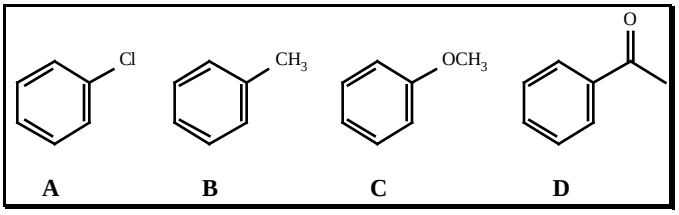
---

1. Please provide ***chemical structures*** for the following IUPAC names:
(6 pts)

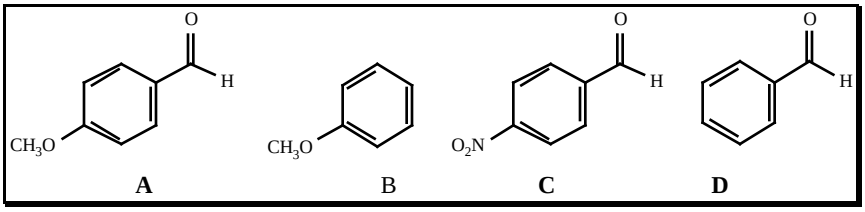
· 5-methyl-5-hexen-2-ol

· 2-chloro-1,1,2-trifluoroethyl difluoromethyl ether (a general anesthetic)

2. For each of the following groups, *rank* the compounds in order of INCREASING *reactivity* toward *electrophilic aromatic substitution.*
(6 pts: 3 pts each, all or none)

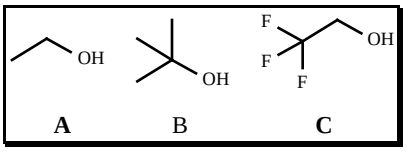


____ < ____ < ____ < ____
least most



____ < ____ < ____ < ____
least most

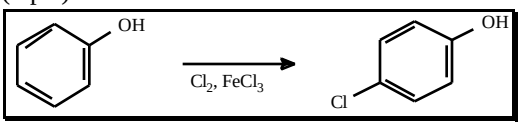
3. *Rank* the following alcohols in order of INCREASING *acidity*.
(3 pts)



____ < ____ < ____
least most

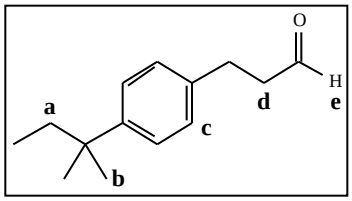
4. ***Draw all*** the possible ***resonance structures*** for the ***positively charged intermediate*** formed during the bromination of *phenol* at the *para* position.

(8 pts)



5. *Identify* the ^{1}H NMR ***splitting pattern*** that you would observe for each of the protons (a-d) indicated in the structure below.

(10 pts)



a. _____

b. _____

c. _____

d. _____

e. _____

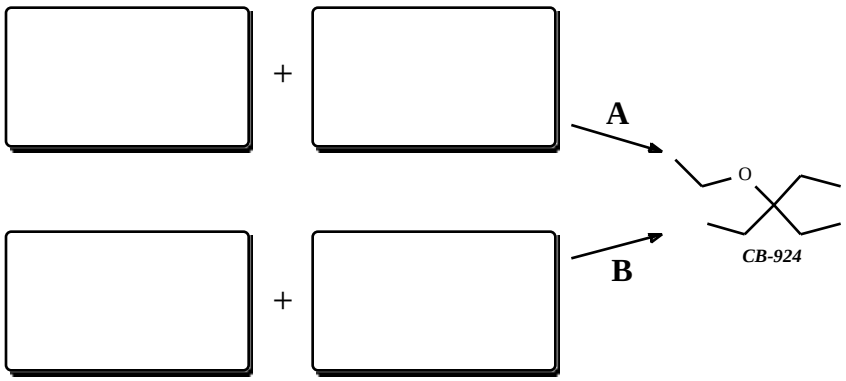
6. An "anonymous" professor recently isolated the chemical ***CB-924*** from a plant growing on the campus at SFSU. The professor "accidentally" found that chemical produced colorful hallucinations when taken in small doses. To obtain more of ***CB-924***, the professor designed 2 different reactions pathways (**A** and **B**). <u>One reaction was **successful** but the other reaction was **unsuccessful** and gave a ***different product*** instead</u>.

(6 pts)

a) Provide the corresponding alkoxide (RO^- Na^+) and alkyl halide (R'-X) for each of the two possible Williamson Ether Synthesis reactions (**A** or **B**) below.

b) ***Identify*** (circle) which of the reaction pathways was **successful** .

c) ***Draw*** the ***different product*** formed from the **unsuccessful** reaction.



different product from the unsuccessful reaction

7. ***Deduce*** the ***structure*** of the following compound *based on* the given ***NMR*** *data* and the *molecular formula.* (14 pts)

$$\mathbf{C_{12}H_{14}O_3}$$

^{1}H NMR*

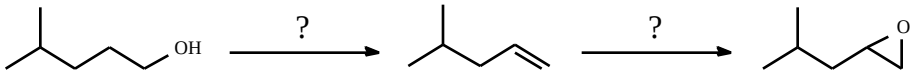
1.8 δ (t, 3H)
2.1 δ (d, 3H)
4.3 δ (q, 2H)
5.4 δ (m, 1H)
7.2 δ (d, 2H)
7.9 δ (d, 2H)
9.5 δ (d, 1H)

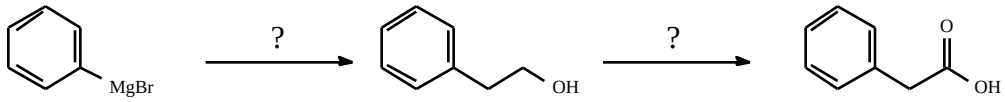
*s = singlet, d = doublet, t = triplet, q = quartet, m = multiplet

^{13}C NMR

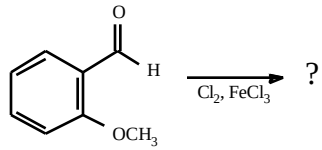
13.6 δ
14.4 δ
52.5 δ
59.1 δ
129.4 δ
129.7δ
130.2 δ
140.2 δ
170.0 δ
203.7 δ

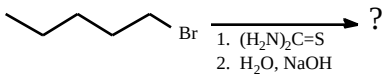
8. ***Provide*** the ***reagents*** for the following transformations.
(12 pts; 3 pts each)

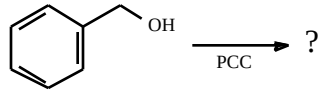


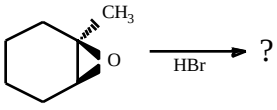


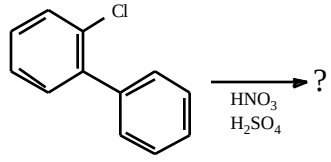
9. ***Draw*** the ***MAJOR products*** for the following reactions. If there is *No Reaction,* please write "***NR***". Please ***indicate*** *relevant* ***stereochemistry*** when necessary (i.e., wedge and dash).
(15 pts; 3 pts each)











10. Using *2-butene* as your only source of carbon atoms in the product, ***write*** a ***synthesis*** for *3,4-dimethyl-2,5-hexanediol*. You may use as much 2-butene as you need.
(20 pts)