

CHEM 3331, Professor M. Walczak, Spring 2016
Second hour exam, March 8th, 2016

Printed Name: _____

Student ID: _____ Recitation TA: _____

Recitation Day and Time: _____ Signature: _____

1. _____ / 18
2. _____ / 20
3. _____ / 20
4. _____ / 20
5. _____ / 10
6. _____ / 12

This is a closed-book exam. You are not allowed to use molecular models, lecture notes, personal class notes, textbooks, and electronic copies of the above materials on mobile devices. Use the backs of the pages for scratch notes.

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Total: _____ / 100

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* Lanthanide series

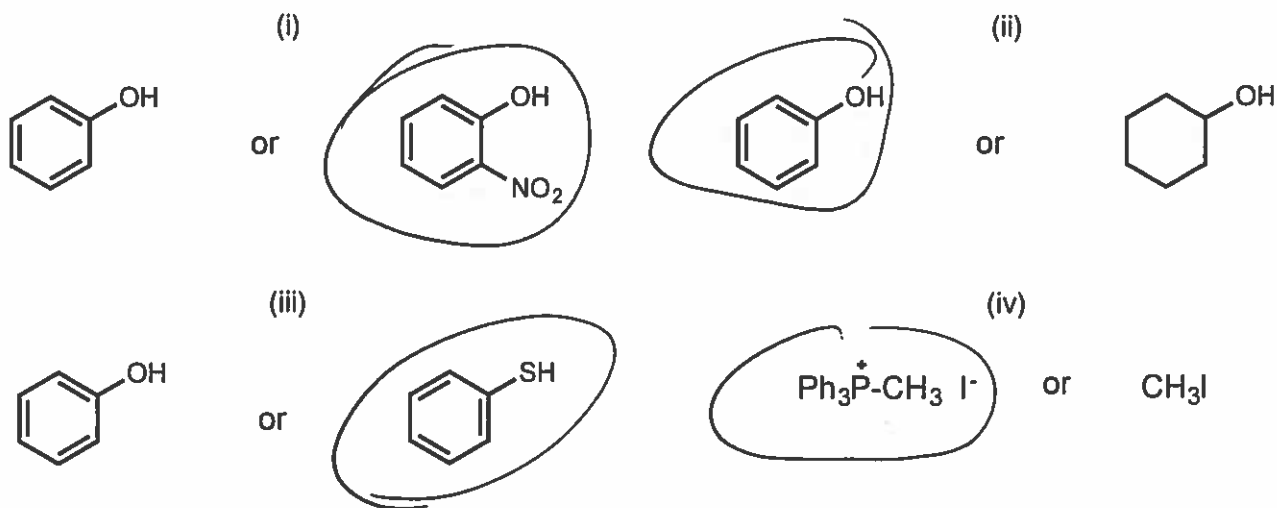
57	58	59	60	61	62	63	64	65	66	67	68	69	70
La	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb
138.91	140.12	140.91	144.24	144.91	150.36	151.96	157.25	158.93	162.50	164.93	167.26	168.93	173.04

** Actinide series

89	90	91	92	93	94	95	96	97	98	99	100	101	102
Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No
112.4	232.04	231.04	238.03	237.05	244.06	243.06	247.07	247.07	251.08	252.08	257.09	258.10	262.11

1.

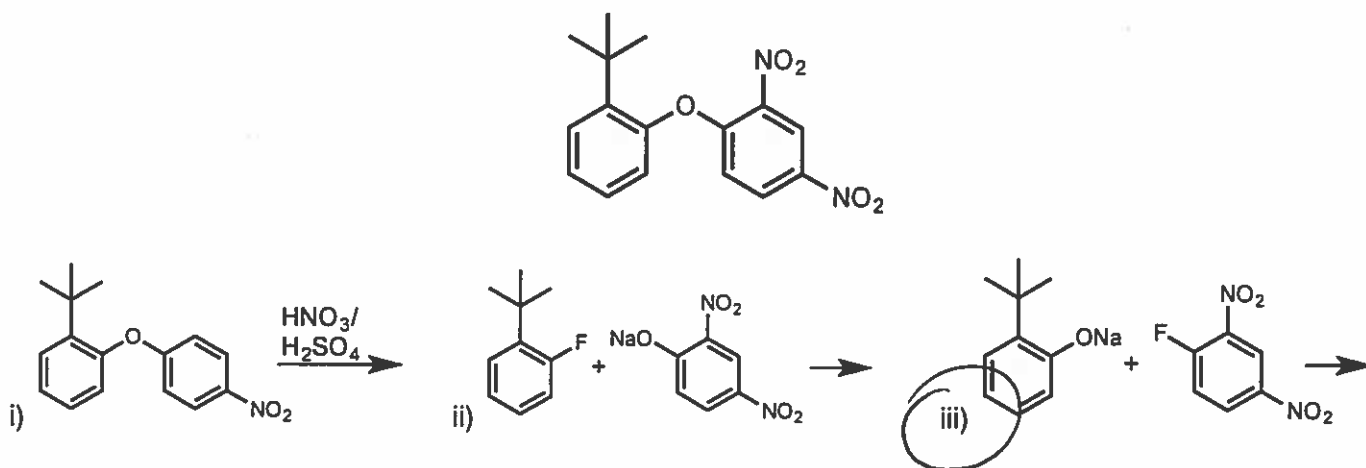
(A) Which of the following compounds would you expect to be more acidic (please circle the correct answer)? (3 points each)



(B) Which statement about nitration of benzene is *incorrect*? (3 points)

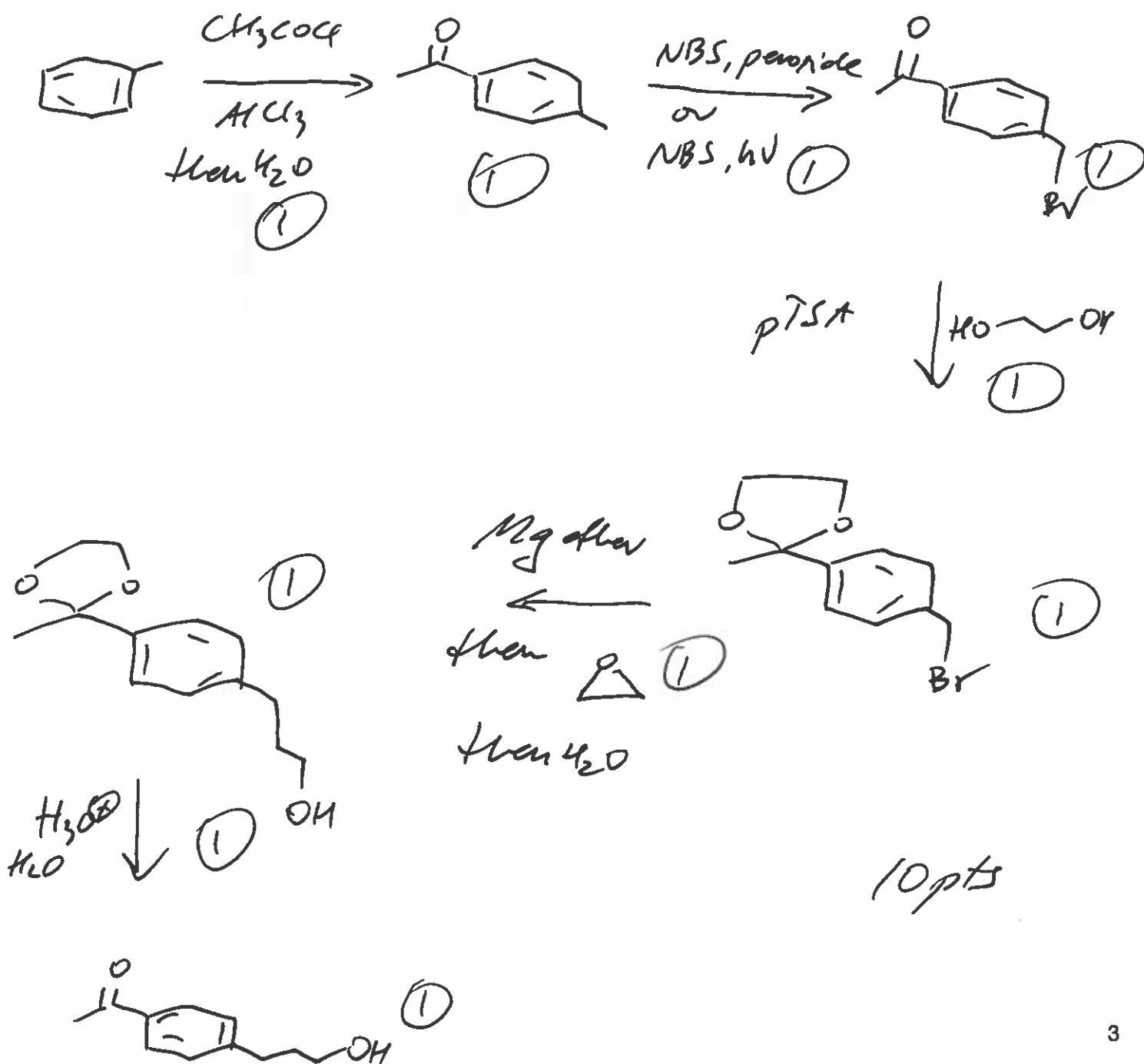
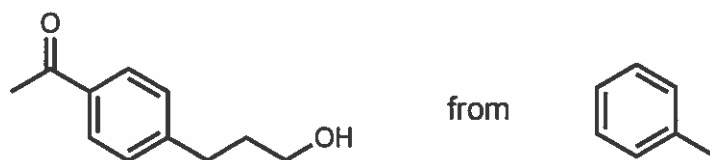
- i) Nitric and sulfuric acids are common nitrating agents ii) Nitronium ion has a negative charge
iii) The first step in this reaction is protonation of HNO₃ iv) Nitro group is a deactivating group

(C) Which is the best synthesis of the compound depicted below (3 points)?

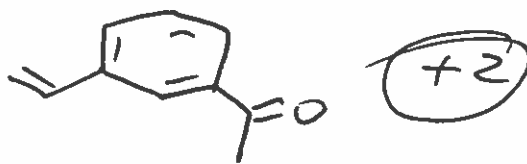
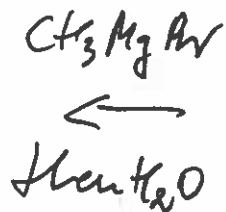
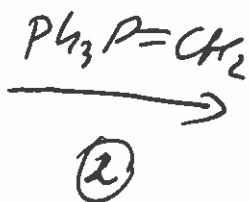
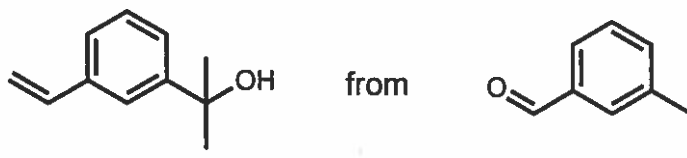


2. Provide a reasonable synthesis of the following two compounds using the provided starting materials. More than one step may be required to complete the synthesis. (10 points each, 20 points total)

(a)



(b)



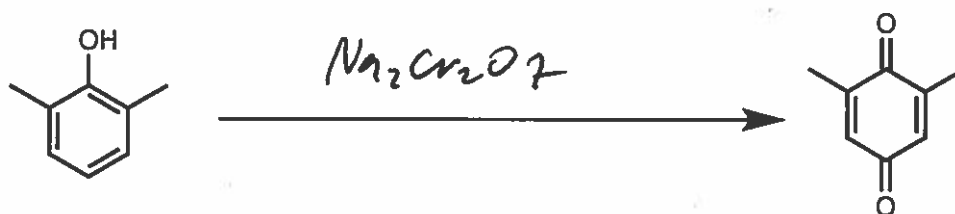
10 points

3. Which reagents will accomplish the following transformations? (4 points each)

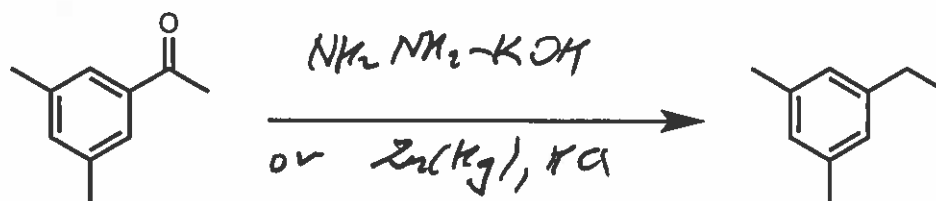
(a)



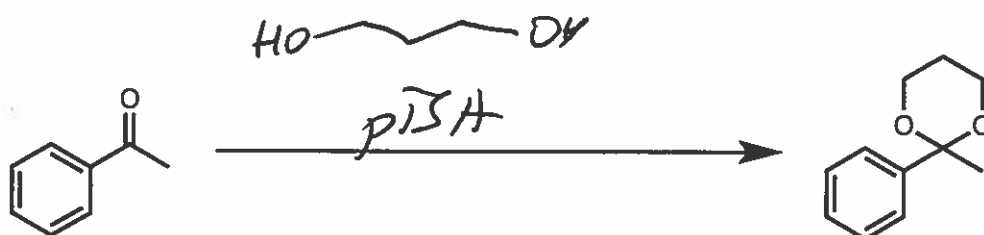
(b)



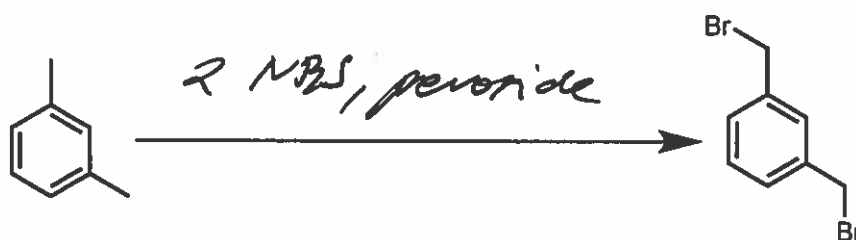
(c)



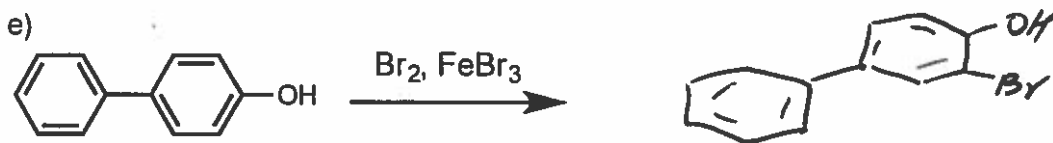
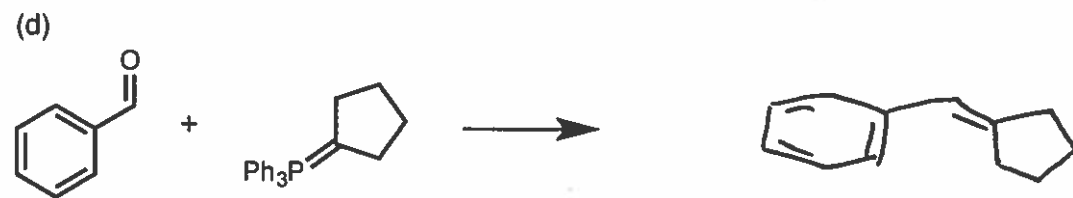
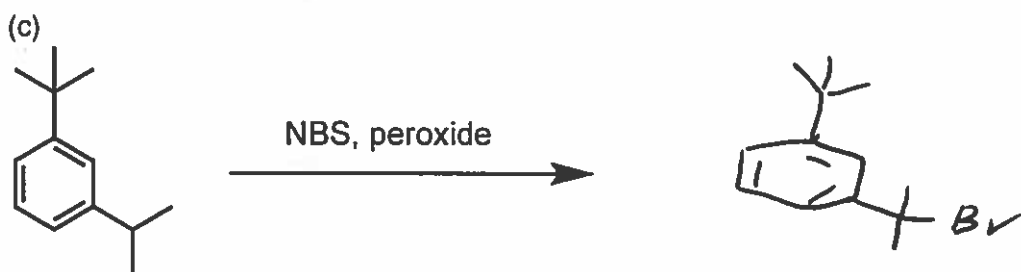
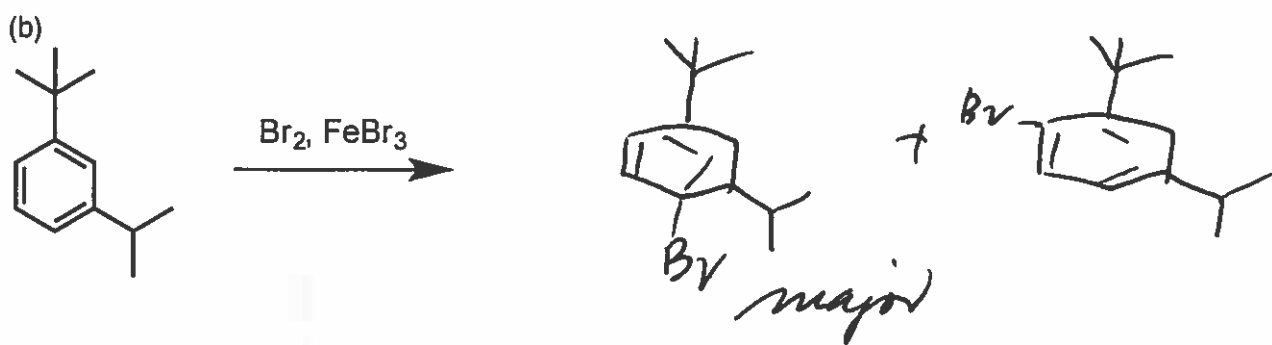
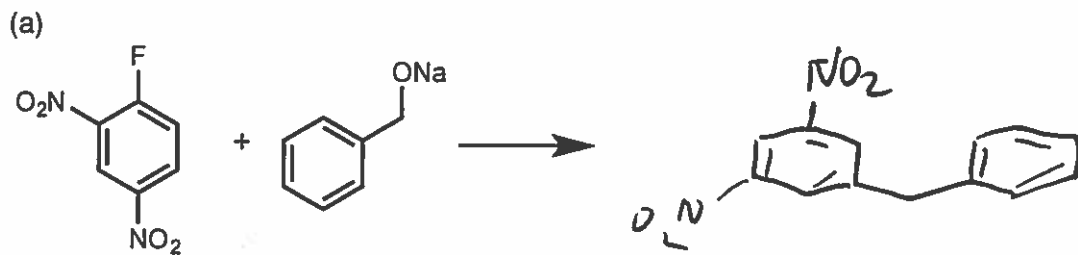
(d)



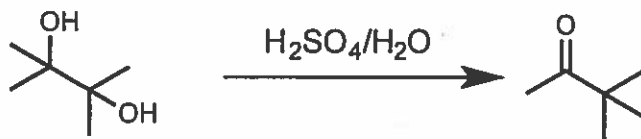
(e)



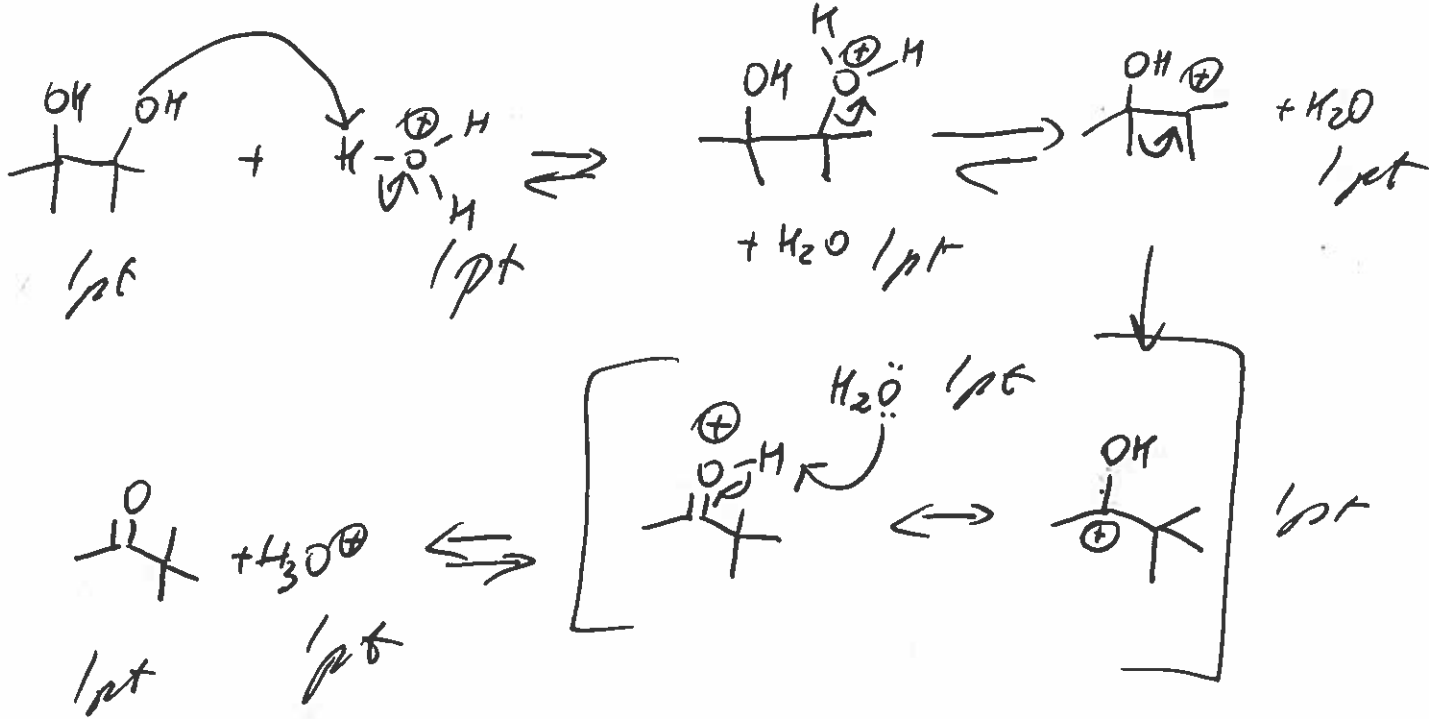
4. What are the major products in the following reactions? If you expect to obtain a mixture of isomers, indicate the major product. If electrophilic aromatic substitution occurs, assume only monosubstitution. (4 points each)



5. Please draw a mechanism of the following reaction. (10 points)



1pt 1pt



6. Which combination of acyl halide and arene would you choose to prepare the following compounds by Friedel-Crafts acylation (please circle only the correct equation)? (4 points each)

