

10 points each

TUD Department of Chemistry

Spring 2017

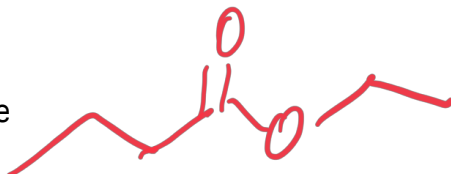
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1) Draw the structure for:

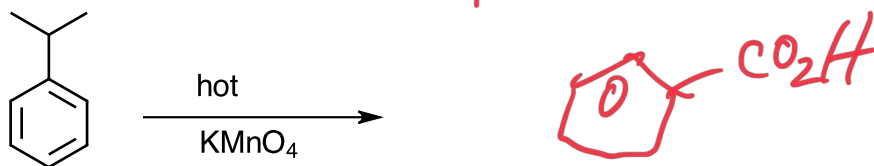
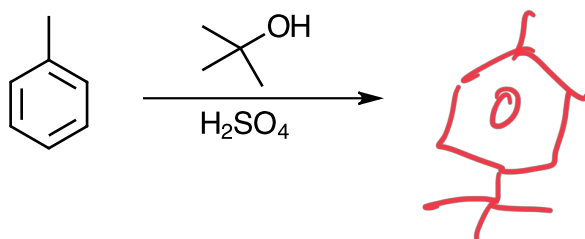
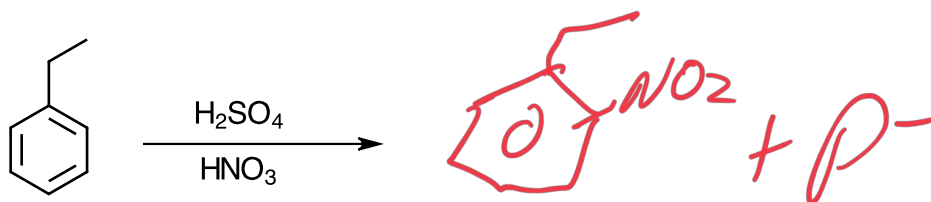
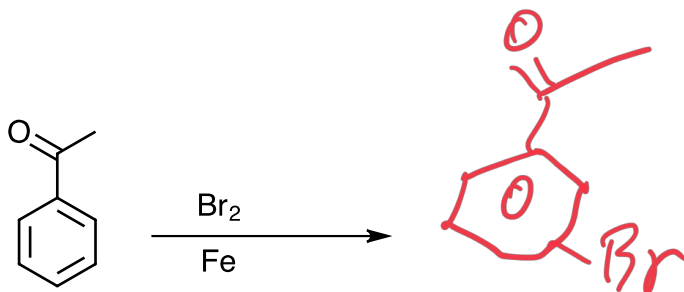
semicarbazide



ethyl butanoate



2) Show products of the following reactions:



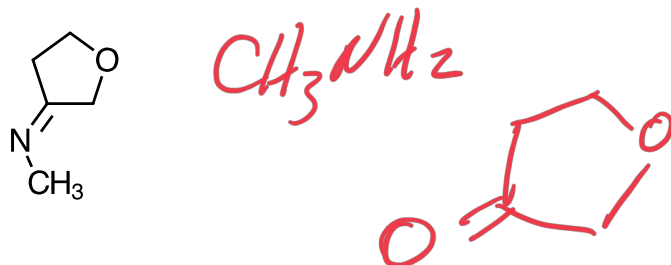
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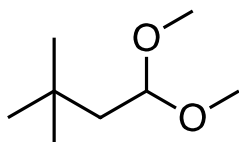
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- 3) What two molecules reacted to form this compound??



Refer to structure Q below for questions 4 and 5:



Structure Q

- 4) What do we call the functional group in Q?

acetal

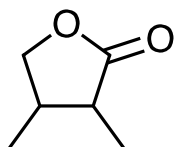
- 5) What products are formed when Q is treated with aqueous acid (draw them)?



- 6) Draw a molecule with the functional group that the 2,4-DNP test is used to detect:



Refer to structure W for questions 7 and 8

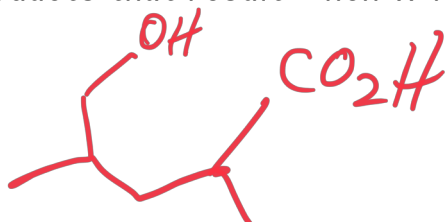


Structure W

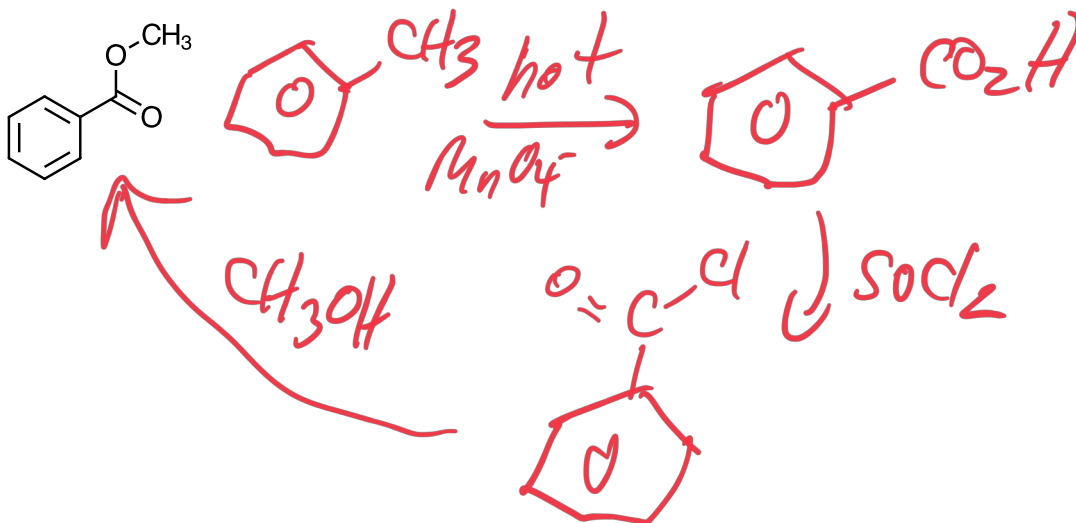
- 7) What functional group is present in W?

ester
(lactone)

- 8) Draw the products that result when W is heated in aqueous acid



- 9) Starting from toluene, outline a reasonable laboratory scale synthesis of:



CHM 3343

Exam 3

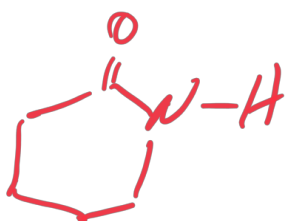
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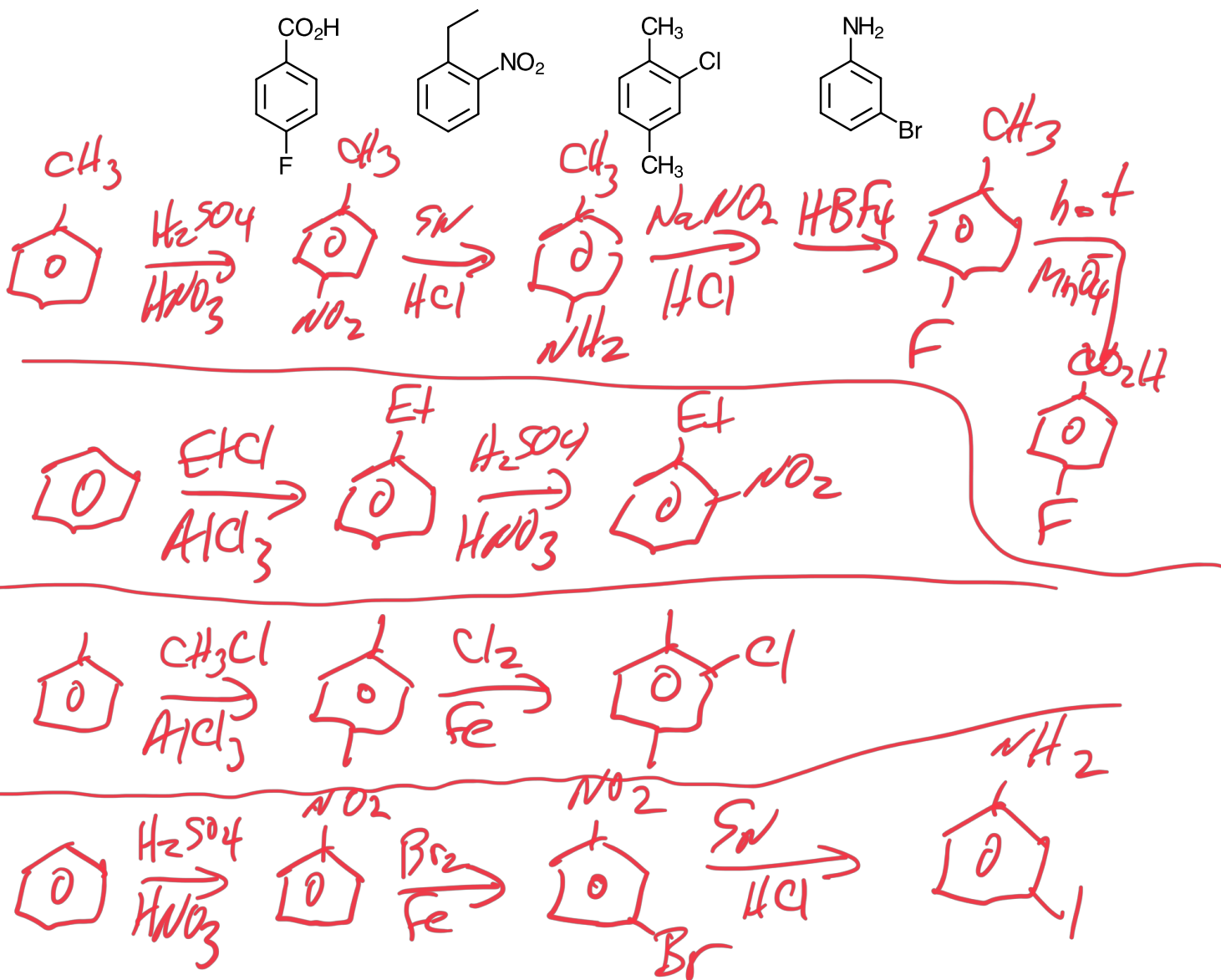
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10) Draw the structure of a lactam.



11) Prepare one of the compounds below starting from benzene or toluene:



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Exam 3

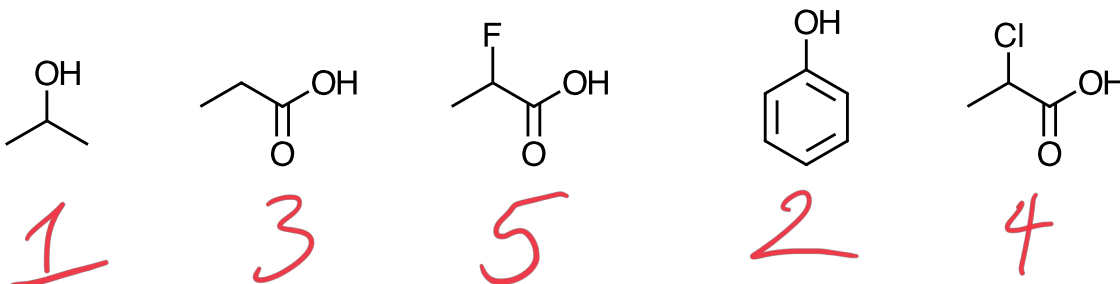
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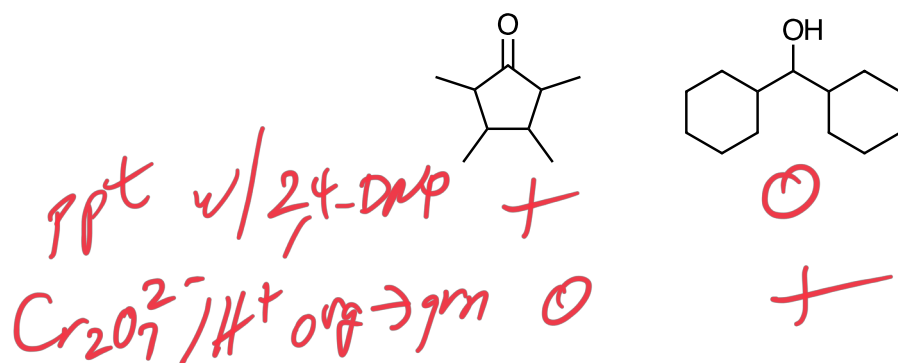
12) Number the structures below from least acidic (#1) to most acidic (#5)?



13) Why is an acid chloride more reactive towards nucleophilic acyl substitution than a carboxylic acid?

chloride better L.G. than -OH

14) Name two different simple chemical tests that could be used to differentiate the two molecules below?



15) What simple chemical test can be used to differentiate a carboxylic acid from a phenol?

acid bubble w/ HCO₃⁻

16) Draw the oxime derivative of acetone



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Exam 3

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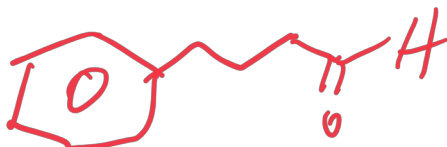
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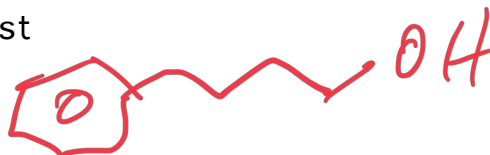
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17) Give structures which are consistent with the data:

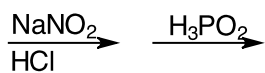
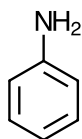
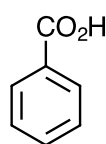
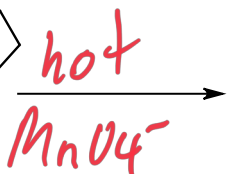
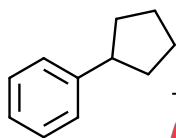
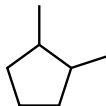
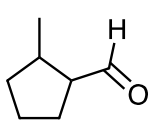
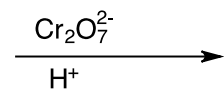
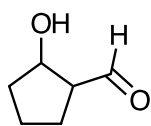
a) $C_{10}H_{12}O$ insoluble in water, gives a positive 2,4-DNP test and a positive Tollens test



b) $C_{10}H_{14}O$ insoluble in water, gives a negative 2,4-DNP test, a negative Tollens test and a positive $Cr_2O_7^{2-}$ test



18) Fill in reagents or products:



CHM 3343

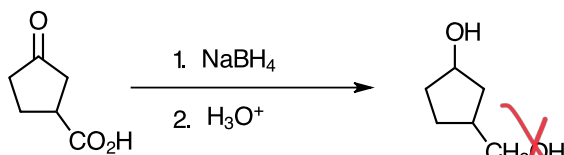
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19) What's wrong with the proposed synthetic step below:



NaBH₄ will not reduce carboxylic acid

20) What is it (C₇H₁₆O)

