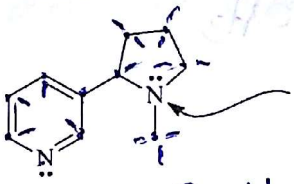
80/80

The University of Jordan — Organic Chemistry 233 — March 23, 2017

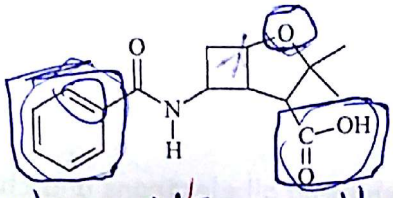
Dep — First Exam (60 min.)

Nam — ...er 61

I. (3 pts) Consider nicotine compound  to answer each of the following:

- The molecular formula the above compound is $C_{10}H_{14}N_2$
- The formal charge of the indicated nitrogen atom is 0 (atomic number for N =7)

II. (3 pts) Name three functional groups in the following compound:

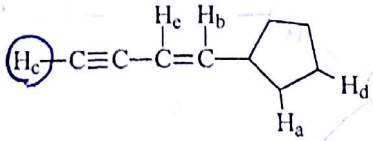


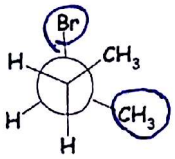
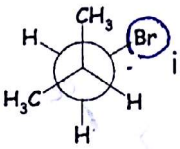
arene, alkene ; carboxylic acid ; ether

III. (4 pts): Answer each of the following:

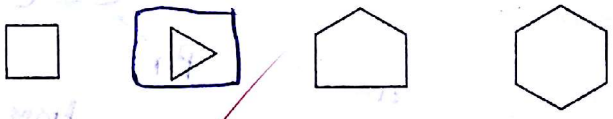
- The number of sp^2 hybridized carbon(s) in  is 4

(3 domains)

- The most acidic hydrogen in the structure  is H_c

- The structures  and  is Consitutional isomers.

(identical, constitutional, configurational, conformational isomers)

- The least stable of the following  is 

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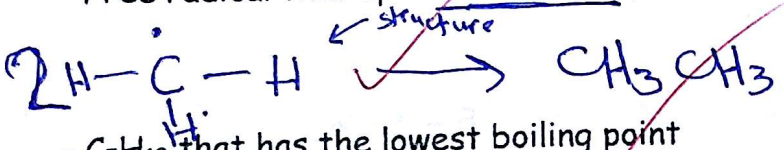
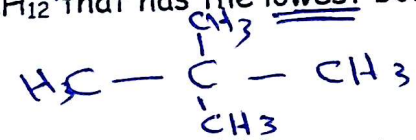
IV. (30 pts)- Draw the structure for each of the following:

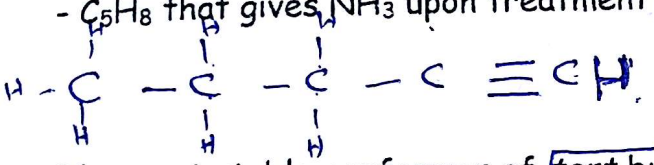
- Free radical that upon termination process gives ethane.



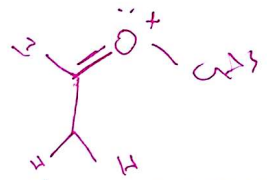
- C_5H_{12} that has the lowest boiling point



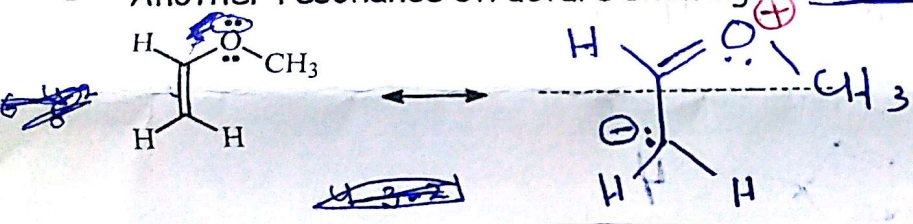
- C_5H_8 that gives NH_3 upon treatment with $NaNH_2$



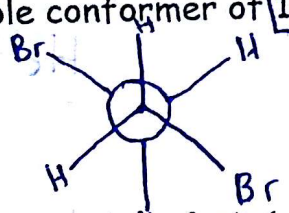
- The most stable conformer of *tert*-butylcylohexane.



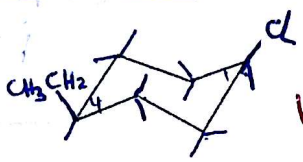
- Another resonance structure showing all electrons and charges:



- The most stable conformer of 1,2-dibromoethane (Newman projection)

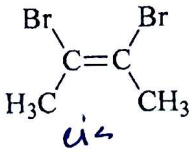


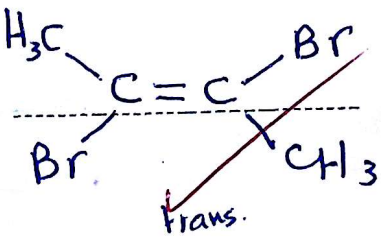
- The chair conformation of *cis*-1-chloro-4-ethylcyclohexane



- Configurational isomer for

cis/trans





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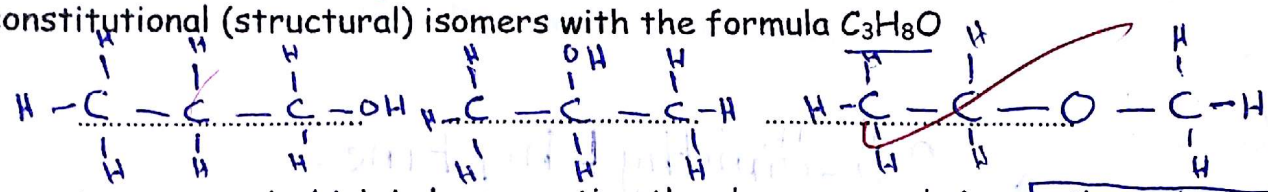
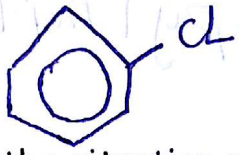
Three constitutional (structural) isomers with the formula C_3H_8O



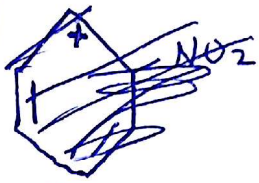
- An aromatic compound which is less reactive than benzene and gives ortho and para products upon nitration



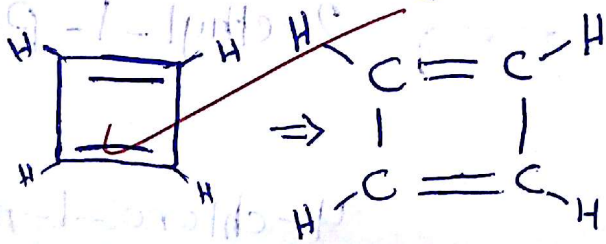
- The electrophile generated during the nitration of benzene

NO_2^+

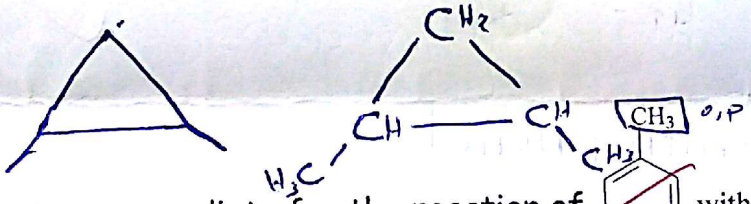
NO_2^+

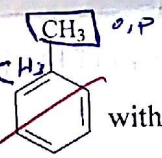


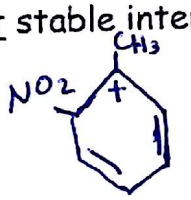
- C_4H_4 that has conjugated multiple bonds

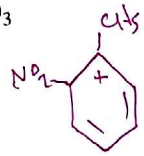


- C_5H_{10} that can show cis-trans isomers

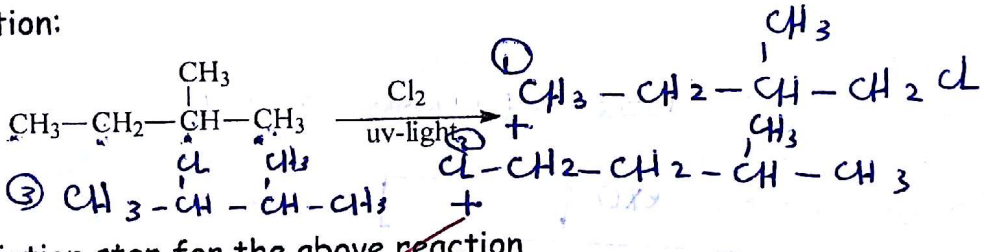


- The most stable intermediate for the reaction of  with HNO_3





V. (3 pts) For the following reaction:



- Write an equation for the initiation step for the above reaction

$Cl_2 \xrightarrow{\text{Uv light}} 2Cl^{\bullet}$

- The number of mono-chlorination product(s) of the above reaction is ---4---

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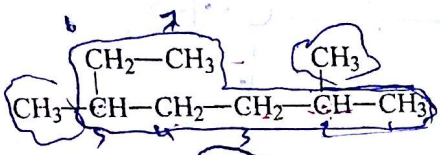
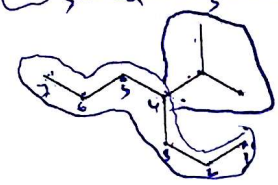
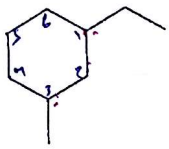
VI. (12 pts) Give the IUPAC name for each of the following compounds:



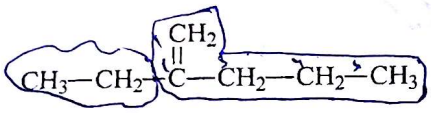
2,5-dimethyl-heptane



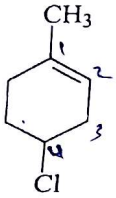
4-isopropyl-heptane



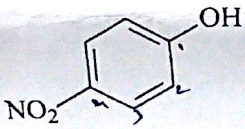
1-ethyl-3-methyl-cyclohexane



2-ethyl-1-pentene

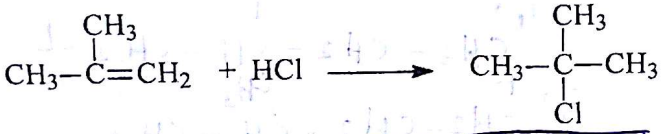


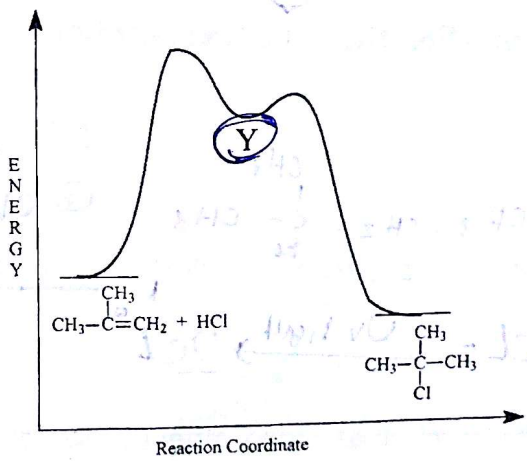
4-chloro-1-methyl-cyclohexene



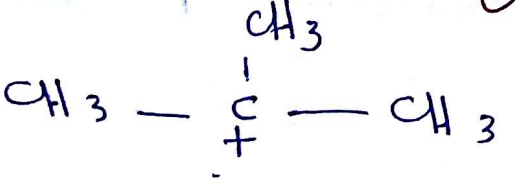
P-nitrophenol

VII. (4 pts) Examine the following reaction energy diagram for the reaction





- The overall reaction is exo- (exothermic, endothermic)
- Y is ---------- (carbocation intermediate, transition state, product, activation energy)
- Draw the structure of Y



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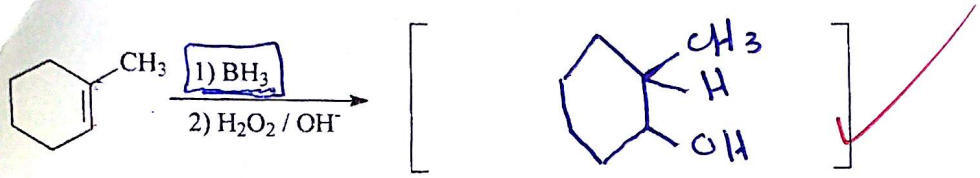
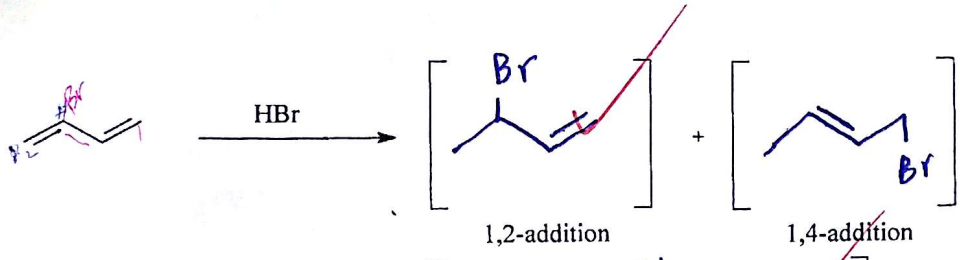
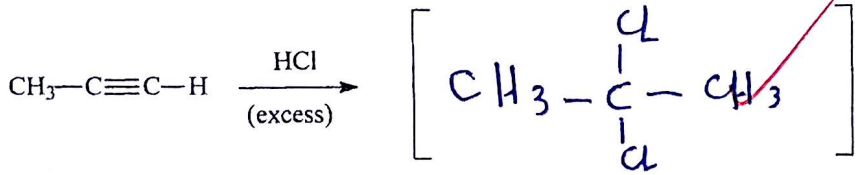
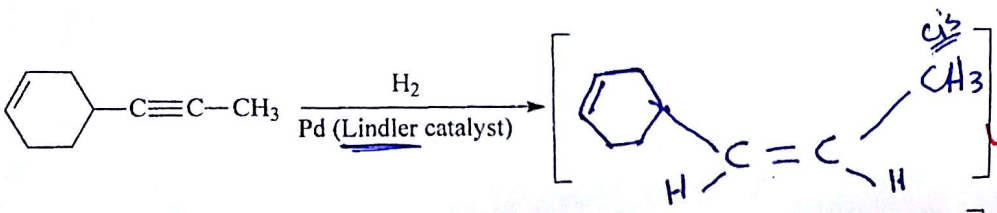
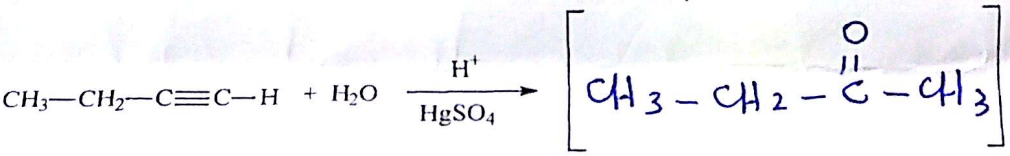
VIII. (20 pts) Fill in the missing reactant, reagent or Product in the following equations:

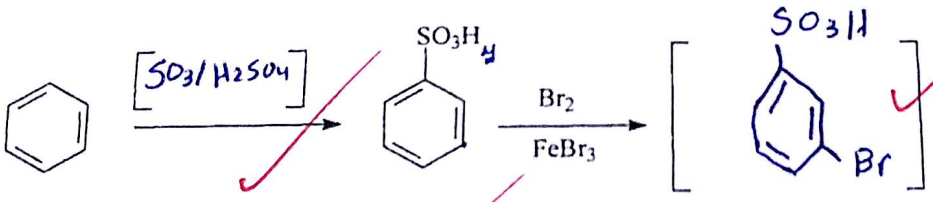


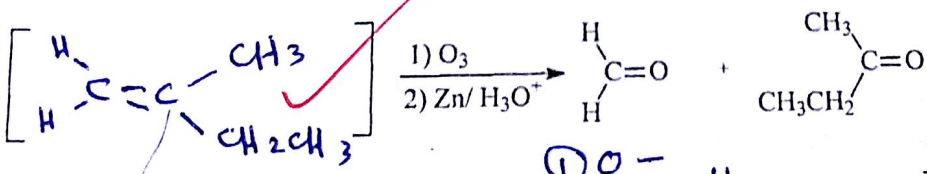


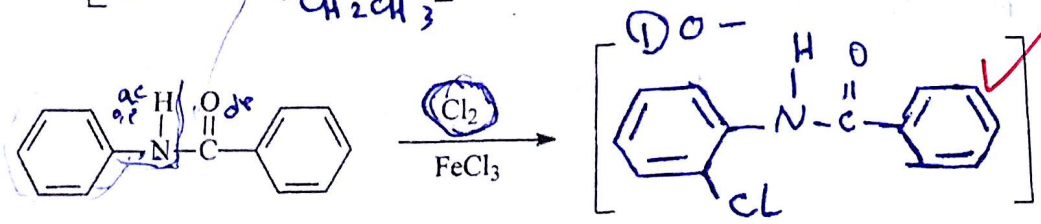




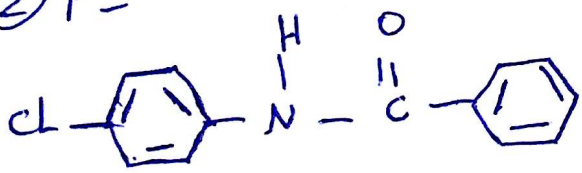








② P-



GOOD LUCK