CHM 234, Spring 2018

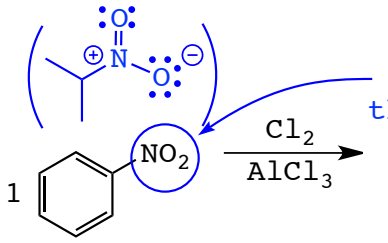
QUIZ #9 ANSWER KEY

(hit the RETURN Button to return to the Main Quiz Page)

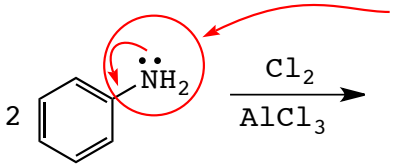
QUESTION 1

MC32n

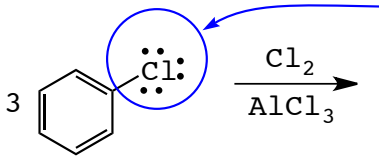
For the following reactions indicated as 1, 2 and 3, which is the correct order of INCREASING rate of electrophilic aromatic substitution?



this is STRONG WITHDRAWING group due to the formal positive charge on the nitrogen in the nitro group, so is DEACTIVATING, and decreases the reaction rate



this is a STRONG DONATING group on a π-system, due to the resonance effect of the non-bonding electrons on the nitrogenm, thus is ACTIVATING, and increases the rate of the reaction



this is WEAK WITHDRAWING group, even though the Cl has non-bonding electrons it is so electronegative that the inductive effect outweighs the weak resonance donation effect, Cl is thus DEACTIVATING and decreases the reaction rate somewhat

A 1 (slowest) < 2 < 3 (fastest)

B 2 (slowest) < 3 < 1 (fastest)

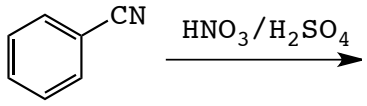
C 1 (slowest) < 3 < 2 (fastest)

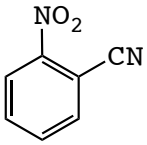
D 3 (slowest) < 2 < 1 (fastest)

QUESTION 2

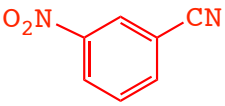
MC32o

give the product of the following electrophilic aromatic substitution reaction

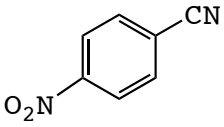




A

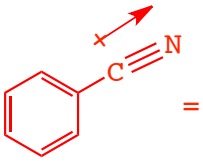


B



C

Do not give the answer D



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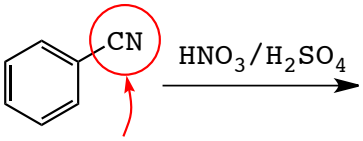
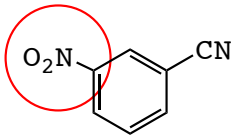


meta-position

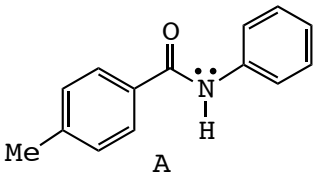


electron withdrawing due to dipolar nature of the carbon-nitrogen triple bond, thus META-directing

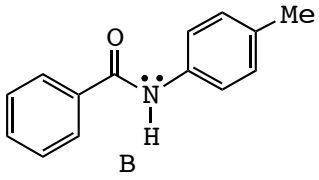
QUESTION 3

MC321

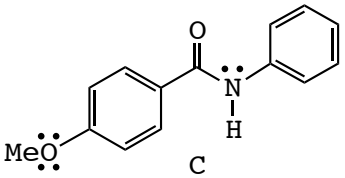
Which of the following structures would undergo electrophilic aromatic substitution fastest?



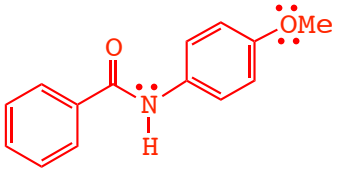
A



B



C



D

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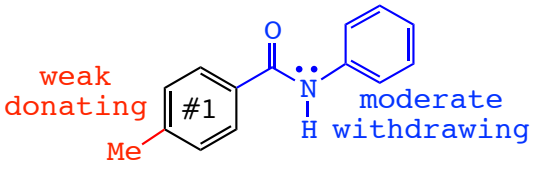
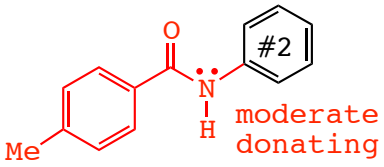
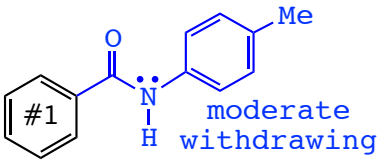
donating groups are ACTIVATING, they make electrophilic aromatic substitution reactions FASTER, the stronger the donating group, the faster the reaction

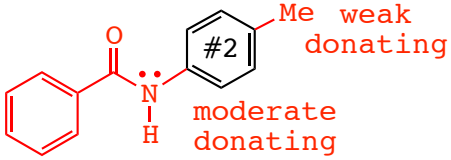


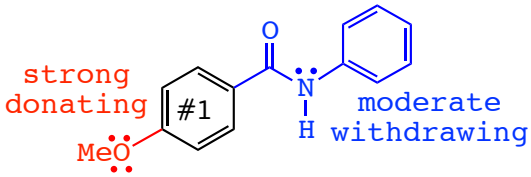
A



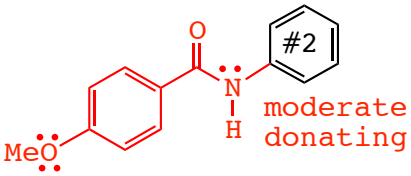


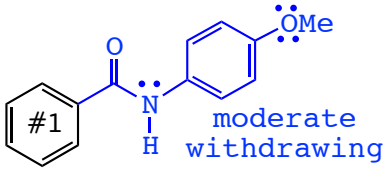
B



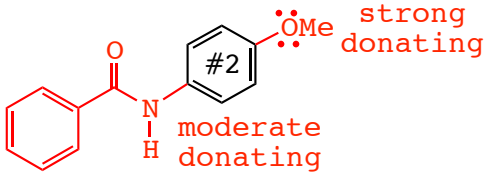


C





D

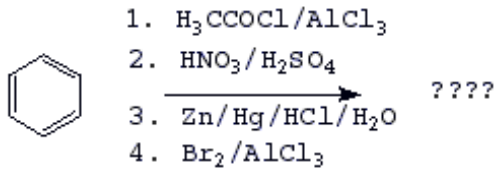


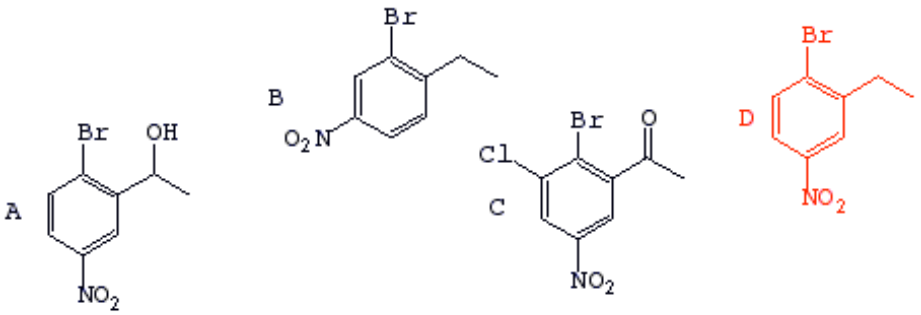
the #2 ring in structure D has both moderate and a strong donating groups, THIS ring on THIS structure is the most activated, reaction would be fastest HERE

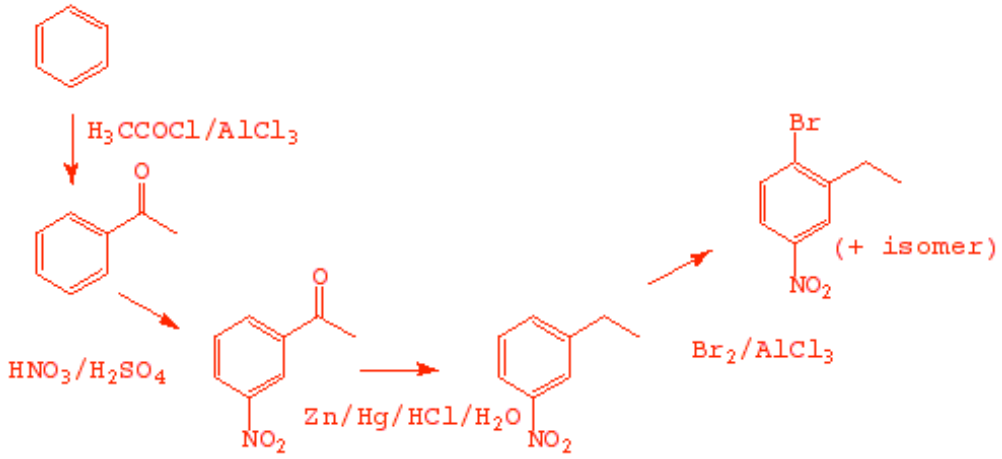
QUESTION 4

MC32a

Which of the following is a possible (not necessarily most probable) product of the following reaction sequence?



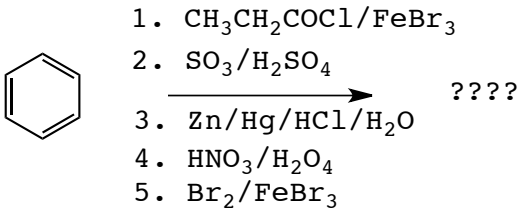


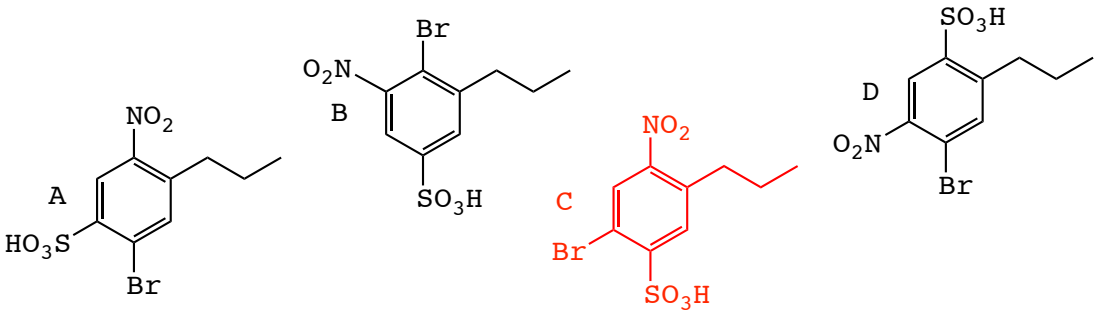


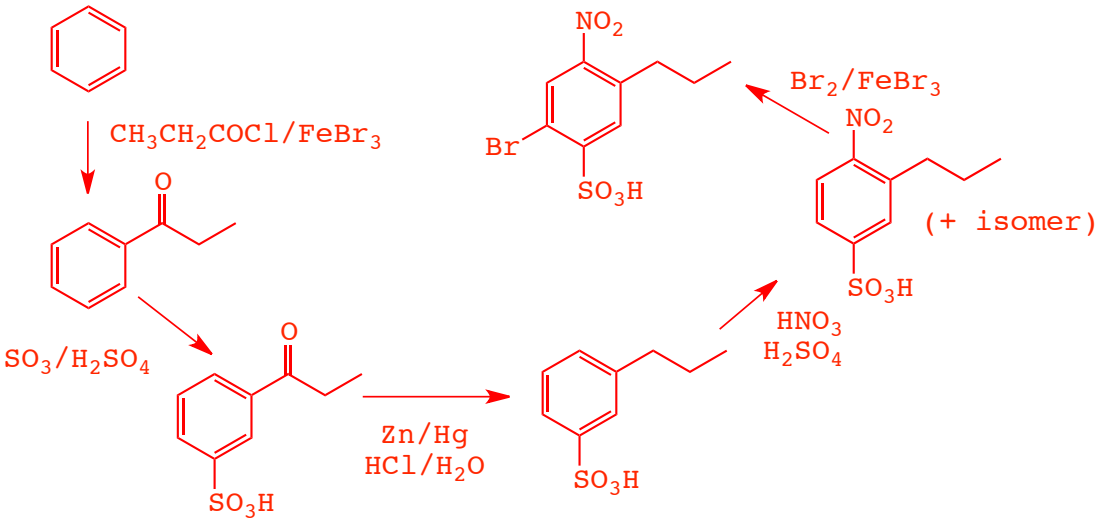
QUESTION 5

MC32e

Which of the following is a possible (not necessarily most probable) product of the following reaction sequence?



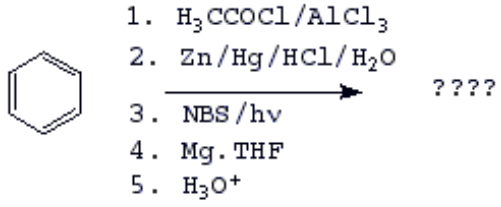


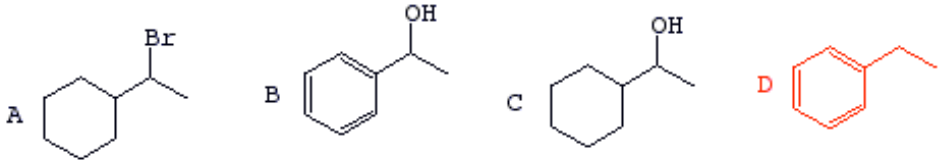


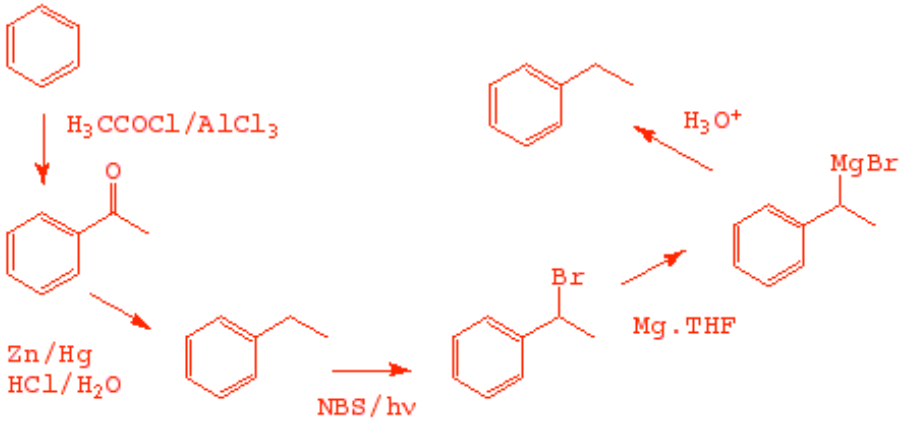
QUESTION 6

MC32b

Which of the following is a possible (not necessarily most probable) product of the following reaction sequence?





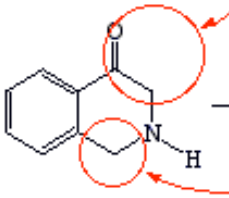


QUESTION 7

MC32k

For the following reactions indicated as 1, 2 and 3, which is the correct order of INCREASING rate of electrophilic aromatic substitution?

1

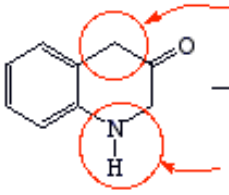


Cl_2, $AlCl_3$

as far as the benzene ring is concerned, this is a withdrawing, and thus DEactivating substituent (slows reaction)

this is a very weakly donating, and thus weakly activating substituent (speeds reaction a little bit)

2

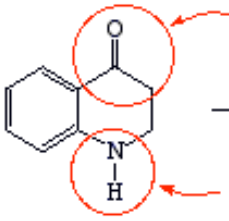


Cl_2, $AlCl_3$

this is a weakly donating, and thus activating substituent (speeds reaction)

this is a strongly donating, and thus strongly activating substituent (speeds reaction a lot)

3



Cl_2, $AlCl_3$

this is a withdrawing, and thus DEactivating substituent (slows reaction)

this is a strongly donating, and thus strongly activating substituent (speeds reaction a lot)

A 1 (slowest) < 2 < 3 (fastest)

B 2 (slowest) < 3 < 1 (fastest)

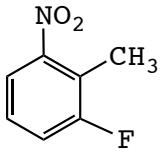
C 1 (slowest) < 3 < 2 (fastest)

D 3 (slowest) < 2 < 1 (fastest)

QUESTION 8

MC32q

Which is the correct IUPAC name for the following structure?



A 1-methyl-2-fluoro-6-nitrobenzene
B 2-fluoro-6-nitrotoluene
C 2-nitro-6-fluorotoluene
D 1-nitro-3-fluoro-2-methylbenzene

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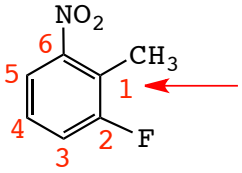
named as a substituted TOLUENE



in this case all other things are equal, therefore fluoro comes before nitro alphabetically, so the F gets number 2 and nitro number 6