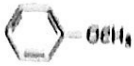
CHEMISTRY 233 Second EXAM CHEMISTRY DEPARTMENT
70 MIN May 02, 2015
Name .....xxxxxxx..... Registration No..... Section..... Seat No .....

I. (28 pts) Circle the correct answer in each of the followings:

- The name of  is

a) aniline b) styrene c) toluene c) phenol e) anisole

- The correct first step mechanism for the addition of HCl to propene is

a) 

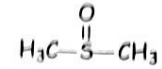
b) 

c) 

d) 

e) 

- Which of the following is a polar aprotic solvent?

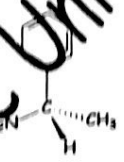
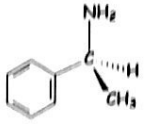
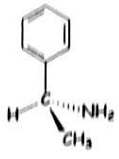
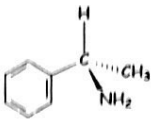
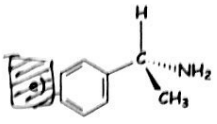
I. H_2O II. CH_3OH III.  IV. 

a) III and IV only b) I only c) I and II only
d) II and III only e) all of them

- The observed rotation for 100 mL of an aqueous solution containing 4.0 g of sucrose, placed in a 2-decimeter sample tube, is +4.8° at 25°C. What is the specific rotation [α] of sucrose?

a) +60° b) +15° c) +30° d) +90° e) +15°

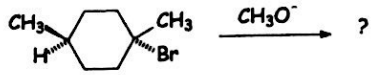
- Which of the following has the R configuration?

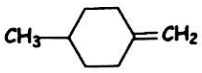
a)  b)  c)  d)  e) 

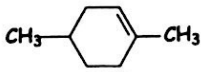
- Which of the following is the strongest nucleophile?

a) H_2N^- b) NH_3 c) CH_3OH d) H_2O e) HO^-

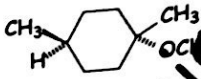
➢ What would be the major product of the following reaction?



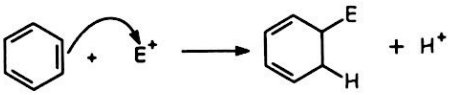
a) 

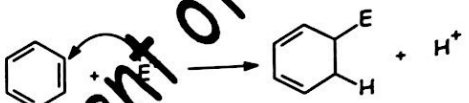
b) 

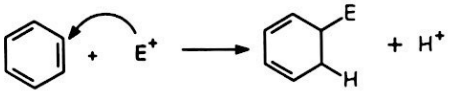
c) 

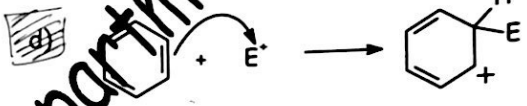
d) 

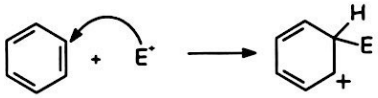
➢ Which of the following is most likely to be the first step in the general mechanism for electrophilic substitution reactions?

a) 

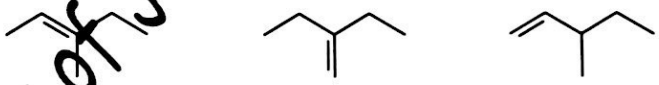
b) 

c) 

d) 

e) 

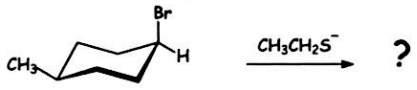
➢ Which of the following alkene(s) produce $CH_3-CH_2-\underset{\underset{CH_3}{|}}{\overset{\overset{Br}{|}}{C}}-CH_2-CH_3$ as the major product upon addition HBr?

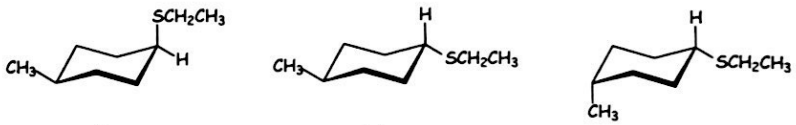


I II III

a) I and II only b) II and III only c) I, II and III d) I only e) II only

➢ The product(s) of the following reaction is





I II III

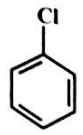
a) equall amounts of I and II b) equall amounts of II and III

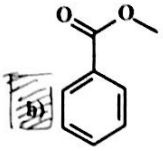
c) I only d) II only e) III only

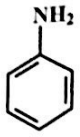
- Assume that (2S,3S)-2,3-dibromobutane has a specific rotation of + 18°. What would be the specific rotation of the (2R,3R)-isomer

a) 0° b) + 36° c) - 9° d) + 18° e) - 18°

- Which of the following compounds will give meta directing major product?

a) 

b) 

c) 
d) 

e) 

- Which of the following reactions proceeds with inversion of configuration at the carbon bearing the leaving group?

a) E2 b) E1 c) S_N2 d) S_N1 e) All of them

- The slowest step of an S_N1 reaction involves:

a) breaking the bond between the carbon and the leaving group to give a carbocation.

b) combination of a nucleophile with the carbocation to give the product.

c) loss of a proton from the nucleophile to give the product.

d) attack of the nucleophile on the alkyl halide.

- Which of the following is not a nucleophile?

a) NH_3 b) NH_4^+ c) CN^- d) H_2O e) CH_3O^-

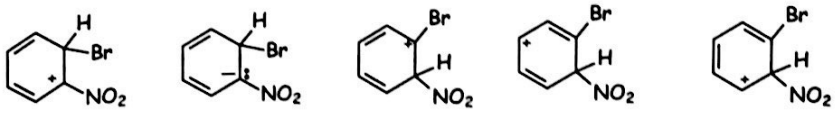
- Which of the following is true of any (S)-enantiomer?

a) It is the mirror image of the corresponding (R)-enantiomer. b) It is a racemic form.

c) It rotates plane-polarized light to the right. d) It rotates plane-polarized light to the left.

e) It has a plane of symmetry (mirror plane).

- Which of the following is (are) correct resonance structure(s) for the intermediate formed in the nitration of bromobenzene?



I II III IV V

a) I, III, IV and V b) III, IV and V c) I only d) II only e) III only

- Which of the following names is correct?

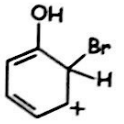
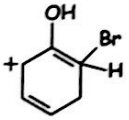
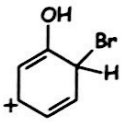
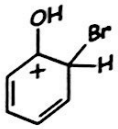
a) 1,5-dibromobenzene b) 3-nitroaniline c) o-ethylhydroxybenzene

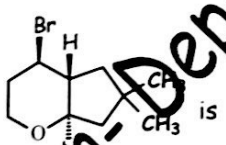
d) p-aminonitrobenzene e) 1,6-dichlorobenzene

- Which alkyl halide would you expect to undergo an S_N1 reaction most rapidly?

a) $CH_3CH_2\underset{\underset{Br}{|}}{C}HCH_2Br$ b) $CH_3CH_2CH_2CH_2CH_2Br$ c) $CH_3CH_2\underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{C}}Br$ d) $CH_3\underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{C}}CH_2Br$ e) $CH_3\underset{\underset{CH_3}{|}}{C}HCH_2CH_2Br$

- Which of the following structures is the most important resonance structure formed when phenol undergoes o-bromination?

a)  b)  c)   e) 

- The total number of stereoisomers of  is

a) 16 b) 64 c) [illegible] d) 4 e) 8

- Which S_N2 reaction will occur most rapidly in aqueous acetone solution?

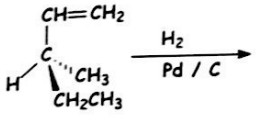
a) $HO^- + CH_3\text{-}Br \longrightarrow CH_3OH + Br^-$

b) $HO^- + CH_3\text{-}I \longrightarrow CH_3OH + I^-$

c) $HO^- + CH_3\text{-}F \longrightarrow CH_3OH + F^-$

d) $HO^- + CH_3\text{-}Cl \longrightarrow CH_3OH + Cl^-$

e) They will all occur at the same rate.

- The product obtained from  is

a) optically active b) racemic mixture c) meso compound d) achiral e) chiral

- The most stable carbocation

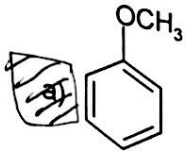
a) $H_3C\text{—}\overset{\overset{+}{|}}{\underset{\underset{CH_3}{|}}{C}}\text{—}CH_3$ b)  c) $\overset{+}{C}H_3$ d) $CH_3CH_2CH_2\overset{+}{C}H_2$ e) $CH_3CH_2\overset{+}{C}HCH_3$

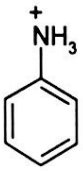
- Identify the leaving group in the following reaction.

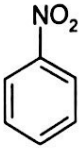
$$C_6H_5S^-Na^+ + CH_3CH_2I \longrightarrow C_6H_5SCH_2CH_3 + Na^+ + I^-$$

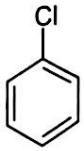
a) $C_6H_5SCH_2CH_3$ b) I^- c) $C_6H_5S^-$ d) Na^+ e) CH_3CH_2I

➢ Which of the following compounds would be the most reactive to ring bromination?

a) 

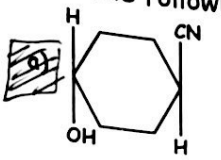
b) 

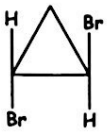
c) 

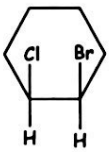
d) 

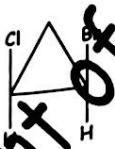
e) 

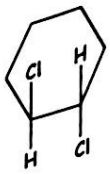
➢ Which of the following compounds is achiral?

a) 

b) 

c) 

d) 

e) 

➢ If the observed optical rotation of an unknown sample is zero, which of the following conclusions(s) is (are) true?

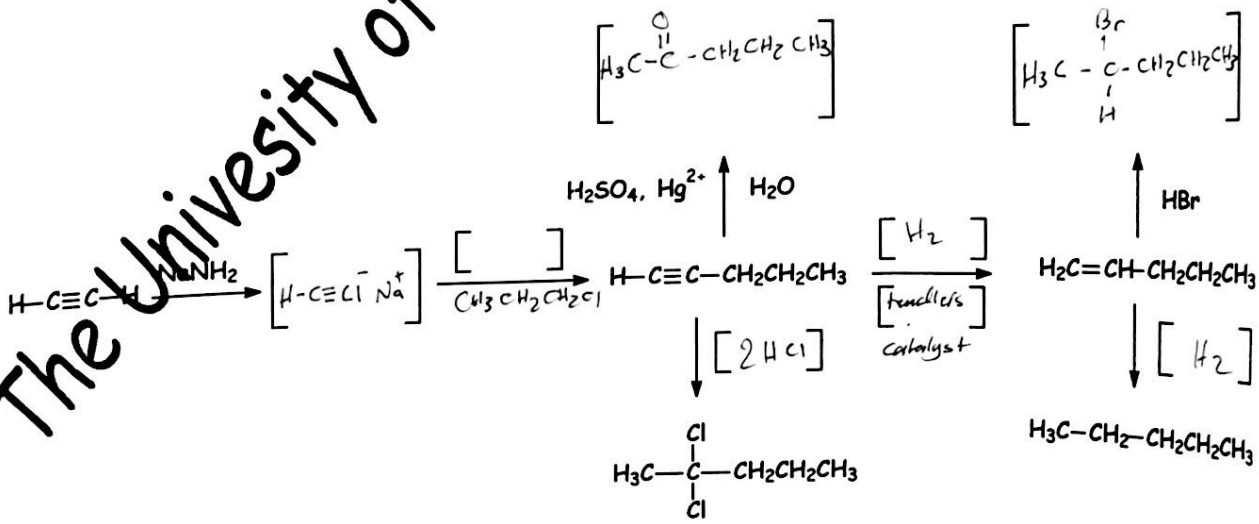
I. The sample is a pure enantiomer

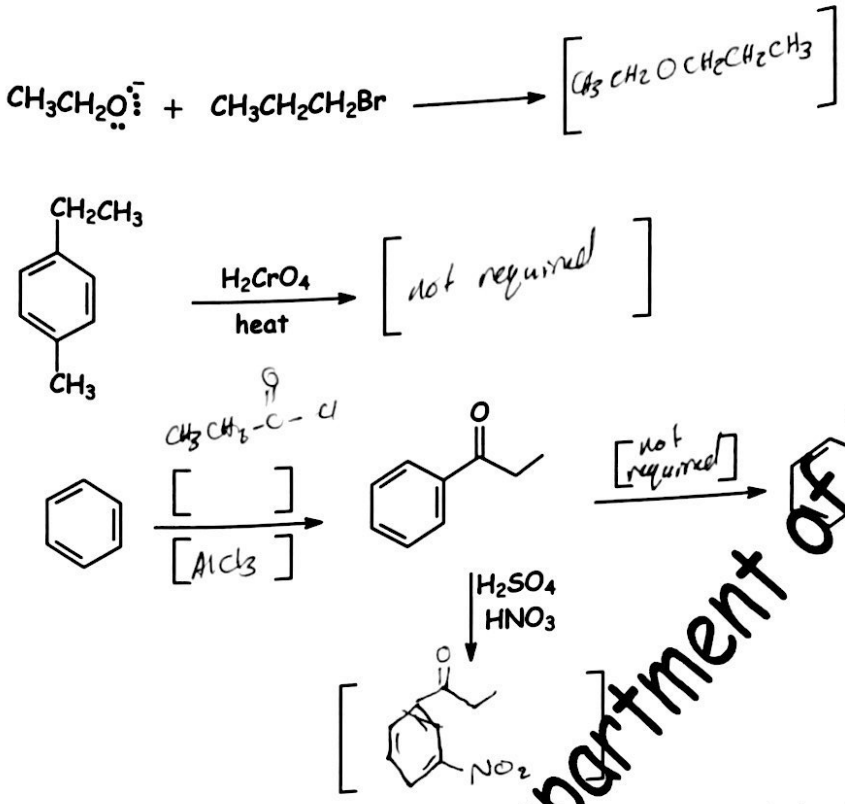
II. The sample is a meso compound

III. The sample is a racemic mixture

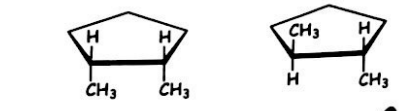
a) I only b) II only c) III only d) I and II only e) II and III only

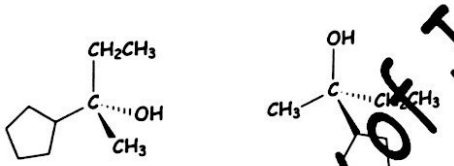
II. (12 pts) complete the following reactions by writing the missing reagent, reactant or major product:

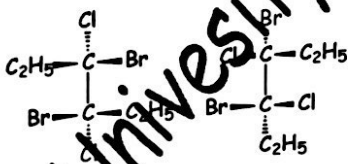


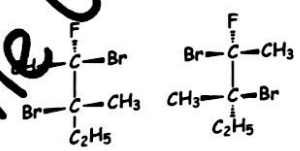


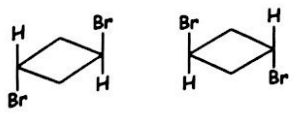
III. (5 pts) Indicate the relationship between each of the following pairs of structures (enantiomers, diastereomers, or same)


diastereomers


same


dia


enantiomers


same