

Final Lab Quiz Study Guide

◇ Lab 5

- Electrophilic Aromatic Substitution: Nitration
 - Substrate – benzene ring
 - Added substituents on benzene ring will determine the regioselectivity of the NO_2 group
 - Ortho/Para directors – alkyl group, Phenyl, Oxygen or Nitrogen groups with lone pairs (esters, amines, amides), halogens
 - These groups are “activators;” (except for halogens) and donate electrons into the benzene ring
 - Meta directors – EWG groups: NO_2 , CF_3 , $\text{C}=\text{O}$, CN , the atom directly attached to the ring will have a positive charge
 - These groups are “deactivators;” and withdraw electrons from the benzene ring
 - Reagents – $\text{HNO}_3/\text{H}_2\text{SO}_4$
 - Product – benzene ring with NO_2 group attached

◇ Lab 6

- Aldol Condensation
 - Mechanism of acetone to dibenzylacetone with all counter ions and byproducts included (refer to lab notes)

◇ Lab 7

- Wittig Reaction
 - Substrate – aldehydes or ketones
 - Reagents– “Wittig Salt”: $\text{R group} + (\text{PH})_3\text{-P}^+\text{Cl}^-$ and NaOH
 - Product –alkene replaces the oxygen of the aldehyde/ketone carbonyl and adds the R group
 - Be able to determine product: R group is added to substrate via an olefin bond

◇ Lab 8

- Amide Preparation
 - Substrate – R + amine group
 - Reagents – acetic anhydride
 - Product – R + amide and byproduct (acetic acid)
 - What other reagents can you use to produce an amide, and their respective byproducts?
 - Acid chloride (HCl)
 - Carboxylic acid (H_2O)

◇ Lab 9

- Arenediazommonium Salts
 - Substrate – aromatic ring

- Reagent – arenediazonium salts (benzene and $\text{N}\equiv\text{N}^+ \text{Cl}^-$ group) and KI
- Product – benzene and I
- How do you make the arenediazonium salt?
 - NaNO_2/HCl
- What other reagents can you use to add a different functional group directly onto the ring?
 - $\text{H}_3\text{O}^+/\text{heat}$ adds OH
 - HBF_4/heat adds F
 - CuCN adds CN

◇ Characterization of your product

- What does IR tell you about an unknown
 - Functional groups
 - How to use IR to tell the difference between a starting material and a product
- Melting points
 - If your product is lower than the actual melting point, what does this mean
- Thin Layer Chromatography
 - How to characterize your product with a standard
 - How to calculate the R_f value from a plate
 - How to determine polarity of the products

◇ Calculations

- Theoretical yield
- Actual yield
- Percent yield