Review: 1st Midterm Exam, 2005

Basic Mechanisms of organic chemistry :

electrophilic addition to alkenes (first semester)

S_N1/E_1:S_N2/E_2 (first semester)

free radical substitution

nucleophilic addition and nucleophilic addition/elimination

acid/base

redox reaction mechanisms

electrocyclic reactions, Diels Alder, coming up in Chapter 20

electrophilic substitution, coming up in Chapter 22

these will be on 2nd midterm exam

Spectroscopy, IR and NMR

Nomenclature

Resonance and Structure, aromaticity

Acidity/Basicity

Reactions, Chapters 15,18,19

carbon-carbon bond forming reactions:

acid synthesis, NaCN (S_N2)
acid synthesis, Grignard, CO_2 (nucleophilic addition)

alkylation of lithium enolates at low temperature with primary halide

aldol reaction at elevated temperature, mixed aldol, both base catalyzed to make beta hydroxy ketone or aldehyde, synthesis of 5 and 6-membered rings
mixed aldol reaction at low temperature with lithium enolate from reaction with LDA

Grignard + ester; $LiCuR_2$ + acid chloride

Claisen condensation (nucleophilic addition/elimination) to make beta keto ester

Reformatsky, organo zinc reagent with alpha-bromo ester, nucleophilic addition to ketone or aldehyde

alkylation of ester: LDA (low temp), (S_N2) with primary alkyl halide or nucleophilic addition to ketone or aldehyde

functional group transformations:

enolization of ketones and aldehydes, acid or base catalyzed: halogenation at the alpha-position, deuterium exchange, racemization

Hell-Volhard-Zelinsky (electrophilic substitution), cat. PBr_3/Br_2, acid to alpha-bromo acid

acid chloride, $SOCl_2$ (nucleophilic addition/elimination)

Hunsdieker (free radical chain), acid to alkyl bromide with loss of CO_2

acid catalyzed esterification (nucleophilic addition/elimination)

diazomethane (S_N2), acid to methyl ester

acid chloride and anhydride to esters or amides (nucleophilic addition/elimination)

esters to amides (nucleophilic addition/elimination)

redox

hydride reductions: $NaBH_4$, $LiAlH_4$, $LiBH_4$, $LiAlH(t\text{-}OBu)_3$ (nucleophilic addition sometimes with elimination)

hydrogenation, surface reaction, order of reactivity of functional groups; Rosemund reduction, acid chloride to aldehyde, $Pd/BaSO_4$, quinoline

oxidations: $KMnO_4$, $H_2Cr_2O_7$, pyridinium $ClCrO_3^-$

Chapter 16

review of reactions in Chapters 3-15

strategy for synthesis: create new carbon-carbon bonds at functional groups or at carbons activated by functional groups