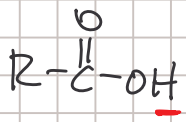
Ch 20 Carboxylic acids

Note Title 4/3/2006

Webassign due Fri evening

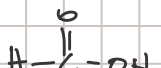
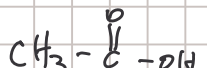
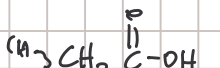
No class Fri.

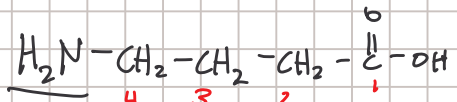
Exam 3 next Monday (Ch 18-20)

Carboxylic acid : 

acidic proton

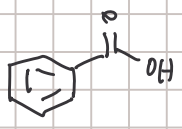
Nomenclature

	common	IUPAC
	formic acid	methanoic acid
	acetic acid	ethanoic acid
	propionic acid	etc. (propanoic acid)
4C	butyric acid	
5C	valeric acid	

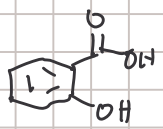


IUPAC: 4-aminobutanoic acid

common: γ-aminobutyric acid GABA



benzoic acid



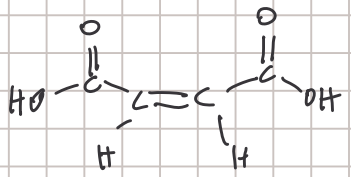
o-hydroxybenzoic acid

salicylic acid

Dicarboxylic acids

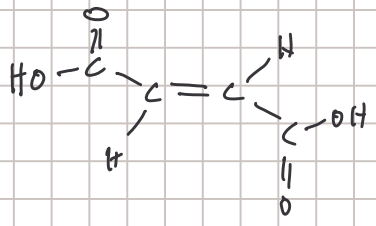
	common	IUPAC
HO–C(=O)–C(=O)–OH	oxalic acid	ethanedioic acid
HO–C(=O)–CH_2–C(=O)–OH	malonic acid	propane dioic acid
4C	succinic acid	etc. ↓
5C	glutaric acid	
6C	adipic acid	
7C	pimelic acid	

Oh, my! Such good apple pie!



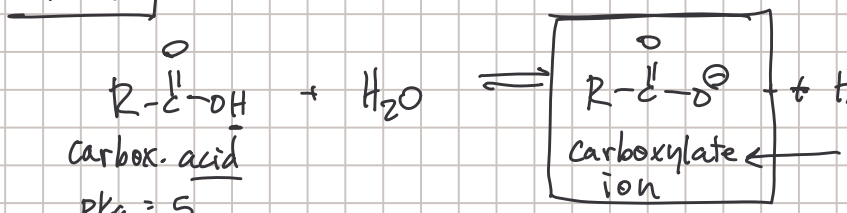
cis-2-butenedioic acid
maleic acid

Krebs cycle

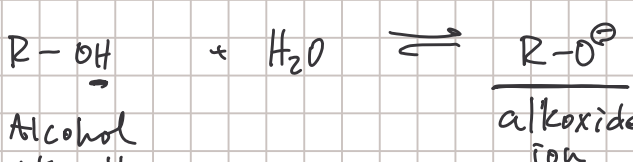


trans-
fumaric acid

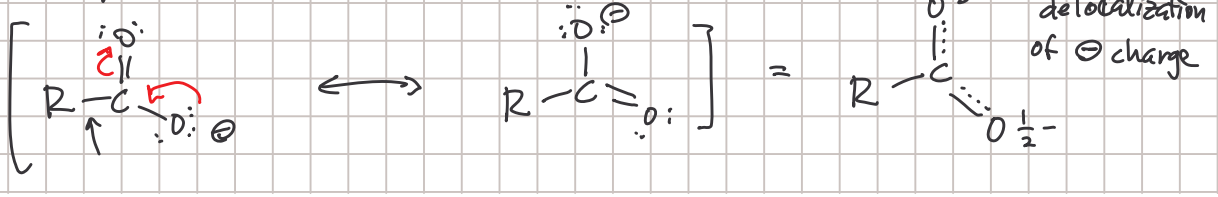
Acidity



$$\frac{K_a}{10^{-5}} = \frac{[RCO_2^-][H_3O^+]}{[RCO_2H]}$$

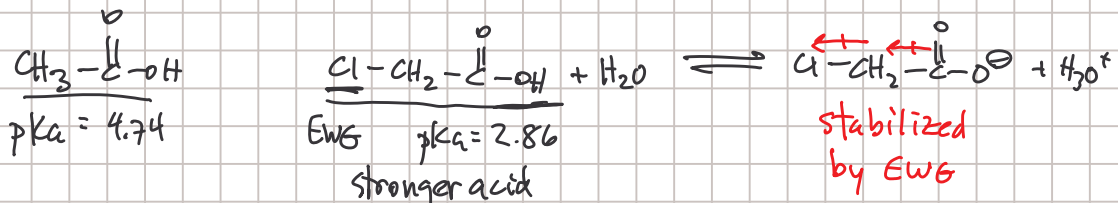


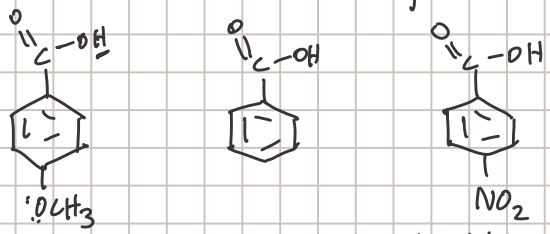
$$10^{-16} = \frac{[RO^-][H_3O^+]}{[ROH]}$$



Substituent effects

electron-withdrawing groups stabilize ⊖ charges



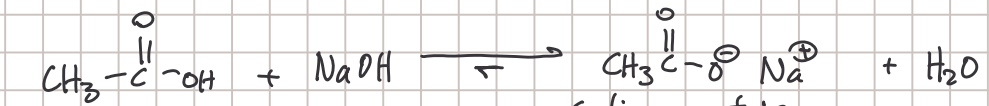


e⁻ donating group — e⁻ withdrawing grp

pKa: 4.46 (weakest) — 4.19 — 3.41 (strongest acid)

Carboxylate salts

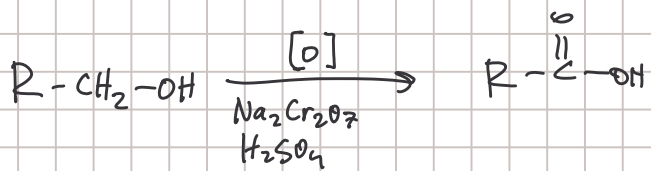
carboxylate ion + ⊕ counterion



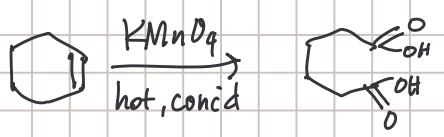
usu. water soluble (water layer)

Synthesis

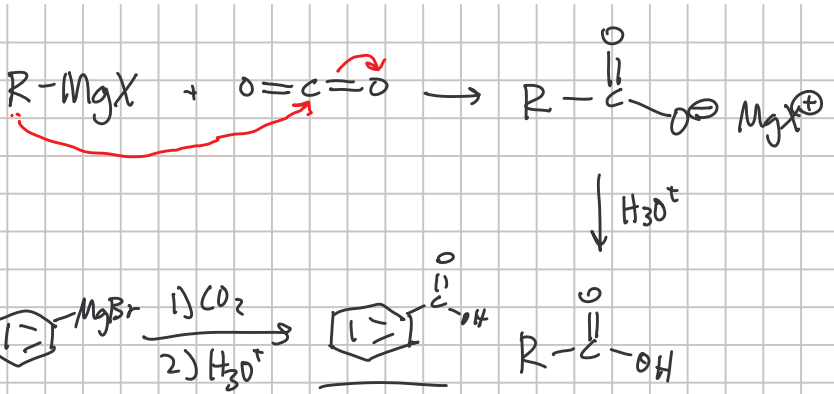
1) oxidation of 1° R-OH



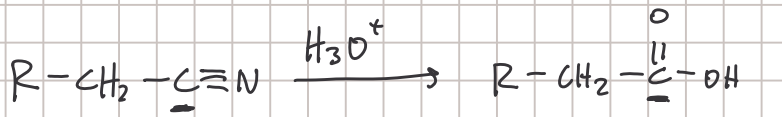
2) oxidative cleavage



3) Grignard



4) hydrolysis of nitriles



nitrile (cyanide)

carboxylic acid

1° RX

S_N2

add 1 Carbon

make carbox. acid