

(17) Today

Section 3.1
Functional Groups

Section 3.2
Alkanes and Isomers

Section 3.3
Alkyl Groups

Section 3.4
Nomenclature

Next Class (18)

Section 3.2
Alkanes and Isomers

Section 3.3
Alkyl Groups

Section 3.4
Nomenclature

(19) Second Class from Today

Section 3.3 Alkyl Groups

Section 3.4 Nomenclature

Section 3.5 - 3.7 Properties and
Conformations of Alkanes

Chap 4 Cycloalkanes

Third Class from Today (20)

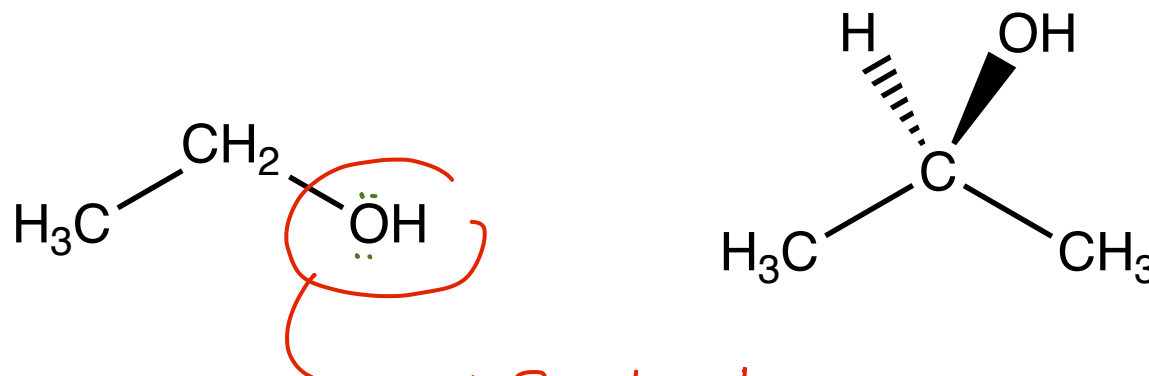
Chap 4 Cycloalkanes

Please rework test 1 and hand in on Monday, Oct 23

CHEM 0315 MWF 11:30 to 12:20 lab F 12:35 to 3:25

16 seats Restricted to seniors

A **functional group** is a group of atoms within a molecule that has a characteristic chemical behavior.¹



alcohol functional group

H-bond donor + H-bond acceptor

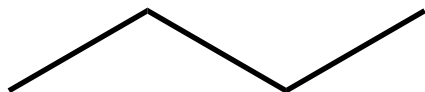
weak bases

weak acid

¹ Organic Chemistry, 10th ed. McMurry. (2023) Openstax

Functional Groups: Alk**a**nes and Alk**e**nes and Alk**y**nes

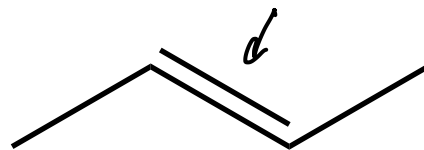
Section 3.1



linear, acyclic alk**a**ne

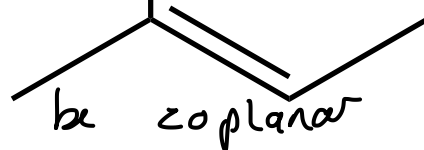
C + H's all single bonds

$C, H's + C=C$

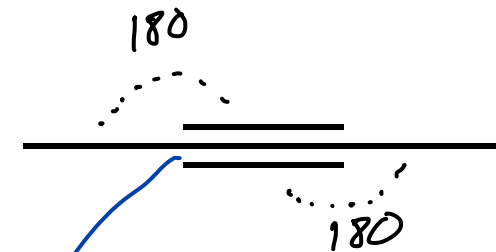


linear, acyclic alk**e**ne

remember, all atoms connected to C at ends of db must

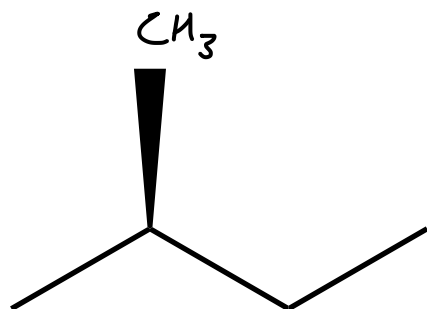


branched, acyclic alk**e**nes

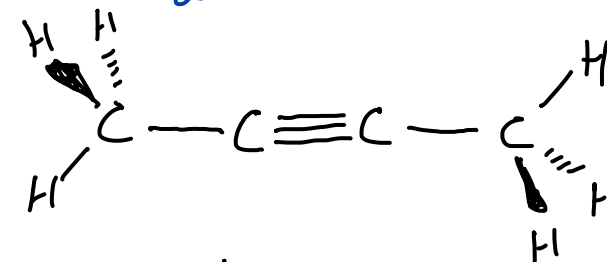
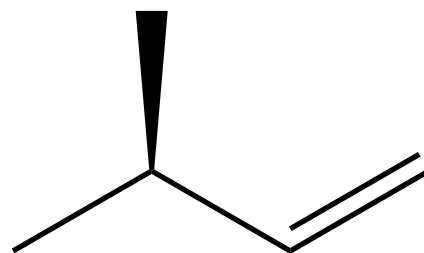


linear, acyclic alk**y**ne

where the triple bond ends... there is a C atom

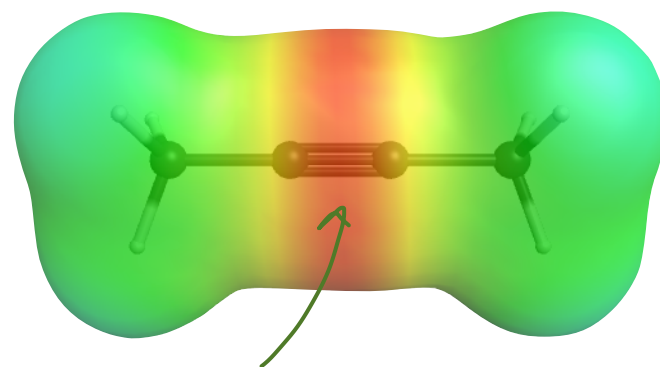
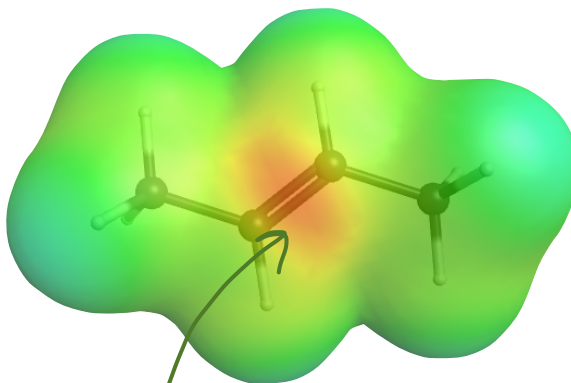
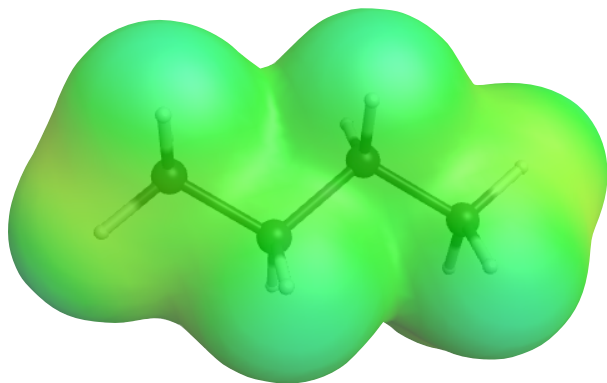
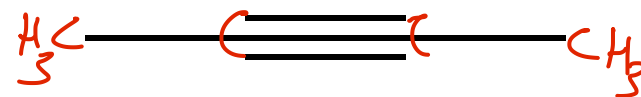
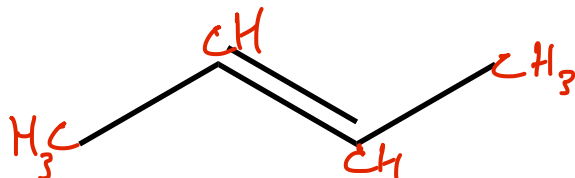
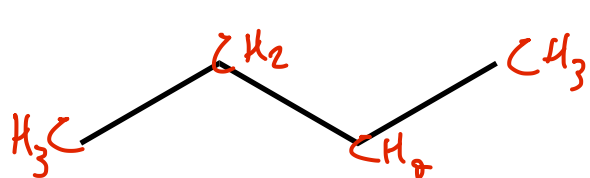


branched, acyclic alk**a**ne



$C, H's + C \equiv C$

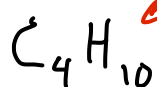




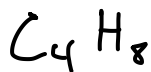
not particularly interesting
 .. mostly looks like a weak positive charge on the surface of the molecule

electron rich area popping out away from the nuclei

Formulas?
 saturated with H atoms ... no room for more

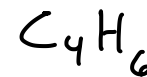


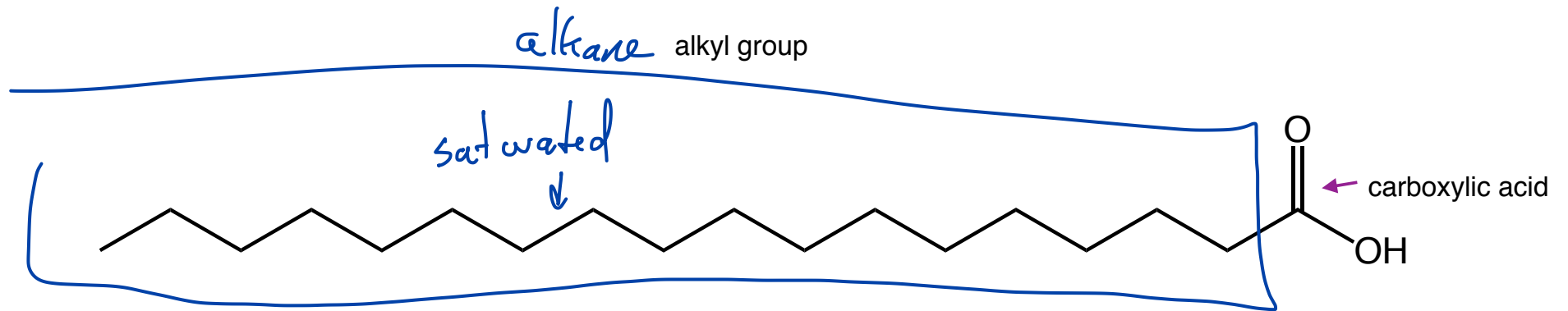
2 more H atoms than alkene of same length
 4 more than alkyne



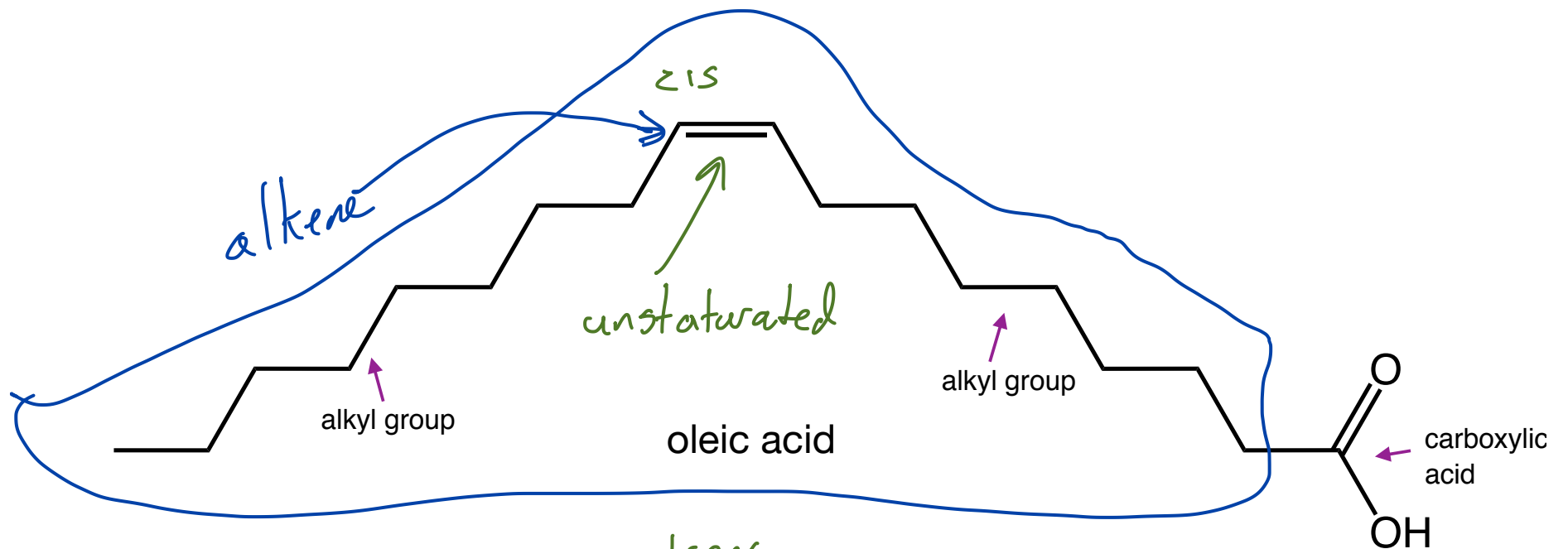
not saturated with H's. we can do chemistry and add more H's.

unsaturated

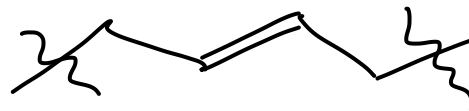




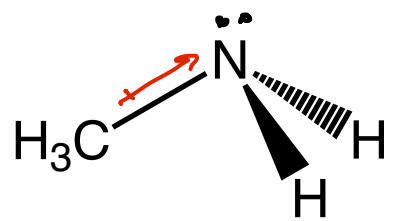
palmitic acid



trans



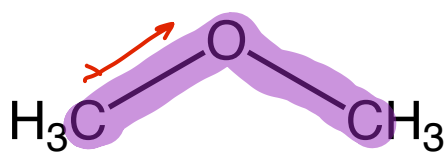
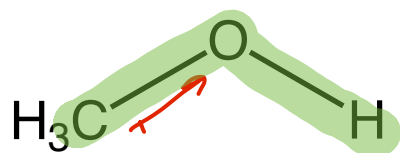
Amines



at least 1 N to C
single

carbon an alkyl substituent
carbon can act as a base

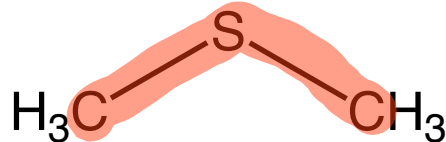
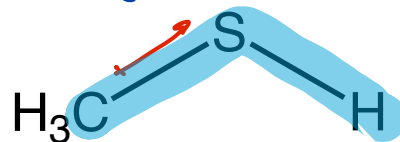
Alcohols and Ethers



but I'm also an H⁺ bond donor

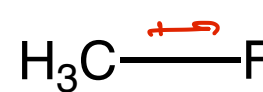
Thiols and Thioethers

sulfhydryl

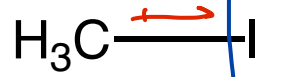
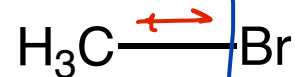
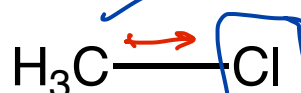


the C atoms in these functional groups are kind of \oplus

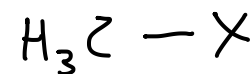
Alkyl Halides



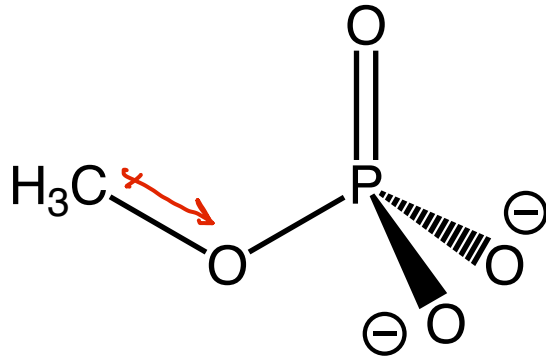
δ^+ C
attractive to \ominus things



very low energy anions



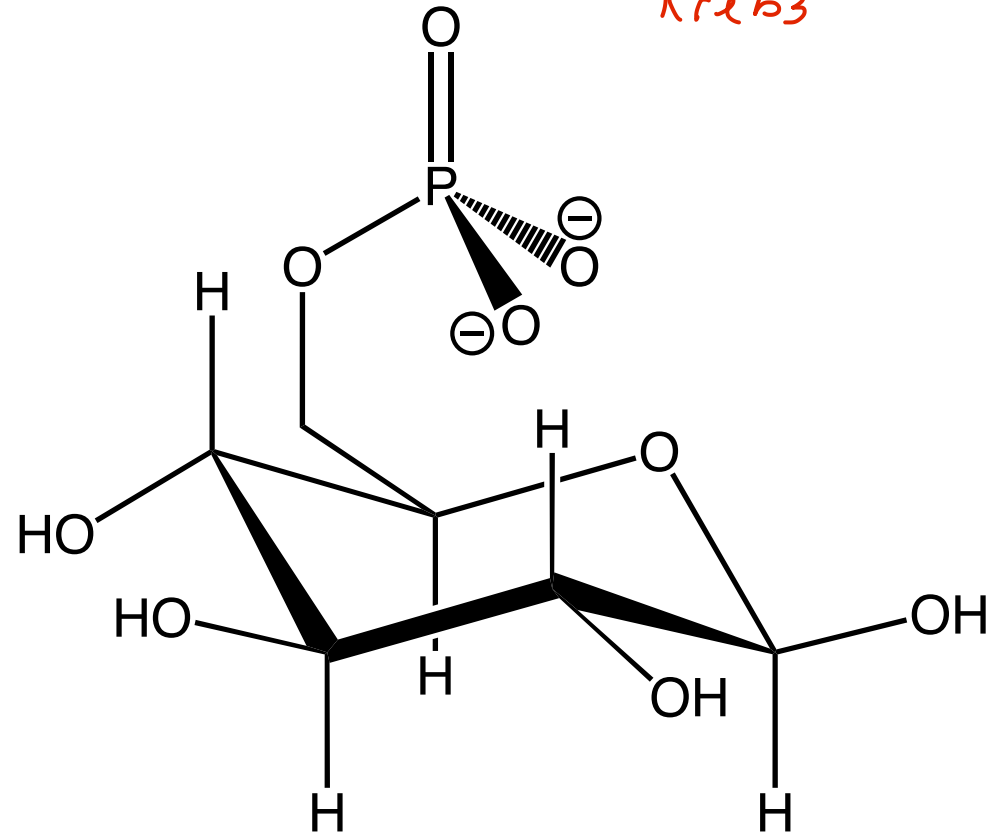
Organophosphates



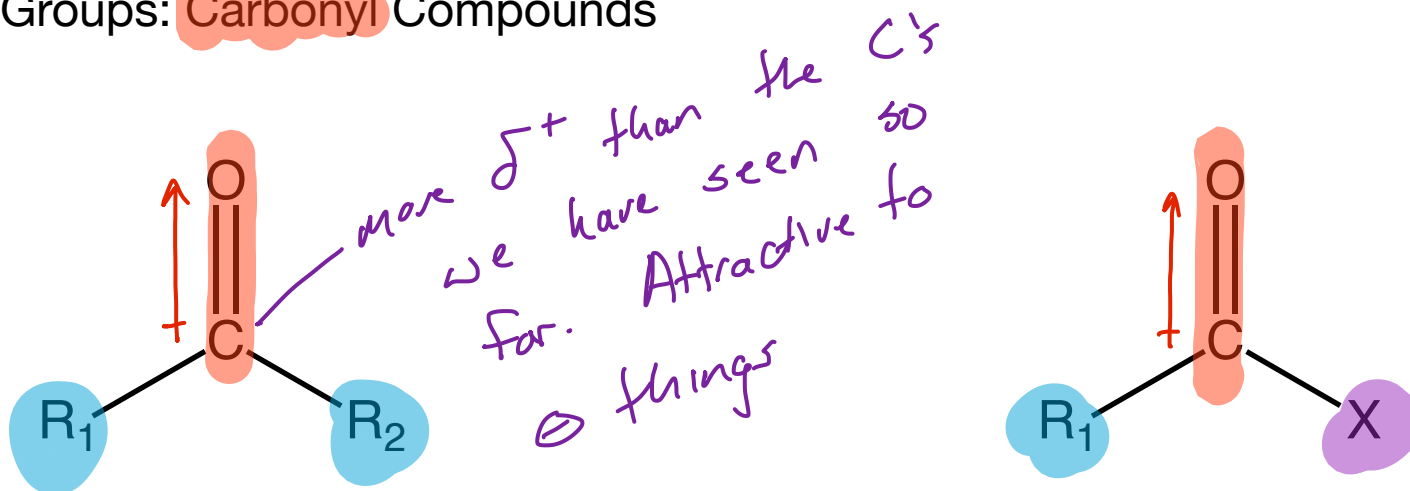
PO_4^{3-}
is a stable
anion

pesticides bad for you

glycolysis → krebs



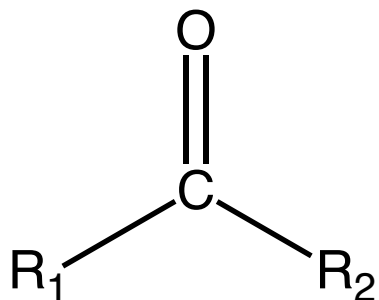
glucose-6-phosphate



R is used as an organic variable
 can be alkyl, alkenyl ... hydrogen

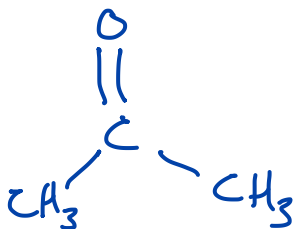
X is used as a variable for halogens or
 other electronegative atoms

Ketones

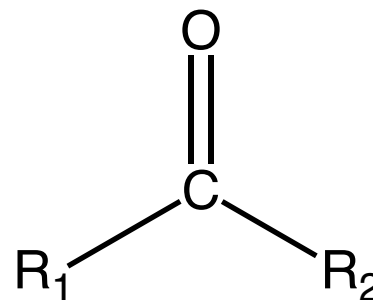


R_1 or $\text{R}_2 \neq \text{H}$

both have to be C

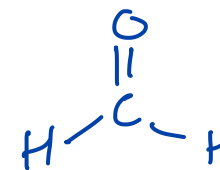
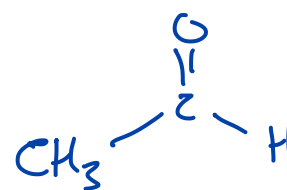


Aldehydes



R_1 or $\text{R}_2 = \text{H}$

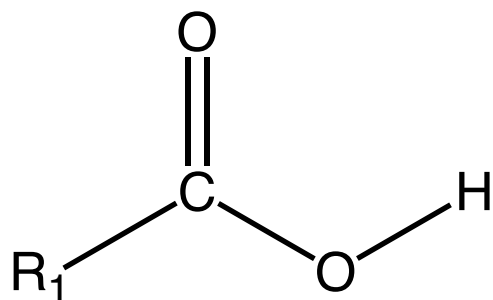
if one R group is H



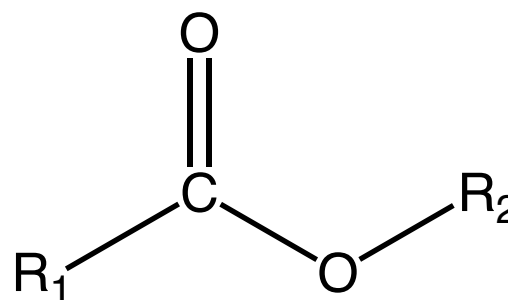
Functional Groups: Carbonyl Compounds with Adjacent Polar Groups

Section 3.1

Carboxylic Acids and Esters

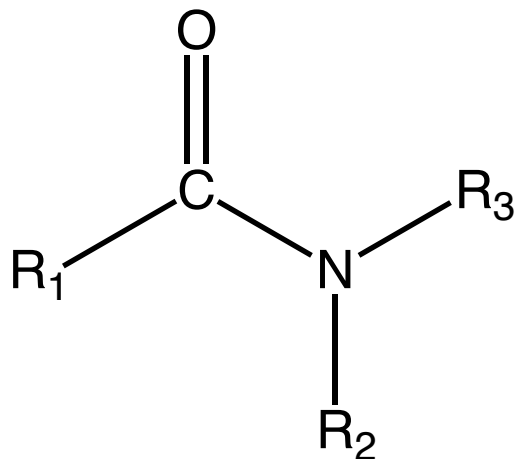


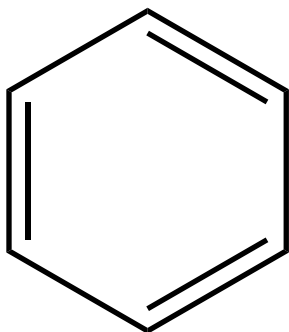
$\text{R}_1 = \text{H}$ or $\text{R}_1 \neq \text{H}$



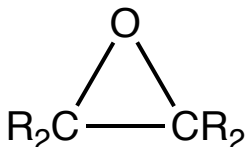
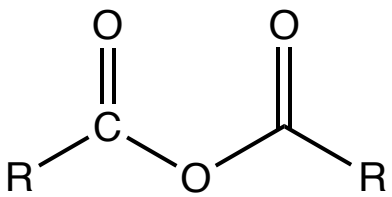
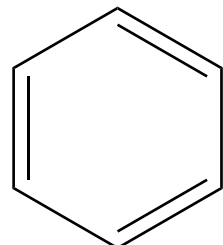
$\text{R}_1 = \text{H}$ or $\text{R}_1 \neq \text{H}$ but $\text{R}_2 \neq \text{H}$

Amides





Grouped to highlight which ones have similar reactivities

$\text{R}_2\text{C}=\text{CR}_2$ <p>alkenes</p> $\text{R}-\text{C}\equiv\text{C}-\text{R}$ <p>alkynes</p>	$\text{R}_3\text{C}-\text{X}$ <p>X = Cl, Br, I Alkyl Halides</p> $\text{R}_3\text{C}-\text{OH}$ <p>alcohols</p> $\text{R}_3\text{C}-\text{O}-\text{CR}_3$ <p>ethers</p>  <p>epoxides</p> <p>and more...</p>	$\begin{array}{c} \text{O} \\ \\ \text{R}-\text{C}-\text{R}' \end{array}$ <p>ketones (R, R' ≠ H) and aldehydes (R or R' = H)</p> $\text{RC}(=\text{O})\text{NR}_2$ <p>amides</p> $\text{RC}(=\text{O})\text{OR}$ <p>esters (R ≠ H)</p> $\text{RC}(=\text{O})\text{OH}$ <p>carboxylic acids</p>  <p>anhydrides</p> $\text{RC}(=\text{O})\text{Cl}$ <p>acid chlorides</p>	 <p>aromatics</p> <p>and more...</p>
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