Nucleophilic addition to esters

\[ \text{CH}_3\text{CO}_2\text{H} + \text{Nu}^- \rightarrow \text{CH}_3\text{CO}_2\text{Nu} + \text{H}^+ \]

Example: ethyl acetate (component of nail polish remover)

Ester naming
- First name: ends in -yl
- Last name: ends in -ate

Esters: usually have a far more pleasant smell than most compounds

Phenyl acetate vs methyl benzoate

Nucleophile attack on resonance structures

\[ \text{Nu}^+ \text{C} = \text{O} \rightarrow \text{Nu}^- \text{C} - \text{O} \text{CH}_3 \text{or} \]

Why?
- \( \text{O}^2^- \) helps make bond
- \( \text{O}^- \) breaks bond
- \( \text{C}_3 \text{H}_6 \) is best
- \( \text{C}_2 \text{H}_5 \) is not so good

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Methyl acetate
\[
\begin{align*}
\text{Excess MgBr} & \quad \text{Ether (solvent)} \\
\text{Limitation (or asset):} & \quad \text{two of same group on tertiary alcohol}
\end{align*}
\]

or: with "H" sources

New nucleophile, new product:

Amides from esters:

Remember: ammonia pyramidal
Amide functional group:

Also called "peptide bond" b/c this bond links together amino acids in proteins & peptides.

Nitrogen: more basic than O, so better at 2nd res structure geometry @ Nitrogen: structure 1 predicts pyramidal, structure 2 predicts flat.

by X-ray: flat, lacks in geometry, which gives difference in bond length: 0.08 Å (in Å world, a big difference)

hydrogen bonding in acetamide:

ester + amine \(\rightarrow\) amide Not so fast. Solution: make a \(\alpha\)ester amide by using a different carboxylic acid derivative.

hydrolysis of amides

N-benzyl 2-methyl propanamide

Need to bake at high Temp to get going
heteroatom → C bond breaks (c.w/o attached)
reason need to back

Acid hydrolysis

\[
\text{Ph}^+ \text{NH}_3^- + \text{CHOH}
\]

not a good resonance structure in base, but still best to explain hydrolysis

\[
\text{tetrahedral intermediate}
\]

because in acid