CHEM – 647

Organic synthesis



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Carboxylic Acids

$$R \longrightarrow C \longrightarrow R-MgBr + CO_2$$

$$R + CO_2H \xrightarrow{FGI} R + CN \xrightarrow{C-C} R - Br + {}^{\Theta}CN$$



Carboxylic Acids

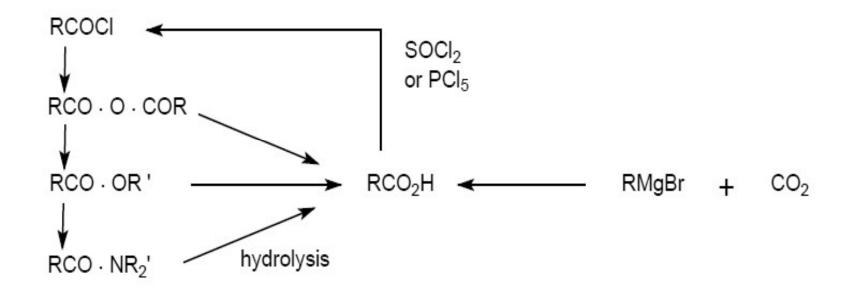
$$R-Br \stackrel{\mathsf{FGI}}{\longleftarrow} R-\mathsf{MgBr} + \mathsf{CO}_2 \stackrel{\mathsf{C-C}}{\longleftarrow} R + \mathsf{CO}_2 \mathsf{H} \stackrel{\mathsf{FGI}}{\longrightarrow} R + \mathsf{CN} \stackrel{\mathsf{C-C}}{\longrightarrow} R - \mathsf{Br} + {}^{\ominus}\mathsf{CN}$$

$$\rightarrow$$
 CI $\xrightarrow{1. \text{Mg, Et}_2\text{O}}$ \rightarrow CO₂H

Ph CI
$$\frac{\text{NaCN}}{\text{H}_2\text{O}, \text{ EtOH}}$$
 Ph CN $\frac{\text{EtOH}}{\text{H}}$ Ph CO₂Et



Carboxylic Acids FGI





Carboxylic Acids FGI

Synthesis:

Br
$$\frac{1. \text{ Mg, Et}_2\text{O}}{2. \text{ EtCHO}}$$
 HO $\frac{1. \text{ PBr}_3}{2. \text{ Mg, Et}_2\text{O}}$ $\frac{1. \text{ SOCI}_2}{3. \text{ CO}_2}$ Th



Carbonyl Compounds

1,1-diX Disconnections

$$R \xrightarrow{O} X \xrightarrow{1,1-diX} R \xrightarrow{O} OMe + OX$$

The Corresponding C-C Disconnection:

$$R^1 \stackrel{O}{\rightleftharpoons}_{R^2} \xrightarrow{C-C} R^1 \stackrel{O}{\longleftarrow}_{OMe} + {}^{\ominus}_{R^2}$$



Carbonyl Compounds

1,2-diX Disconnections

$$x \xrightarrow{2} 1 R \xrightarrow{1,2-diX} x \ominus + \bigvee_{0} R$$

The Corresponding C-C Disconnection:

$$R^1 \xrightarrow{2} \stackrel{1}{\underset{O}{\uparrow}} R^2 \xrightarrow{C-C} Br - R^1 + \bigvee_{O} R^2$$





$$R - Br \stackrel{\mathsf{FGI}}{\longleftarrow} R - MgBr + CO_2 \stackrel{\mathsf{C-C}}{\longleftarrow} R \oint CO_2 H \stackrel{\mathsf{FGI}}{\Longrightarrow} R \oint CN \stackrel{\mathsf{C-C}}{\Longrightarrow} R - Br + {}^{\ominus}CN$$



Carbonyl Compounds

Carbonyl Compounds by Alkylation of Enols

$$R^{1} \xrightarrow{Q} R^{2} \xrightarrow{1,2' C-C} R^{1-Br} + Q^{0}$$

$$\begin{array}{ccc}
& R^1Br \\
& \times & TM
\end{array}$$



