

## ORGANIC CHEMISTRY 2 LECTURE GUIDE 2019

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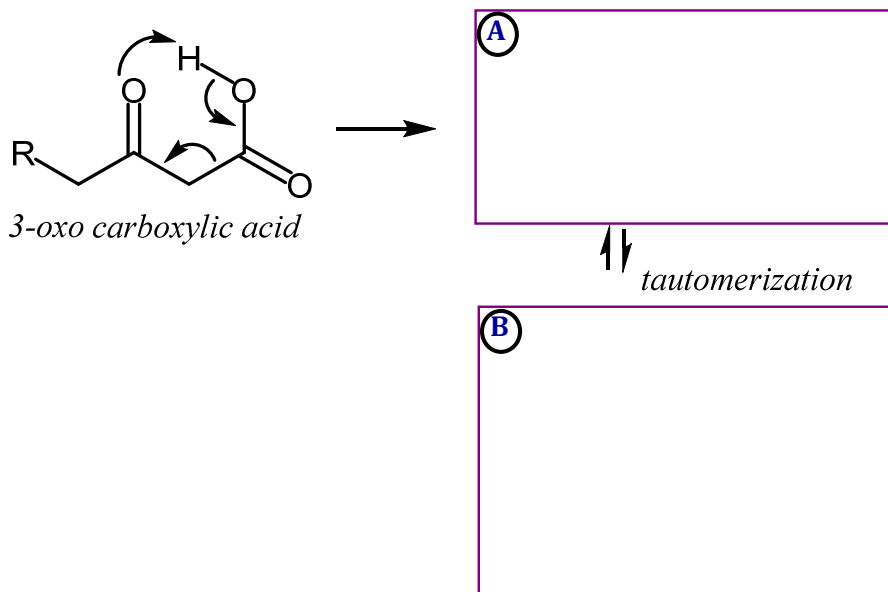
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## Lesson VI.19. Decarboxylation and Synthetic Applications

### Decarboxylation

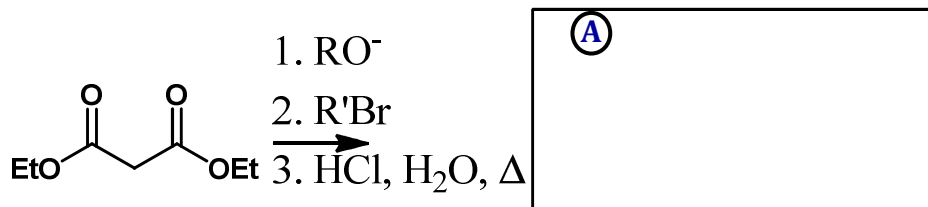
It is possible to remove not only the carbonyl O, but the entire C=O unit. This is done by a process called **decarboxylation**. This is often done simply by heating. The temperature required varies on the basis of the functional group. The 3-oxo-carboxylic acids are relatively easy to decarboxylate:



Notes

**Lesson VI.19. Decarboxylation and Synthetic Applications***Malonic ester synthesis*

Now that we know that a 3-oxo carbonyl is often relatively easy to decarboxylate, we can exploit this property in some specific and very useful reactions. The first of these that we will cover is the **malonic ester synthesis**. This reaction typically starts with diethyl malonate and is used to prepare various carboxylic acids:



We should be able to reason through what's happening in these three steps.

Step 1. Base:

Step 2: R'Br:

Step 3. Acid and heat:

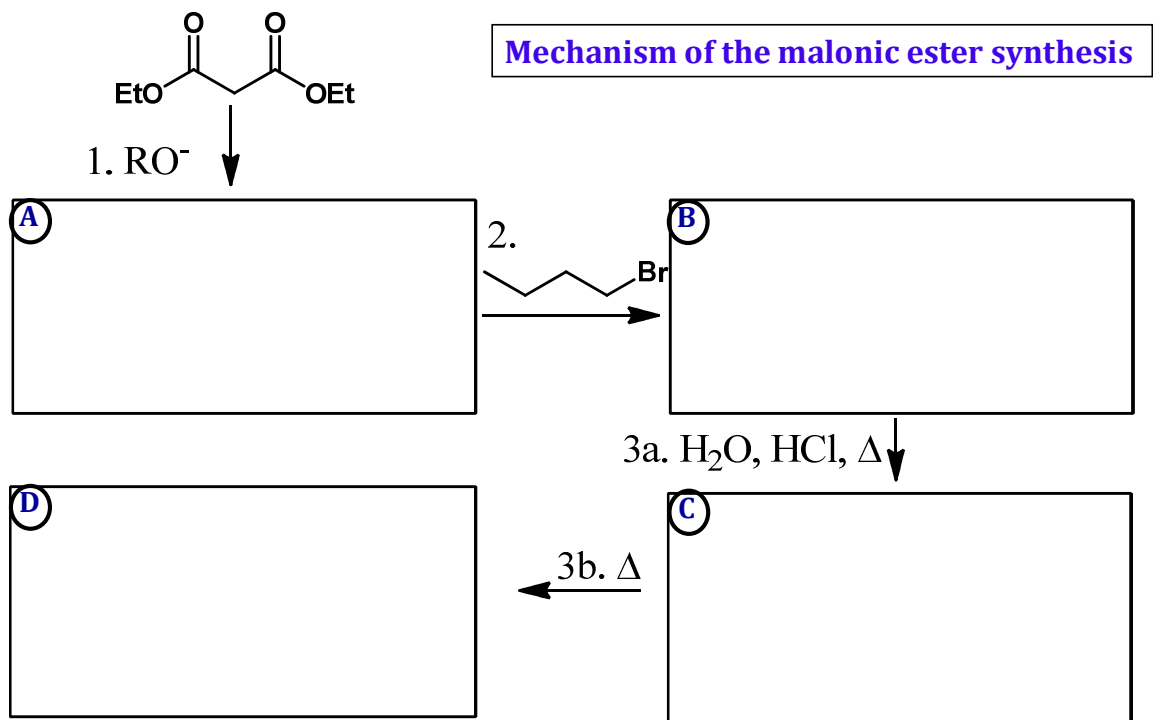
a.

b.

Notes

## Lesson VI.19. Decarboxylation and Synthetic Applications

### Malonic ester synthesis

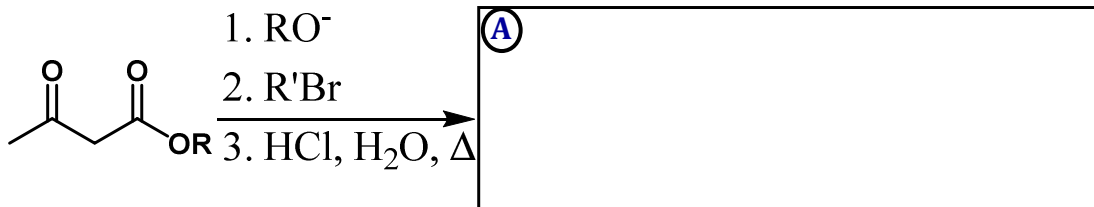


Notes

## Lesson VI.19. Decarboxylation and Synthetic Applications

### *Acetoacetic ester synthesis*

Now that we have seen the malonic ester synthesis, the **acetoacetic ester synthesis** should be relatively straightforward. This reaction simply has a methyl group in place of one of the two ethoxy groups of diethylmalonate:



The three steps are quite analogous to those we saw for malonic ester synthesis as well...

Step 1. Base:

Step 2: R'Br:

Step 3. Acid and heat:

a.

b.

Notes