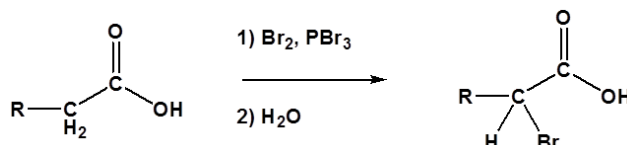
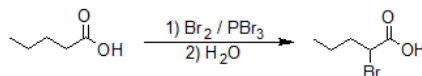


## 23.5: BROMINATION OF ACIDS- THE HVZ REACTION

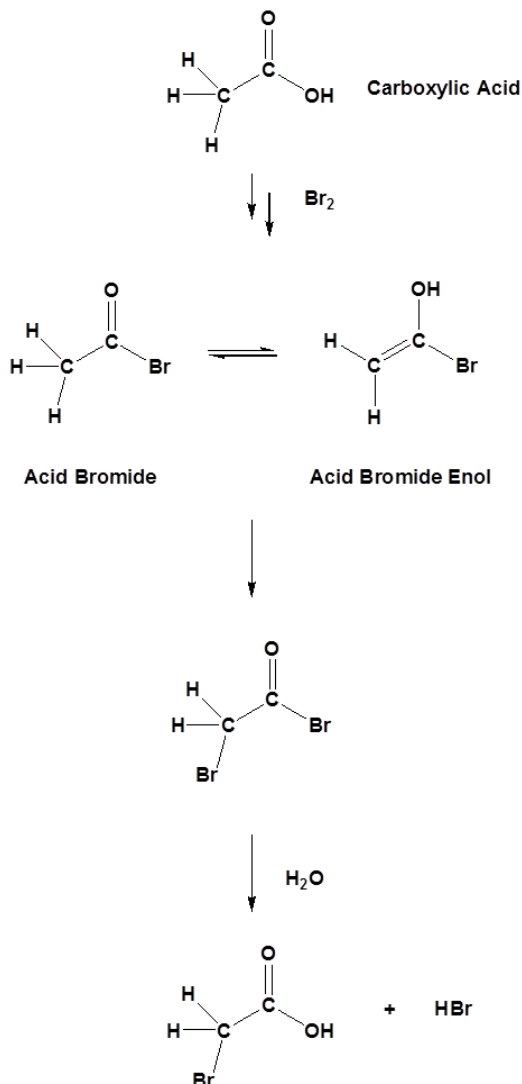
Although the alpha bromination of some carbonyl compounds, such as aldehydes and ketones, can be accomplished with  $\text{Br}_2$  under acidic conditions, the reaction will generally not occur with acids, esters, and amides. This is because only aldehydes and ketones enolize to a sufficient extent to allow the reaction to occur. However, carboxylic acids, can be brominated in the alpha position with a mixture of  $\text{Br}_2$  and  $\text{PBr}_3$  in a reaction called the Hell-Volhard-Zelinskii (HVZ) reaction.



For example, pentanoic acid can be converted to 2-bromopentanoic acid as shown in the example below.

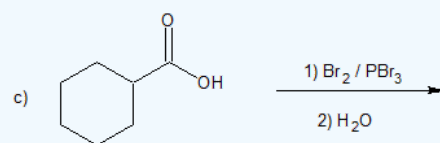
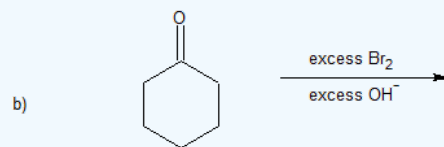
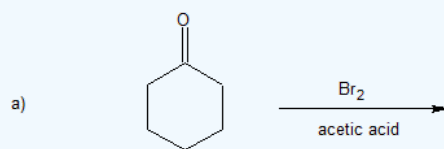


The mechanism of this reaction involves an acid bromide enol instead of the expected carboxylic acid enol. The reaction starts with the reaction of the carboxylic acid with  $\text{PBr}_3$  to form the acid bromide and  $\text{HBr}$ . The  $\text{HBr}$  then catalyzes the formation of the acid bromide enol which subsequently reacts with  $\text{Br}_2$  to give alpha bromination. Lastly, the acid bromide reacts with water to reform the carboxylic acid.



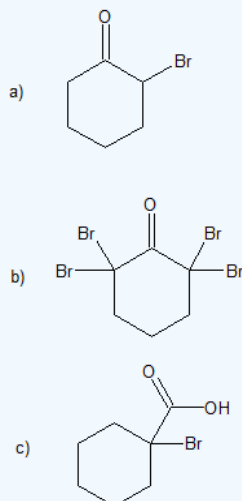
## Exercise

8. Draw the bond-line structure for the product of each reaction below.



Answer

8.



## CONTRIBUTORS AND ATTRIBUTIONS

- Dr. Dietmar Kennepohl FCIC (Professor of Chemistry, [Athabasca University](#))
- Prof. Steven Farmer ([Sonoma State University](#))

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