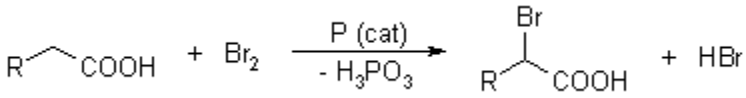
Answer on question #76351

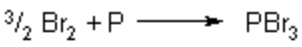
Hell-Volhard-Zelinsky Reaction

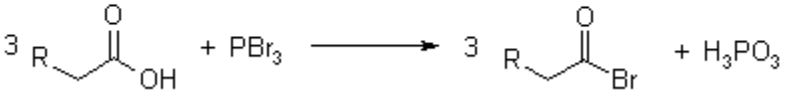


Treatment with bromine and a catalytic amount of phosphorus leads to the selective α-bromination of carboxylic acids.

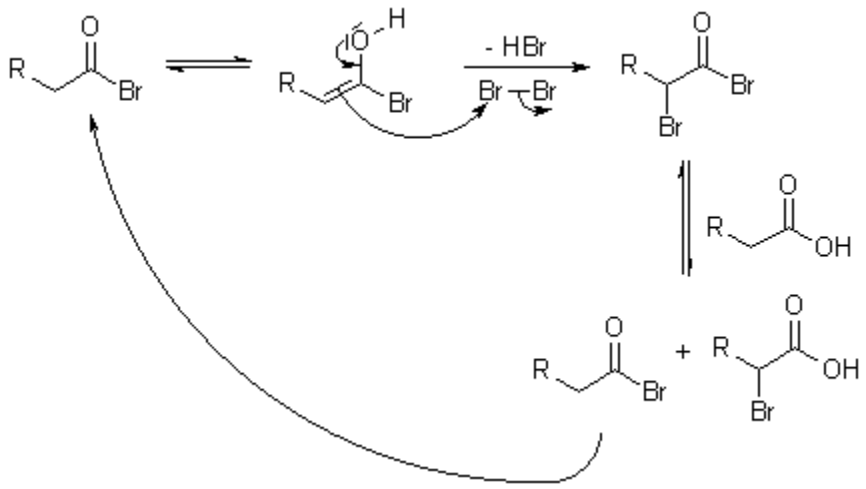
Mechanism of the Hell-Volhard-Zelinsky Reaction

Phosphorus reacts with bromine to give phosphorus tribromide, and in the first step this converts the carboxylic acid into an acyl bromide.





An acyl bromide can readily exist in the enol form, and this tautomer is rapidly brominated at the α-carbon. The monobrominated compound is much less nucleophilic, so the reaction stops at this stage. This acyl intermediate compound can undergo bromide exchange with unreacted carboxylic acid via the anhydride, which allows the catalytic cycle to continue until the conversion is complete.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