

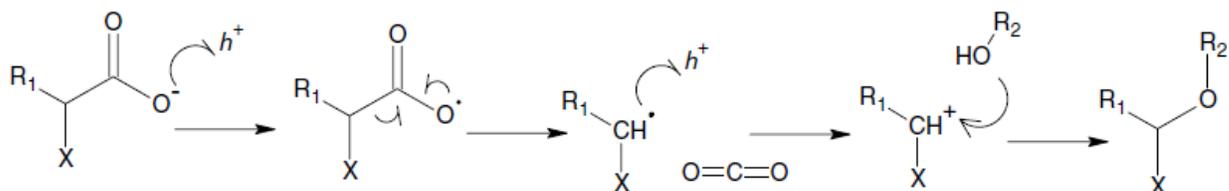
Answer on Question #43879, Chemistry, Organic Chemistry

Question:

What is the mechanism of ruff degradation?

Answer:

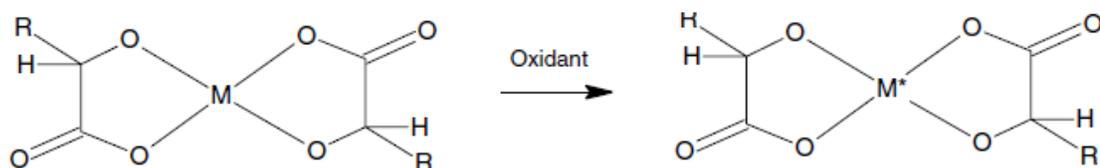
The Ruff degradation involves the decarboxylation of aldonic acids by Fe(III) and hydrogen peroxide (also called 'Fenton's-like reagent') to yield aldoses with one less carbon atom than the original aldonic acid. The Ruff degradation reaction is critically reviewed [*Carbohydrate Research* 342 (2007) 407–418]. Based on available information, the Hofer–Moest decarboxylation mechanism (see fig. below) is declared as the mechanism for it.



wherein X denotes OH or another electron-withdrawing group; h^+ symbolizes an anode (or a transition metal ion taking the place of the anode); R_1 and R_2 denotes substituents.

In the case of ruff degradation R_2 denotes H , X denotes OH and the product formed is isomerised to corresponding aldose.

Together, the data gathered suggest that a carboxylic acid requires a hydroxyl group in the α -position in order to be susceptible to the Ruff degradation. The data also suggest a mechanism in which carboxylates with a free α -hydroxyl group form a complex with the metal ion:



The metal ion is then 'activated' by the presence of an oxidant.