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# MECHANISM OF THE PHOTOCHEMICAL REDUCTION OF C–Cl BOND IN FLUORINE COMPOUNDS

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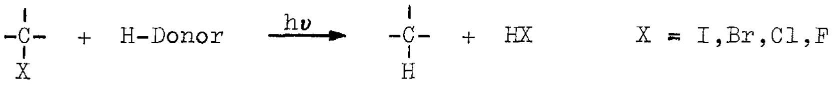
The photochemically initiated substitution of a halogen for hydrogen atom represents a preparative reaction, that can be expressed by the general scheme:



$$-\overset{|}{\underset{\underset{X}{|}}{C}}- \;+\; \text{H-Donor} \;\xrightarrow{h\nu}\; -\overset{|}{\underset{\underset{H}{|}}{C}}- \;+\; HX \qquad X = I,Br,Cl,F$$

The reaction is characterized by a high selectivity in polyhalogeno compounds as demonstrate examples of successfully performed preparations: $CF_3$-$CBr_2Cl$ $\longrightarrow$ $CF_3$-$CHBrCl$, $CCl_2F$-$CClF_2$ $\longrightarrow$ $CHClF$-$CClF_2$ , $CF_3CClF$-$CCl_3$ $\longrightarrow$ $CF_3CClF$-$CHCl_2$.

A marked directive effect on the regioselectivity of the reduction is exhibited by the ester group in fluorinated propanoates: CFXY-CClZ-COOR $\longrightarrow$ CFXY-CHZ-COOR (X,Y = F,Cl). The quantum yields of this reduction in 2-propanol are as high as several hundreds of units, which is indicative of the chain mechanism. The photo-reduction is auto-sensitized by the resulting acetone.

The kinetic model of the reduction indicates, under a definite ratio of the terminal reaction rates, a rate limit independent of the concentration of the starting substance. The kinetic model of the reduction initiated by α-phenyl benzoin and benzoin isopropyl ether was verified also using the Stern-Volmer dependence of a total quantum yield of HCl.