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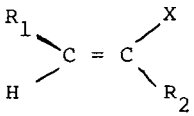
O_4

F_2 FLOURINATION OF OLEFINS CONTAINING H ATOMS

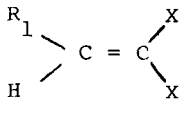
L. Conte*, G. P. Gambaretto, E. Legnaro,
Istituto Chimica Industriale, Università di Padova, Via Marzolo 9, Padua (Italy)

C. Gervasutti and M. Pianca
Montefluoss S.p.A. Milan (Italy)

Perhalofluoroalkanes can be obtained from the corresponding perhalofluoro olefins by addition of fluorine to the double bond. Normally these reactions are carried out on perhalogenated olefins, however, the practical application of this approach is limited by low yields, by the formation of addition products and by secondary products due to dimerization and/or substitution reactions. In the present work we have studied operational conditions for the addition of F_2 to the double bond of olefins containing H atoms, minimizing at the same time substitution and dimerization reactions Thus it has possible to synthesize hydrofluoroalkanes from the corresponding hydrohalo olefins by addition of fluorine with excellent yields.
Olefins with the following structures have been studied so far:



where X = H, Cl



R_1R_2 = H, Cl. CH_2Cl

The conditions needed in order to reduce substitution reactions at H and/or chlorine atoms have been preliminarily studied by reacting F_{12} (CF_2Cl_2) and F_{22} (CHF_2Cl) with fluorine.
While CCl_2F_2 was shown to be stable to fluorine even at room temperature, CHF_2Cl reacts to give CF_3Cl_4 with a reaction that in some instances is explosive.
The reaction can be controlled by careful regulation of the relative concentrations of fluorine and CF_2HCl in nitrogen and the mixing temperature of the reagents.
Some observations relative to the kinetics of reaction between fluorine and F_{22} are also reported.