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AN IMPROVED SYNTHESIS OF PERFLUOROALKYL ALDEHYDES BY REACTION OF PERFLUOROALKYL IODIDES WITH DIMETHYLFORMAMIDE

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This work involves the reactions of radical initiator activated perfluoroorganozinc compounds R_FZnI ($R_F = C_nF_{2n+1}$) with dimethyl formamide, leading to the formation of high yields of perfluoroalkyl aldehydes.

Usually, the perfluoroorganozinc compounds R_FZnI are prepared by a reaction of perfluoroalkyl iodides R_FI in the presence of zinc-copper couple in dissociating solvents [1], for example DMF. These organometallic derivatives which are adsorbed on the metallic surface, show an important reactivity with different substrates. But, in the presence of some radical initiators for example, azo-bis-iso-butyronitrile (AIBN), a reaction of the R_FZnI has been observed with the solvent, leading to the formation of perfluoroalkyl amide and perfluoroalkyl aldehyde, involving a C-alkylation reaction of the DMF.

$$R_FI + Zn/Cu + AIBN \xrightarrow{DMF} R_FCON(CH_3)_2 + R_FCHO$$

After studying the influence of different parameters like the temperature, the kind of initiator, the ratio DMF/R_FI, etc... the perfluoroalkyl aldehyde formation has been optimized to >90% yield [2].

The reactivity of R_FCHO and the influence of the radical initiator on the reaction mechanism, have been studied and discussed.

This procedure has been applied to different amides, carbonyl compounds, substrates and reactants. Many products have been obtained and can be synthesized by this method.

1 H. Blancou, P. Moreau and A. Commeyras, Tetrahedron, 33, 2061 (1977); J. Chem. Soc. Chem. Comm., 715 (1976); French Patents 2 342 950, 2 373 503 and 2 374 287 (1976).

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2 S. Bénéfice-Malouet, H. Blancou and A. Commeyras, French Patent 8 806 000 (1988).