Synthesis of Perfluoro- and 2-Trifluoromethylpentafluoro-dihydrofurans and Their Epoxy Derivatives

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Abstract - Perfluorotetrahydrofuran-2-carboxylic acid was converted through a series of transformations into perfluoro-2,3-dihydrofuran and perfluoro-2,5-dihydrofuran; likewise, from (2-perfluorotetrahydrofuryl)difluoroacetic acid 2-trifluoromethylpentafluoro-2,3-dihydrofuran was obtained. Perfluoro-2,3-dihydrofuran and 2-trifluoromethylpentafluoro-2,3-dihydrofuran underwent isomerization into perfluoro-2,5-dihydrofuran and 2-trifluoromethylpentafluoro-2,5-dihydrofuran by the action of cesium fluoride. Treatment of perfluoro-2,5-dihydrofuran with SbF_5 resulted in ring opening and formation of *cis*-perfluoro-2-butenoyl fluoride, while 2-trifluoromethylpentafluoro-2,3-dihydrofuran was converted into 2-trifluoromethylpentafluoro-2,5-dihydrofuran under the same conditions. Perfluoro-3,4-epoxytetrahydrofuran and 2-trifluoromethyl-3,4-epoxypentafluorotetrahydrofuran containing fused oxirane and tetrahydrofuran rings were synthesized by reactions of perfluoro-2,5-dihydrofuran and 2-trifluoromethylpentafluoro-2,5-dihydrofuran, respectively, with sodium hypochlorite.