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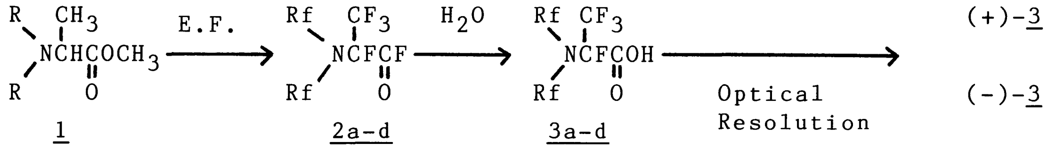
New Optically Active Perfluoro(2-dialkylamino-propionic acids)

Eiji HAYASHI,* Haruhiko FUKAYA, Takashi ABE, and Kota OMORI†
Government Industrial Research Institute, Nagoya,
Hirate-cho, Kita-ku, Nagoya 462
†Research & Development Dept., Tohkem Products Corporation,
Barajima, Akita 010

Some new optically active nitrogen containing perfluorocarboxylic acids, (+)- and (-)-perfluoro(2-dialkylamino propionic acids), have been obtained by the optical resolution of perfluoro(2-dialkylamino-propionic acids).

The development of efficient chiral derivatizing agents for the determination of enantiomeric excess has become more important. Among such agents, optically active α-methoxy-α-trifluoromethylphenyl acetic acid[1)] or optically active perfluoro-2-propoxypropionic acid[2)] have been used.

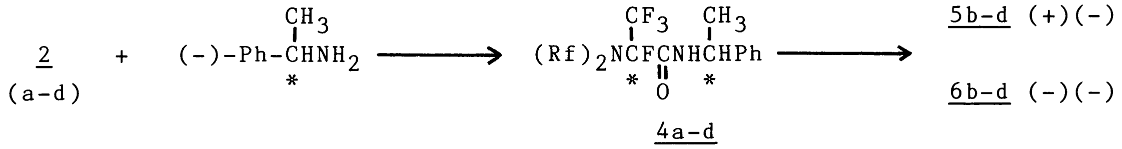
We have recently obtained various perfluoro(2-dialkylamino-propionyl fluorides) (2) by the electrochemical fluorination of the corresponding methyl 2-dialkylamino-propionates(1).[3)] By the hydrolysis of 2, perfluoro-(2-dialkylamino-propionic acids) (3) were easily prepared. As compounds 3 have the chiral carbons attached to the bulky perfluoro-dialkylamino groups, optically resolved 3 have been expected to be used for chiral derivatizing agents.



$$R_2NCH(CH_3)COCH_3 \ (\mathbf{1}) \xrightarrow{\text{E.F.}} Rf_2NCF(CF_3)CF(=O) \ (\mathbf{2a\text{-}d}) \xrightarrow{H_2O} Rf_2NCF(CF_3)COOH \ (\mathbf{3a\text{-}d}) \xrightarrow[\text{Resolution}]{\text{Optical}} (+)\text{-}\mathbf{3},\ (-)\text{-}\mathbf{3}$$

$(Rf)_2N- = (CF_3)_2N-$ a; b; c; d

In order to obtain optically pure 3, we first tried to separate diasteromeric amides obtained from 2. Some kind of diasteromeric amides (4a+4b) were prepared quantitatively by the reaction of 2 with (-)-1-phenylethylamine. On silica-gel (Wakogel C-200) using hexane-benzene



$$\underset{(a\text{-}d)}{2} + (-)\text{-Ph-}\overset{CH_3}{\underset{*}{C}}HNH_2 \longrightarrow \underset{4a\text{-}d}{(Rf)_2N\overset{CF_3}{\underset{*}{C}}F\overset{CH_3}{\underset{O}{\overset{\|}{C}}}NH\overset{CH_3}{\underset{*}{C}}HPh} \longrightarrow \begin{matrix} 5b\text{-}d\ (+)(-) \\ 6b\text{-}d\ (-)(-) \end{matrix}$$

(3.5:1) as eluent, except 4a, completely separated amides 5(+)(-) and 6(-)(-)[4] were readily obtained.

The differences of ^{19}F NMR absorption peaks due to fluorine atoms directly attached to the chiral carbon[5] and base line separation by GLC[6] between 5 and 6 were also observed.

The optically pure (+)- and (-)-perfluoro(2-dialkylamino-propionic acids) [(+)-3 and (-)-3][7] were obtained respectively from the hydrolysis of the separated amides 4a and 4b with sodium hydroxide by the similar way described in the patent.[8] The enantiomers of perfluoro(2-cyclicamino-substituted propionic acids) thus obtained are the first example, as far as we know, of the optically active perfluorinated carboxylic acids obtained by the electrochemical fluorination.

More efficient methods for the optical resolutions of these new perfluorocarboxylic acids and applications to chiral derivatizing agents are now under way.

References

1) D. M. Feigel and H. S. Mosher, J. Org. Chem., 33, 4242(1968).
2) H. Kawa, F. Yamaguchi and N. Ishikawa, J. Fluorine Chem., 20, 475(1982).
3) T. Abe and E. Hayashi, H. Baba, and H. Fukaya, J. Fluorine Chem., accepted for publication.
4) $[\alpha]^{20}_{D}$ ($CHCl_3$,c 1.00);5b:-63.1,6b:-69.8;5c:-61.0,6c:-66.6;5d:-62.3, 6d:-67.7. Mp θm/°C;5b:85.0-86.0,6b:57.0-58.0;5c:80.0-81.0,6c:51.5-52.5; 5d:72.5-73.5,6d:45.5-47.0.
5) ^{19}F NMR spectra were measured in 1% $CDCl_3$ with $CFCl_3$ as internal standard at 35 °C on a Hitachi R-90 F (84.68 MHz). Chemical shifts due to C-F were as follows; 5c:-135.6,6c:-135.4 and 5d:-136.8,6d:-136.3.
6) GLC analysis was carried out on a Shimazu GC-6A using a stainless column (3 mmx3.0 m) packed with 10% Thermol III on Uniport B(60-80 mesh). The carrier gas was helium. The Column was kept at 160 °C.
7) $[\alpha]^{20}_{D}$ ($CHCl_3$,c 1.00);(+)-3b:13.0,(-)-3b:-13.0;(+)-3c:16.0,(-)-3c:-15.9; (+)-3d:14.5,(-)-3d:-14.4. Bp θb/°C(Torr);(+)-3b and (-)-3b:70.0-72.0 (36);(+)-3c and (-)-3c:75.0-77.0(35);(+)-3d and (-)-3d;78.0-80.0(35).
8) N. Ishikawa, JP 58/57333.

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