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Preliminary communication

ON THE INTERACTION OF TRIFLUOROMETHYL DERIVATIVES OF MERCURY WITH ORGANIC COMPOUNDS OF TIN AND PLATINUM

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Summary

It has been shown that CF_3HgX molecules react easily with trimethyltrifluoromethyltin and *cis*-bis(triphenylphosphine)dimethylplatinum in inert solvents, to give typical alkyl exchange reaction products.

It was shown recently [1,2] that trifluoromethyl derivatives of mercury react with symmetrical organomercury compounds to give the products of the redistribution reaction 1:

$$CF_3HgX + R_2Hg \xrightarrow{\text{solvent}} CF_3HgR + RHgX \qquad (1)$$

and that the rates of these reactions depend strongly on the nature of the solvent in which the reactions occur [3]. In this communication we report that trifluoromethyl derivatives of mercury react easily with some organic compounds of tin and platinum.

Equimolar amounts of trifluoromethylmercury trifluoroacetate and trimethyltrifluoromethyltin on mixing in benzene react according to eqn.2.

$$CF_3HgOCOCF_3 + Me_3SnCF_3 \xrightarrow{\text{benzene}} CF_3HgMe + CF_3Me_2SnOCOCF_3 \qquad (2)$$

A PMR spectrum of the resulting benzene solution (after ~ 24 h at ~ 20°) consists of a singlet of the methyltrifluoromethylmercury protons (δ 0.5 ppm, $J(^1H—C—^{199}Hg)$ 140.0 Hz). The ^{19}F NMR spectrum showed a singlet of the trifluoromethyl group (δ 33.0 ppm from CF_3COOH; $J(^{19}F—C—^{199}Hg)$ 930.0 Hz). These ^1H and ^{19}F spectral parameters are in good agreement with published data [4]. Dimethyltrifluoromethyltin trifluoroacetate is a white crystalline precipitate, whose PMR spectrum in pyridine consists of a singlet with δ 1.30 ppm, $J(^1H—C—^{117}Sn)$ 78.0 Hz, and $J(^1H—C—^{119}Sn)$ 81.0 Hz. The observation that in reaction 2 a CH_3 and not a CF_3 group is eliminated is not very surprising because it was shown earlier that a CH_3 group is indeed eliminated on interaction of trimethyltrifluoromethyltin with chlorine [5] or hydrogen chloride [6], although on mixing with sodium iodide trimethyltin iodide [7] is obtained in a yield of 90%. It is interesting to note that trimethyltrifluoromethyltin virtually does not react with trifluoromethylmercury chloride and also that the reaction of tetramethyltin with trifluoromethylmercury trifluoroacetate is very slow.

We have shown also that trifluoromethylmercury chloride interacts easily with *cis*-bis(triphenylphosphine)dimethylplatinum in chloroform as in eqn.3.

$$CF_3HgCl + cis\text{-}Me_2Pt(PPh_3)_2 \xrightarrow{CHCl_3} CF_3HgMe + cis\text{-}MeClPt(PPh_3)_2 \qquad (3)$$

The methyl singlet of *cis*-$Me_2Pt(PPh_3)_2$ (δ 0.2 ppm, $J(^1H—C—^{195}Pt)$ 70.0 Hz) disappears immediately after mixing the components, and the methyl singlet of $MeHgCF_3$ (δ 0.5 ppm, $J(^1H—C—^{199}Hg)$ 140.0 Hz) can be observed as well as the methyl quartet of $CH_3ClPt(PPh_3)_2$ in which intensities of the components are equal due to spin—spin coupling with the *cis*- and *trans*-phosphorus [9] (δ 0.4 ppm, $J(^1H—C—^{195}Pt)$ 57.0 Hz, $J(^1H—C—Pt—^{31}P)$ 4.0 Hz; $J(^1H—C—Pt—^{31}P)$ 7.0 Hz).

The interaction of trifluoromethylmercury trifluoroacetate with trimethyltrifluoromethyltin proceeds in a similar way in chloroform or in benzene.

We are studying the kinetics and mechanism of these reactions in various solvents, although in the case of organoplatinum compounds the studies are made difficult by high rates of reaction and limited solubilities of these compounds in most organic solvents.

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