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**SHORT COMMUNICATION**

# $(Me_4N)(NO_2)_2C_6H_3CO_2$ NEW $MCl_2$ (M = Zn, Co, Cd) AND $SnR_3Cl$ (R = Me, Ph) ADDUCTS: SYNTHESIS AND INFRARED STUDY

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**Abstract**: Five new $(Me_4N)(NO_2)_2C_6H_3CO_2$ adducts with $MCl_2$ (M = Zn, Co, Cd) and $SnR_3Cl$ (R = Me, Ph) have been synthesized and studied by infrared spectroscopy. The suggested structures are discrete, the anion behaving as mono- and bichelating ligand towards $MX_2$, tri- and monodentate towards $SnR_3Cl$ (R = Me, Ph).The environment around Zn, Co and Cd is tetrahechal, while the tin (IV) centre is trigonal bipyramidal.

**Keywords:** *$[NO_2C_6H_3CO_2]^-$ ligand, infrared, discrete, structures*

## INTRODUCTION

The main results on the coordinating ability of carboxylate anions towards tin have been reported by Tiekink [1]. The coordination ability of carboxylates anions (formiate, acetate and oxalate) has been reported by several authors including our group [2, 3]. We initiate here the study of the interactions between $(Me_4N)(NO_2)_2C_6H_3CO_2$ and $MCl_2$ (M = Zn, Co, Cd) or $SnPh_3Cl$ which have yielded five new adducts infrared studies of which have been carried out, then structures suggested on the basis of infrared data.

## MATERIALS AND METHODS

$(Me_4N)(NO_2)_2C_6H_3CO_2$ have been obtained as a powder on neutralizing $(NO_2)_2C_6H_3CO_2H$ with a 20% water solution of $Me_4NOH$ and allowing the water to evaporate at the oven at 60 °C.
When ethanolic solutions of $(Me_4N)(NO_2)_2C_6H_3CO_2$ are mixed with ethanolic solutions of $ZnCl_2$, $CoCl_2$, $CdCl_2$, precipitation occurs. The precipitates were stirred around two hours and filtered.
For $SnR_3Cl$, R = Ph, Me (both solutions being ethanolic) a powder is collected after a slow solvent evaporation at room temperature.
The analytical data reported below, with the ratio (salt / halide) have allowed to suggest the following formulae (Table 1).

***Table 1.*** *Suggested formulae of synthesized compounds and the elemental analyses*

| Compound | Chemical formula | Elemental analysis [%] | | | | | |
|---|---|---|---|---|---|---|---|
| | | C | | H | | N | |
| | | calc. | found | calc. | found | calc. | found |
| **A** | $Me_4N(NO_2)_2C_6H_3CO_2{\cdot}ZnCl_2(1/2)$ | 31.32 | 31.44 | 3.55 | 3.31 | 9.97 | 10.05 |
| **B** | $[Me_4N(NO_2)_2C6H_3CO_2]_3{\cdot}CoBr_2(1/2)$ | 36.88 | 36.95 | 4.19 | 3.89 | 11.73 | 11.52 |
| **C** | $Me_4N(NO_2)_2C_6H_3CO_2{\cdot}2CdCl_2(1/2)$ | 20.25 | 20.89 | 2.30 | 2.36 | 6.44 | 6.70 |
| **D** | $Me_4N(NO_2)_2C_6H_3CO_2{\cdot}3SnPh_3Cl{\cdot}H_2O$ (1/1) | 54.46 | 54.80 | 7.34 | 7.20 | 3.20 | 3.68 |
| **E** | $Me_4N(NO_2)_2C_6H_3CO_2{\cdot}SnMe_3Cl(1/1)$ | 34.67 | 34.28 | 4.25 | 3.84 | 8.67 | 8.72 |

The elemental analyses have been performed by the Laboratory of Microanalyses-University of Montpellier II – France. The infrared spectra have been recorded at the University of Padova -Italy- by means of a Perkin Elmer 180 spectrometer using CsI, the sample being as Nujol mulls. Infrared data are given in $cm^{-1}$ (IR abbreviations: (vs) very strong, (s) strong, (m) medium, (w) weak, (vw) very weak, (br) broad). All the chemicals were purchased from Aldrich -Germany- and used as such.

## RESULTS AND DISCUSSION

Let we consider the IR data (in $cm^{-1}$) of the studied adducts:

**(A)**: $\nu sOH$ = 3300 (br); $\nu sCO_2$ = 1625 (vs); $\nu asCO_2$ = 795 (w); $\nu sNO_2$ = 1542 (vs); $\nu asNO_2$ = 791(s); $\rho CO_2$ = 520 (m); $\omega CO_2$ = 3700 (m); $\delta NO_2$ = 723 (m); $\nu MX_2$ = 310 (vs);
**(B)**: $\nu sOH$ = 3300(br); $\nu sCO_2$ = 1600 (s); $\nu asCO_2$ = 795 (m); $\nu sNO_2$ = 1542 (vs); $\nu asNO_2$ = 791 (s); $\delta CO_2$ = 750 (m); $\rho CO_2$ = 515 (m); $\omega CO_2$ = 380 (w); $\delta NO_2$ = 723 (w);
**(C)**: $\nu sOH$ = 3400 (br); $\nu sCO_2$ =1620 (vs); $\nu asCO_2$ = 795 (w); $\nu sNO_2$ = 1540 (vs); $\nu asNO_2$ = 791 (s); $\rho CO_2$ = 520 (m); $\omega CO_2$ = 380 (w); $\delta NO_2$ = 723 (m);
**(D)**: $\nu sOH$ = 3300 (br); $\nu sCO_2$ = 1638 (s); $\nu asCO_2$ = 792 (m); $\nu sNO_2$ = 1543 (s); $\nu asNO_2$ = 791 (s); $\delta CO_2$ = 744 (vs); $\rho CO_2$ = 520 (m); $\omega CO_2$ = 370 (trace); $\delta NO_2$ = 720 (trace);
**(E)**: $\nu sOH$ = 3400 (br); $\nu sCO_2$ = 1638 (vs); $\nu asCO_2$ = 792 (m); $\nu sNO_2$ = 1542 (s); $\nu asNO_2$ = 791 (s); $\rho CO_2$ = 520 (m); $\omega CO_2$ = 380 (trace); $\delta NO_2$ = 724 (w); $\nu asSnCl_3$ = 550 (s).

The absence of $\nu s\ SnMe_3$ (**A'**) in the spectrum of **E** is an according with the monocoordination of the anion.
From these data we suggest the structures reported in Figures 1-5.
For the structures presented in Figures 1 and 2 the anion is monochelating while being bichelating in Figure 3, tricoordinating in Figure 4 and monocoordinating in Figure 5.

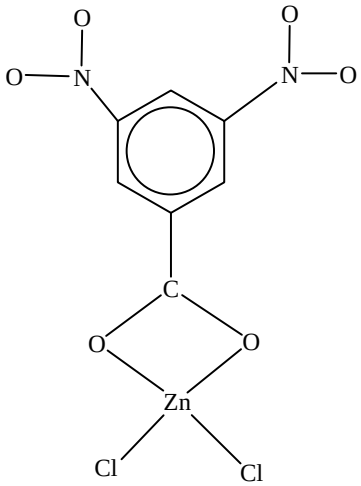


***Figure 1.*** *Compound A*

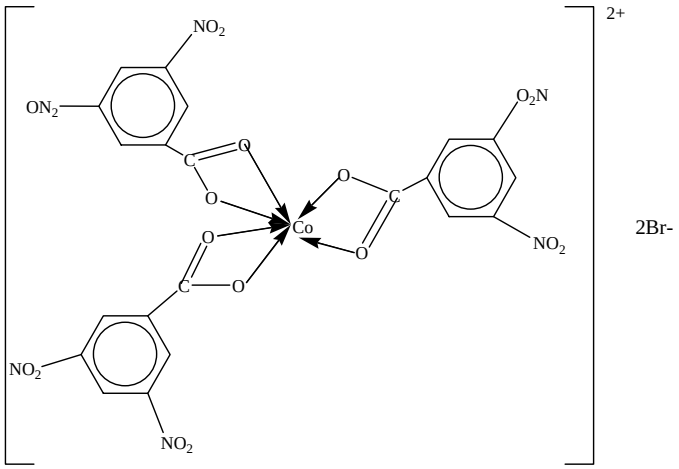


***Figure 2.*** *Compound B*

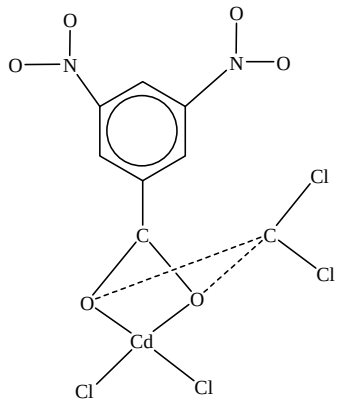

***Figure 3.*** *Compound C*

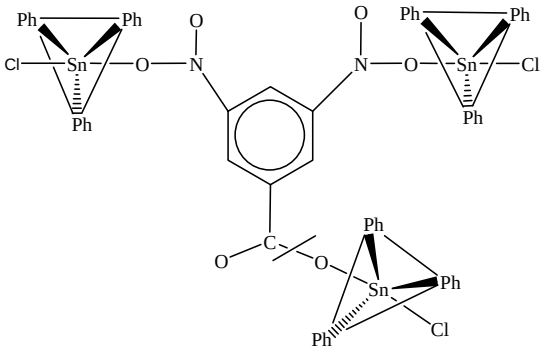

***Figure 4.*** *Compound D*

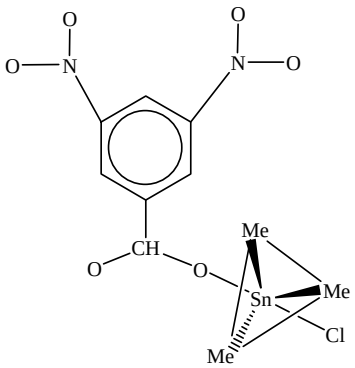

***Figure 5.*** *Compound E*

## CONCLUSIONS

The studied adducts have discrete structures, the anion being a mono- and bichelating ligand towards $MX_2$ while being tridentate and monodentate towards organotin compounds.

## ACKNOWLEDGEMENTS

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