

AIMS AND OBJECTIVES

The Lewis acidity of organotin compounds which increases in the sequence; $R_4Sn < R_3SnX < R_2SnX_2 < RSnX_3$ (where X = halogen or other electronegative groups) has been utilised to prepare a variety of organotin complexes. In conformity with this trend of Lewis acidity, numerous examples of 6 and 7 co-ordinated mono organotin complexes, 5, as well as 6- co-ordinated di- organotin complexes are known, while triorganotin complexes are almost invariably 5-coordinated.

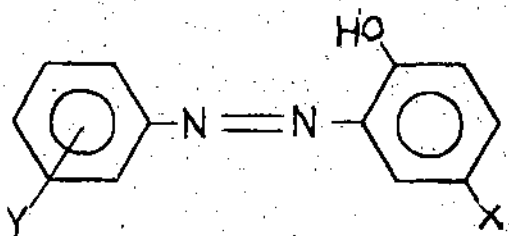
The biocidal properties of organotin compounds and their consequent application in pest control, environmental problems, veterinary medicines and human medicine have led to very rapid increase in the preparation of organotin derivatives of diverse types of ligands. The organotin chemistry, particularly the coordination chemistry, has thus become very rich during the last two decades or so.

Surprisingly, however no example of organotin complexes of arylazo phenoxy compounds have yet been reported, though a great variety of organotin complexes of arylazo carboxylic acids are already known. As organotin phenoxides are well known, it will be of great interest to ascertain the effect of the arylazo group on the preparation and properties of the phenoxy derivatives of organotin compounds.

The present study was, therefore, planned to investigate the reactions of azo-phenoxy compounds with organotin compounds

with a view to preparing their organotin derivatives. Consideration of the steric and other requirements show that a reasonably favourable situation for the formation of arylazophenoxy derivatives of triorganotin compounds may be expected in the following ligands.

I.

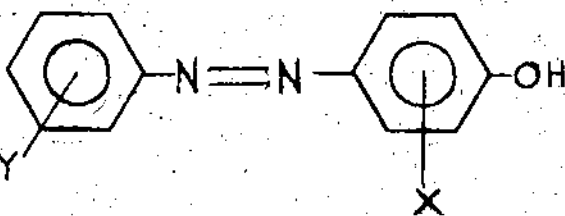
where X = -CH₃, -Cl-N(CH₃)₂

Y = o- or p-

-OH, -NO₂,

-F, -H etc.

II.



where X = o- or m-

-CH₃, -Cl, -N(CH₃)₂X = o- or m- CH₃, -Cl,-N(CH₃)₂;

Y = o- or p-

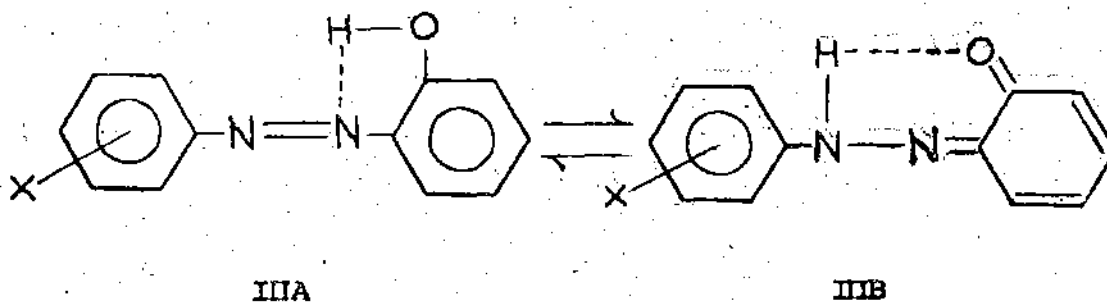
-OH, -NO₂, -F, -H etc.

At a first glance the above ligands appeared to be well suited for the preparation of a variety of interesting organotin complexes because,

- (1) arylazophenoxy compounds with a wide variety of nuclear substituents can be prepared by diazotisation of amines, nitroanilines and aminophenols followed by coupling with suitable aryl moiety,

(ii) the ligands have a very favourable steric arrangements for the formation of tin complexes as a large number of transition metal complexes of these ligands are well known.

Ligands of type I are of considerable interest since the organotin derivative may involve $N(\text{azo}) \rightarrow \text{Sn}$ co-ordinate bond. However, azo compounds of type I are well known to exhibit azo-hydrazone tautomerism of the type:



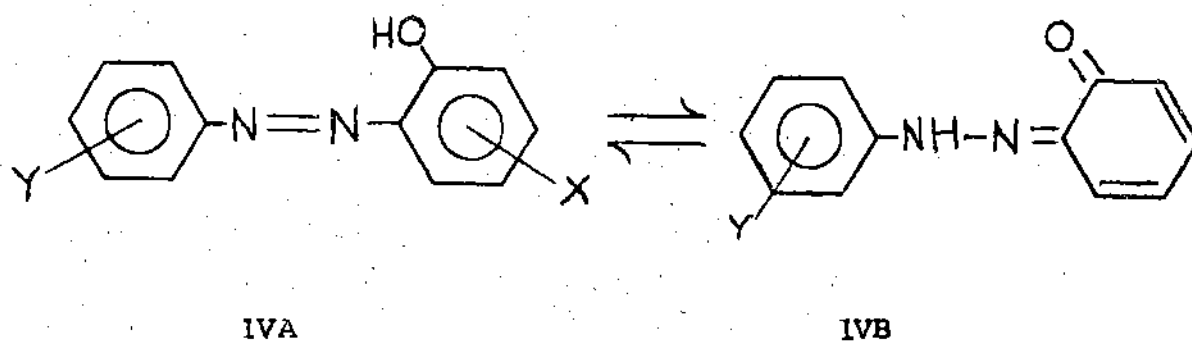
In addition, both the forms IIIA, IIIB are expected to be intramolecularly hydrogen bonded. In accordance with this expectation, all attempts to prepare simple triorganotin derivatives of this type of ligands failed.

Ligands of type II were found to be comparatively more acidic and the sodium salt could be obtained easily. This gave the desired triorganotin derivatives on reaction with the organotin halides. However, the presence of a substituent at ortho position to the -OH group inhibited formation of any organotin derivative, presumably due to the steric hindrance by the ortho-substituent. The ortho-

substituted ligands of the type II also failed to react with organotin compounds, presumably due to the steric hindrance of the substituent.

The reactions of different ligands are summarised below:

In addition, ligands of type I often show azo-hydrazone tautomerism.



It is, therefore, of considerable interest to investigate the effect of R_3Sn group on tautomeric equilibrium.

The present study, therefore, aimed at

- (i) preparation of suitable Arylazo phenols,
- (ii) investigating the reactions of the aryl azo phenols with organotin oxides of the type $(R_3Sn)_2O$ with a view to ascertaining the relative reactivity of the aryl azo phenols towards the organotin oxides,
- (iii) preparation of the derivatives of the type R_3SnL ($LH =$ aryl azo phenol), and
- (iv) to study the physico chemical properties of the organotin derivatives.