SUMMARY

In recent years extensive investigations have been carried out in the field of organotin co-ordination compounds. These studies are primarily directed towards preparation and characterisation by various physico-chemical methods of organotin co-ordination complexes. Organotins are commercially used as biocidal agents for the last two decades or more, apart from their use as P.V.C. stabilisers.

First a short discussion of organotin co-ordination compounds has been given. Compounds of a number of ligands such as phenanthroline, oximes, schiff bases, oxine, β-diketones, pyridine carboxylic acid, dithizone, substituted hydroxamic acids etc. with organotins have been described. Some of these compounds have been characterised by various spectral measurements and X-ray crystal structure determinations etc.

In the Part I of the present investigation, the preparation of twenty new organotin diphenyl carbazonates have been described. No solid organotin diphenyl carbazonate (L) have been reported so far. The compounds isolated and characterised under the present investigation are of the following types:

(a) R_3SnL (R = propyl, butyl, cyclohexyl, phenyl, p-tolyl and benzyl).

(b) R_2SnL_2 (R = methyl, butyl, cyclohexyl, phenyl, p-tolyl, benzyl)

(c) R_2SnLX (R = methyl, butyl, phenyl, p-tolyl)

(d) $RSnL_3$ (R = phenyl)

These compounds have been characterised by elemental analysis, visible, I.R., P.M.R. spectra. Some of these organotin compounds showed a single absorption in the region of 530-550 nm in their visible spectra instead of two absorption bands (455 nm and 565 nm) noticed in the case of diphenyl carbazone in the visible region. The I.R. spectra of all organotin compounds showed interesting changes in 3100-3400 cm^{-1} region and the absence of 1707 cm^{-1} and 1650 cm^{-1} bands of diphenyl carbazone. Appearances of new bands at $\sim$1540 cm^{-1} and a broad band around 1200 cm^{-1} clearly indicates the chelating nature of organotin diphenyl carbazonates.

The P.M.R. spectra of organotin diphenyl carbazonates showed some interesting observations. The alkyl and aryl protons of organotin diphenyl carbazonates showed significant chemical shifts compared to parent compounds. The position of imino protons was found to be variable possibly due to the nature and extent of hydrogen bonding.

All evidences clearly indicated that organotin moieties can replace only one imino proton of diphenyl carbazone in such complexes, similar to organotin dithizonates.

In second part, some ligand exchange reactions have been investigated to obtain an idea of the relative stabilities of different organotin co-ordination complexes. The ligands were diphenyl carbazone, dithizone, oxine, substituted benzohydroxamic acids. It has been found that one ligand (e.g., dithizone) can replace another ligand (oxine) from an organotin oxinate under reflux conditions for 2 hours. From the investigations carried out presently, we possibly can conclude that organotin compounds have definite soft acid character as they form stronger complexes with N-S donors than N-O donors and O-O donors, though some earlier workers believed the hard acid character of organotin compounds.

In the last part, the fungicidal properties of triphenyl tin diphenyl carbazonate, bis-(triphenyl tin) oxide and dithizone have been described against inhibition of conidial germination of Aspergillus niger, Penicillium jenseni, Verticillium albo-atrum, Helminthosporium oryzae . Results obtained indicated extremely high fungitoxic nature of triphenyl tin diphenyl carbazonate against these fungi. An attempt has been made to get a preliminary idea about the effect of co-ordination on triphenyl tin moiety. Though more work is necessary, it may be stated that triphenyl tin diphenyl carbazonate retains most of the fungitoxic character of bis-triphenyl tin oxide, if we consider the actual tin content of such compounds.