

Editorial

Special Issue: Recent Advances in Organotin Chemistry

Organotin chemistry really became a distinct area more than 150 years ago when Löwich [1] described a reaction of alkyl halides with a tin–sodium alloy yielding alkyl tin compounds, although the first organotin compound, Et_2SnI_2 (Eq. (1)) had been discovered by Frankland on 1849 [2,3]



It was not until 1903 that the synthesis of simple and mixed tetraalkyl- and tetrarylthins, by using Grignard reagents and alkyl- and aryltin derivatives (Eq. (2)) was reported [4]. Standard routes to organotin species were established and summarized in 1937 [5]. An interesting and useful review recently reported the synthetic aspects of tetraorganotins and organotin(IV) halides and also discussed the selectivities and yields of the products [6]



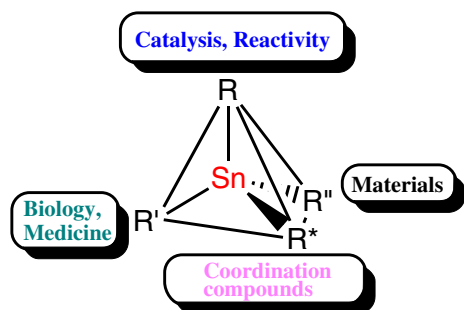
Organotin compounds have a range of applications, including their use as boat paint additives to prevent attack by microorganisms [7], and as insecticides and fungicides [8,9], $\{\text{Bu}_3\text{Sn}\}_2\text{O}$ [10] and the water-soluble tributylmesilylimide [11] being extensively used as wood preservatives. Several organotin compounds are used commercially as hydrochloric acid scavengers in polyvinyl chloride and dibutyltin laurate is now well-established highly effective and universal stabiliser for rigid and flexible PVC. Organotin species provide excellent protection to the PVC under high thermal stress and confer crystal clarity to the finished article. In relatively recent years, it has been reported that $\text{RSn}(\text{SCH}_2\text{-COOC}_8\text{H}_{17})_3$ compounds inhibit dehydrochlorination reactions by exchanging their anionic SR-moiety with the Cl atoms in the polymer [12].

Organotin carboxylate complexes are employed as catalysts for the transesterification reaction [13], polyurethane polymerization [13] and RTV silicone curing reactions [14] whereas derivatives of acetylacetone, salicylic acid and the above-mentioned carboxylate compounds possess antitumor properties [15–17].

Although other organotin complexes exhibit important cytotoxic effects, their mechanism of action is still unclear.

Organic chemists widely use the Stille reaction for the formation of new C–C bonds [18], whereas the reaction of trialkyltin hydride with alkyl halides and alkenes now constitutes the basis of a number of important organic synthetic methods [19]. Interest in organotins from organic chemistry is increasing: for example, very recently a highly diastereoselective Reformatsky-type reaction has been found to be promoted by an organotin iodide complex [20], whereas cationic distannoxane catalysts have been applied to carbon–carbon bond formation [21]. Tin(IV)chloride chiral pyrogallol derivatives have been employed as new Lewis acid-assisted chiral Brønsted acids for enantioselective polyene cyclization [22] whereas mild and selective methods for hydrolysis of ester employ trimethyltin hydroxide [23].

Introduction of ionic or non-ionic hydrophilic terminal groups into the hydrophobic dendritic backbone $\text{Si}(\text{CH}_2\text{CH}_2\text{Sn})_4$ led to a variety of first generation water-soluble tin-based dendrimers [24]. Polymer-supported triorganotin halides were used in the halogenation reaction of aromatic amines [25]. Clusters based on organotin synthons can be synthesised also by simple synthetic variations, doubly bridged ladders, butterfly O-capped and cube structure being widely described by Holmes, Jain and Jurkschat [26–28]. Organotin assemblies containing Sn–O bonds can be assembled from Sn–C bond cleavage and this field has been recently well reviewed by Chandrasekhar et al. [29] which also described the structural diversity of such a family of compounds [30]. Some organotin clusters related structurally to the Sn_5^{2-} Zintl anions have been isolated and thereby establishing a relationship between the Zintl and organoclusters [31]. Sn(IV) Salen catalyst has been employed for ring-opening polymerization of trimethylcarbonate to polycarbonate [32]. A number of organotin(IV) compounds with peculiar structures, as a stannylyne complex containing a W atom triply bonded to Sn [33] have been reported in the last decade.



The discovery of several new organotin species and new relevant applications has led to renewed interest in organotin complexes, and 157 years after their discovery organotin compounds constitute still one a leader research field in organometallic chemistry. This special issue has been dedicated to this intriguing metal and its organometallic derivatives. We have decided to be not restrictive and contributions from different fields have been accepted. We have organized this issue in the following sections:

1. Tin and organotin compounds in catalysis.
2. Coordination compounds: synthesis, structure and spectroscopic characterization.
3. New organotin-based materials: coordination polymers, dendrimers.
4. Biological and pharmaceutical aspects of organotin compounds.

Specific aim of this issue is to facilitate maximum interaction among people working in the same area and an easy transfer of knowledge from high-level scientist to new generations of researchers applying in the organotins field.

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