

## A Novel Access to Organostannane Compounds under Ultrasound Irradiation

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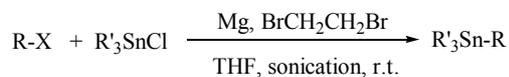
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**Abstract:** A simple and efficient procedure has been developed for the synthesis of organostannane compounds by one-pot reaction of stannane halides, magnesium turnings and organic halides in the presence of 1, 2-dibromoethane under ultrasound irradiation for the first time.

**Keywords:** Organostannane, one-pot reaction, ultrasound irradiation.

Organostannanes are being found increasing application in organic synthesis<sup>1</sup>. Usually organostannanes are synthesized by the reactions of organolithium or organomagnesium derivatives with trialkyltin halides<sup>2</sup>. Another important method is the radical-induced or Pd-promoted addition of tin hydrides to unsaturated systems (*e.g.*, alkynes, alkenes)<sup>3</sup>. Concerning our interest in the synthesis and chemistry of organostannanes, we report here a new method for the synthesis of organostannanes compounds by one-pot reaction of stannane halides, magnesium turnings and organic halides in the presence of 1, 2-dibromoethane under ultrasonic conditions<sup>4</sup> (**Scheme 1**).

### Scheme 1



R = aryl, allyl, alkyl, vinyl R'=Bu, Me; X=Cl, Br, I

A wide range of stannane compounds was subjected to this procedure to produce the corresponding products in quite high yield. Gram-scale reactions with 0.1-10.0 g of stannane halide were also carried out and found to give analogously good yields of the corresponding products. The results are presented in **Table 1**.

As seen, this methodology can accommodate a variety of organic functional halides, the yields are nearly quantitative. It should be noted that (a) the quality of the reagents

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is not critical (solvent or halides) and they do not need to be purified before use; and (b) the use of 1, 2-dibromoethane is not necessary but usually it can increase the yield.

**Table 1** Improved preparation of organostannane compounds from organic halides

Entry	Organic halide	Organostannane	Yield, %
1	C <sub>6</sub> H <sub>5</sub> Br	C <sub>6</sub> H <sub>5</sub> SnBu <sub>3</sub>	90
2	CH <sub>2</sub> =CHCH <sub>2</sub> Br	CH <sub>2</sub> =CHCH <sub>2</sub> SnBu <sub>3</sub>	95
3	PhCH <sub>2</sub> Br	PhCH <sub>2</sub> SnBu <sub>3</sub>	95
4	PhCH(CH <sub>3</sub> )I	PhCH(CH <sub>3</sub> )SnBu <sub>3</sub>	95
5	Ph <sub>2</sub> CHBr	Ph <sub>2</sub> CHSnBu <sub>3</sub>	95
6	<i>o</i> -C <sub>6</sub> H <sub>4</sub> (CH <sub>2</sub> ) <sub>2</sub>	<i>o</i> -C <sub>6</sub> H <sub>4</sub> (CH <sub>2</sub> SnBu <sub>3</sub> ) <sub>2</sub>	95
7	CH <sub>2</sub> =CHBr	CH <sub>2</sub> =CHSnBu <sub>3</sub>	90
8	<i>n</i> -BuBr	<i>n</i> -BuSnBu <sub>3</sub>	95
9	<i>s</i> -BuBr	<i>s</i> -BuSnBu <sub>3</sub>	95

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### References and Notes

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- The following procedure is representative: A flask containing 10 mL of THF, 480 mg (20 mmol) of magnesium turnings, 0.1 mL of 1, 2-dibromoethane, 3.25 g (10 mmol) of tributyl stannane chloride and 2.32 g (10 mmol) of  $\alpha$ -methylbenzyl iodide<sup>5</sup> (entry 4) is plunged into a commercial ultrasonic cleaning bath (KQ-250, working frequency: 40 KHz) and sonicated for 0.5 h. The mixture was treated by the usual way to give 3.75 g (95% yield) of ( $\alpha$ -methylbenzyl)tributyltin. IR (neat): 2957 (s), 2928 (s), 2871 (s), 2856 (s), 1600 (m), 1492 (m), 1457 (m), 1376 (m) cm<sup>-1</sup>; <sup>1</sup>H NMR (CDCl<sub>3</sub>, 400M Hz,  $\delta$  ppm) 7.23 (t, 2 H, *J* = 7.6 Hz), 7.04 (m, 3 H), 2.73 (q, 1 H, *J* = 7.6 Hz), 1.60 (d, 3 H, *J* = 7.6 Hz), 1.44-1.24 (m, 15 H), 0.91-0.78 (m, 12 H); EIMS *m/z*: 396 (M<sup>+</sup>, 2), 339 (15), 291(81), 179 (100). HRMS (ESI) calcd. for C<sub>20</sub>H<sub>36</sub>Sn 396.1840, found 396.1851.

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