

## Research Article

Green Synthesis of Morpholino Cinnamamides Using Sodium Lauryl Sulphate and H<sub>2</sub>O

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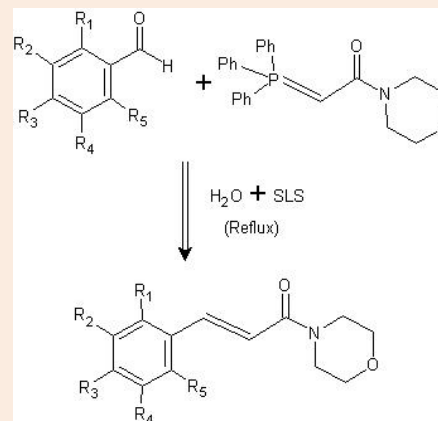
**Abstract**

Morpholino Cinnamamides were synthesized via simple Wittig reaction mechanism. Sodium Lauryl Sulphate (SLS)-H<sub>2</sub>O solvent system was employed to carry out the synthesis. Use of Sodium Lauryl Sulphate increases the solubility of reactants in H<sub>2</sub>O. This solvent system dramatically increases the rate of reaction and helps to maintain a green reaction conditions.

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**Introduction**

Several Cinnamamides and their morpholino derivatives were reported to show a variety of activities such as insecticidal, herbicidal, CNS depressant, antitumor, bird repellent, anesthetic, analgesic etc.[1-7] Cinnamamides and their analogues act as important constituent in many valuable compounds e.g. p-methoxy N, N dimethyl Cinnamamide is a major constituent in anticancer drug *taxol*. [8] Due to wide range of such applications Cinnamamides and their derivatives acquires a great value in various fields[9-13].

Retro-synthetic study of parent Cinnamide molecule shows that, it can be easily synthesized by simple Wittig reaction. After going through the detail literature survey it was observed that there is no evidence for the use of simple Wittig reaction in the synthesis of cinnamamides and their analogues. And hence it remains untouched for this area. Wittig reaction has a number of advantages over other olefination methods; in particular, it occurs with total positional selectivity i.e. an alkene always directly replaces a carbonyl group.

H<sub>2</sub>O is demonstrated to be an excellent medium for the Wittig reaction employing ylides and aldehydes [14-15]. Although the solubility in water appears to be an unimportant characteristic in achieving good chemical yields. Solubility of the starting material will be increases by the addition of catalytic amount of sodium Lauryl Sulphate (SLS). The rate of Wittig reactions in water is unexpectedly accelerated [16-17]. Hence; Wittig reaction is a reliable method for the synthesis of a wide range cinnamamides and can be applied with confidence.

**Experimental****Materials and Reagents**

All reagents and solvents were procured from Sigma Aldrich and S D Fine limited, Mumbai, and used without further purification. Progress of the reactions was monitored by Thin Layer Chromatography. The synthesized compounds

were purified by using column chromatography and identity of compounds was confirmed by Melting Points, Elemental analysis, I.R.  $^1\text{H}$  NMR,  $^{13}\text{C}$  NMR and Mass spectral data.

The IR spectra were recorded on Perkin Elmer spectrometer and  $^1\text{HNMR}$  spectra were recorded on Varian; USA makes Mercury plus 400 MHz, NMR Spectrometer by using  $\text{CDCl}_3$  with TMS as internal standard.  $^{13}\text{CNMR}$  spectra were recorded on Varian; USA makes Mercury plus 100 MHz, NMR Spectrometer by using  $\text{CDCl}_3$  with TMS as internal standard. The mass spectrum was recorded on Jeol make Accu TOF, Mass Spectrometer.

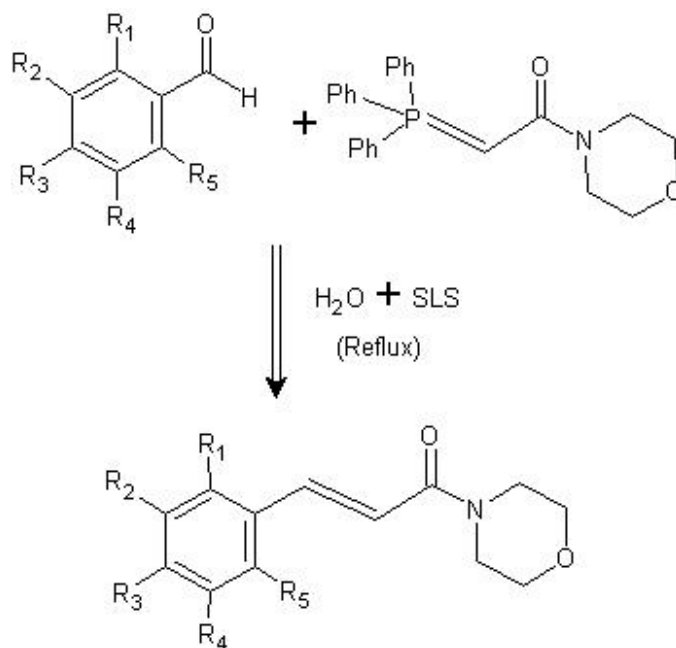
### General Procedure

#### Preparation of Wittig Reagent:

Chloroacetyl chloride (0.1M) was added to the (0.1M) solution of morpholine in Chloroform at  $0^\circ\text{C}$  with constant stirring for 30 minutes. The reaction mixture was stirred at room temperature for 20 minutes and then washed with 10%  $\text{Na}_2\text{CO}_3$  solution, the organic layer was separated and dried over  $\text{Na}_2\text{SO}_4$ , then evaporated to about  $1/3^{\text{rd}}$  volume and chloracetamide was collected as yellowish liquid. This liquid was added to the stirred solution of triphenyl phosphine in dry benzene and refluxed for 03 hours. White crystalline solid was obtained; it was dissolved in dry benzene (90ml) and water (10ml) solution. To this solution 1-2 drops of phenolphthalein indicator were added followed by the addition of 10%  $\text{NaOH}$ , till the pink color persist. Organic layer was separated, washed with water and evaporated to about  $1/3^{\text{rd}}$  volume. Finally, the liquid was scratched with hexane to obtain Wittig reagent.

#### Synthesis of Morpholino Cinnamamides (Scheme 1):

In a 100 ml round bottom flask, 10 ml  $\text{H}_2\text{O}$  and a pinch of Sodium Lauryl Sulphate (SLS) were taken and flask was equipped with stir bar. To this solution aromatic aldehyde was added and the reaction mixture was stirred for 10 minutes at the room temperature. Then 01 g of Wittig reagent was added with constant stirring and the reaction mixture was refluxed for 3-4 hours. The progress of reaction was monitored by thin layer chromatography. After completion of reaction, crude product was filtered off and purified by column chromatography by using silica (mesh 160) to obtained morpholino Cinnamamides (Ia-Ij).



**Scheme 1** Synthesis of Morpholino Cinnamamides (Ia-Ij).

## Results and Discussion

Morpholino cinnamamides (Ia-Ij) were prepared by simple, convenient and green reaction pathway and the representative compounds were characterized by suitable techniques and the results were discussed as follows.

**Table 1** List of Morpholino Cinnamamides prepared

Entries	R <sup>1</sup>	R <sup>2</sup>	R <sup>3</sup>	R <sup>4</sup>	R <sup>5</sup>	Yield (%)	M.P. (°C)
Ia	H	H	H	H	H	72	184
Ib	H	H	-O CH <sub>3</sub>	H	H	68	178
Ic	H	-O CH <sub>3</sub>	-O CH <sub>3</sub>	H	H	76	186
Id	H	-O CH <sub>3</sub>	-O CH <sub>3</sub>	-O CH <sub>3</sub>	H	60	169
Ie	H	-OCH <sub>2</sub> -O-		H	H	66	168
If	-NO <sub>2</sub>	H	H	H	H	70	192
Ig	H	H	-Cl	H	H	64	157
Ih	H	H	-NO <sub>2</sub>	H	H	70	188
Ii	H	H	-N (CH <sub>3</sub> ) <sub>2</sub>	H	H	68	176
Ij	H	H	-OH	H	H	64	168

### Spectroscopic data of representative compounds:

The IR spectra were recorded on Perkin Elmer spectrometer and <sup>1</sup>H-NMR spectra were recorded on Varian; USA makes Mercury plus 400 MHz, NMR Spectrometer by using CDCl<sub>3</sub> with TMS as internal standard. <sup>13</sup>C-NMR spectra were recorded on Varian; USA makes Mercury plus 100 MHz, NMR Spectrometer by using CDCl<sub>3</sub> with TMS as internal standard. The mass spectrum was recorded on Jeol make Accu TOF, Mass Spectrometer.

Ia). (2E)-1-(morpholin-4-yl)-3-phenylprop-2-en-1-one: Pale yellow solid, (M.P.184° C)

Composition: C (77.56%) H (7.53%) N (6.93%) O (7.97%)

IR spectra : (KBr)  $\nu_{\max}$  cm<sup>-1</sup>- 2965, 2858, 1650, 1599, 1434, 1228, 1117, 973,763, 702. <sup>1</sup>H-NMR (400 MHz, CDCl<sub>3</sub>,  $\delta$  ppm): 7.69 (d, *J* = 15.6 Hz, 1H), 7.52-7.51 (m, 2H), 7.37-7.36(m, 3H), 6.84 (d, *J* = 15.6 Hz, 1H), 3.72 (s, 8H). <sup>13</sup>C-NMR (100 MHz, CDCl<sub>3</sub>,  $\delta$  ppm): 165.5, 143.1, 135.1, 129.7, 128.8, 127.7, 116.6, 66.8 Mass: m/z (%): 217.0 (21) (M)<sup>+</sup>, 131.0 (100).

If). (2E)-3-(2-nitrophenyl)-1-(morpholin-1-yl)prop-2-en-1-one: Yellowish solid, (M.P.192° C)

Composition: = C (63.40%), H (5.73%), N (11.38%), O (19.49%)

IR spectra : (KBr)  $\nu_{\max}$  cm<sup>-1</sup>- 2945, 2852, 1656, 1590, 1444, 1230, 1110, 964,753. <sup>1</sup>H-NMR (400 MHz, CDCl<sub>3</sub>,  $\delta$  ppm): 7.62 (d, *J* = 16.5 Hz, 1H), 7.40-7.51 (m, 2H), 7.32-7.38 (m, 3H), 6.80 (d, *J* = 16.5 Hz, 1H), 3.64 (s, 8H). <sup>13</sup>C-NMR (100 MHz, CDCl<sub>3</sub>,  $\delta$  ppm): 162.8, 146.1,144, 134.6, 130, 128.9, 127.3, 121, 118.9, 66.3, 45.6

## Conclusions

The work described in this article follow the simple Wittig reaction mechanism and involves the use of Sodium Lauryl Sulphate (SLS)-H<sub>2</sub>O solvent system which gives the protocol of convenient and green synthesis. The reaction conditions may be employed for the synthesis of many other cinnamamides and related compounds.

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