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SYNTHESIS OF NOVEL ISOXAZOLIDINE VIA 1,3-DIPOLAR CYCLOADDITION OF α-CINNAMIC ARYL-N-ARYL NITRONE WITH CINNAMALDEHYDE CHALCONE

[1]M. Muthu Selvi,[2] S. V. Karthikeyan,[3] S. R. Jayapradha*

[1]PhD Research scholar, PG and Research Department of Chemistry, Government Arts College for Women, Nilakkottai-624 208. Affiliated to Mother Teresa Women's University, Kodaikanal.
[2]Assistant professor, PG and Research Department of Chemistry, The Madura College (Autonomous) Madurai - 625011.
[3]Associate Professor, PG and Research Department of Chemistry, Government Arts College for Women, Nilakkottai-624 208. Affiliated to Mother Teresa Women's University, Kodaikanal.

Tamil Nadu, India

Abstract : The 1,3-Dipolar cycloaddition of is the primary focus of our present investigation. Which result the novel heterocyclic system namely isoxazolidine. Here, dipole is cinnamaldehyde aryl-N-aryl nitrone, and dipolarophile is (4E)-1,5-diphenylpenta-2,4-dien-1-one. The 1,3-dipolar cycloaddition process (1,3-DC) is an effective method for integrating isoxazolidine into multifunctional structural wedges for the development of a variety of compound with heterocyclic structures in synthetic organics. Here are some examples of substituted chalcones that may be used as a create suitable dipolarophile to isoxazolidine using 1,3-dipolar cycloadditions. Which are characterized and used to validate the structure of the compounds using ^{13}C and ^{1}H NMR methods. In addition to the synthesis of isoxazolidine which are subjected to its biological assessment and the results are tabulated.

Keywords: Cycloaddition, Heterocyclic compounds, Nitrone and Antibacterial activity

I. INTRODUCTION

1,3-Dipolar cycloaddition reactions are among the most vital ways to build a five-membered ring of heterocyclic systems.[1,2] Mostly, nitrone cycloadditions are adaptable for the structure of five-membered N-O heterocycles. Nitrones are actual 1,3-dipoles, and they can undergo gladly cycloaddition with electron-deficient olefins to produce substituted isoxazolidine. They are adaptable intermediates for the synthesis of natural products and many biologically interesting molecules.[3] The synthesis of different sizes of heterocyclic structures is created through one of the most important methods of 1,3 cycloaddition.[4] Nitrones are one of the generally used dipoles for 1,3-dipolar cycloaddition reactions, as these are stable compounds. Compared to the other dipole, the nitrone has been easily handled and synthesized. The synthesis of highly substituted 5-membered heterocyclic isoxazolidine rings through one powerful method of 1,3-dipolar cycloaddition of nitrone with different dipolarophiles affords.[5-12] In organic synthesis, cycloaddition reactions occupy the superior place since they involve the instantaneous formation of some bonds and the formation of new stereogenic centers in frequently highly stereo-controlled manners.[13] A variety of isoxazolidine have been prepared through 1,3-dipolar nitrone cycloaddition to functionalized alkenes. Most often, the nitrone cycloadditions to alkenes progressed with high regioselectivity to produce isoxazolidine with three new attached stereogenic centers. Stereoselectivity appears to be prejudiced by both electronic and steric factors.[14] Herein, we would like to report the synthesis of some novel isoxazolidine with high yields in conventional methods using a 1,3-dipolar cycloaddition reaction with novel cinnamaldehyde nitrone and cinnamaldehyde chalcone in a short reaction time. Cinnamaldehyde, a natural product that can be extracted from a variety of plants, exhibits good biological activities, including antibacterial, antifungal, anti-inflammatory, and anticancer properties.[15] Though this product contains at least one isoxazolidine, it is anticipated to yield a bis-isoxazolidine compound. The nitrone of novel isoxazolidine was stimulating biological activities.

EXPERIMENTAL METHOD

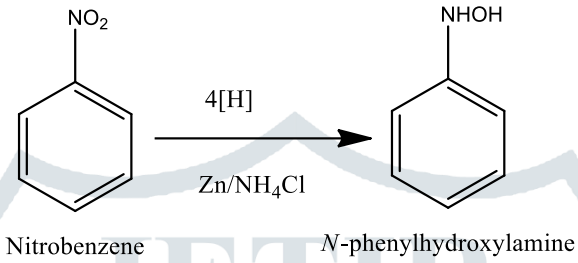
All chemical substances are of reagent-grade quality and can be used without supplementary distillation (Zn powder, Cinnamaldehyde, nitrobenzene, ammonium chloride, acetophenone, sodium hydroxide pellets, and ethanol). The Cinnamaldehyde nitrone was synthesized through the condensation method. It's remained for longer time periods. Silica gel plates have been used to observe the Cinnamaldehyde Nitrone reactions in the course of TLC. Chalcone was synthesized through stirring and

recrystallizing procedures. The synthesized nitrone and chalcone remain stable for a longer time. The conventional method is used to synthesize novel isoxazolidine derivatives. We have used Bruker NMR spectra to record the 1H NMR spectra results using CDCl3 as a solvent at 400 MHz and TMS (diluted tetramethylsilane) as an internal standard. The same instrument has been used to record ^{13}C NMR spectra at 100 MHz and the coupling constant (J) is shown in Hz.

GENERAL SYNTHESIS PROCEDURE

Synthesis of phenylhydroxylamine

A conical flask has been installed along with a mechanical stirrer and thermometer. Then, add the base chemicals of ammonium chloride (10g) in 320 ml of H_2O and 16.6 ml of nitrobenzene to the container and mix them well. In addition to the mixture, put in 23.6 g of Zn powder, which contains 90% purity, for 15 minutes. The amounts of addition could lead to swiftly increasing the temperature up to 60°–65°C. Then continue the stirring process for another 15 minutes until the temperature starts to drop.

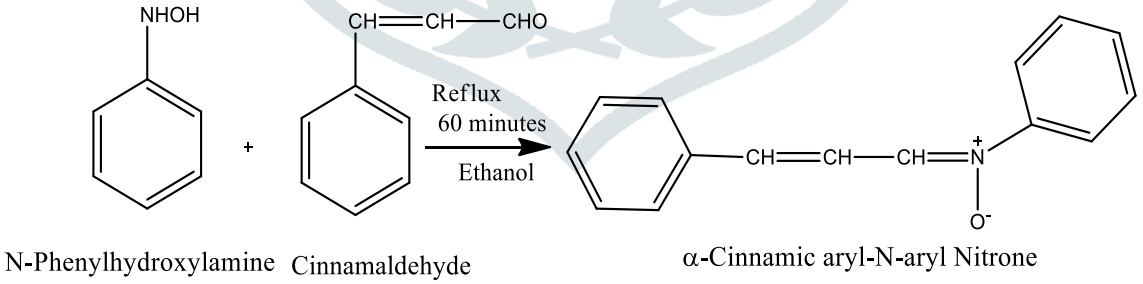


Scheme 2: Synthesis of N-phenylhydroxylamine

To remove the zinc oxide from the warm reaction mixture, Filter the pump and wash it with 100 ml of hot water. To make certain the maximum crystallization of the preferred product, place the remains in the conical flask, wet through the mixture with common salt (60 g), and cool it in an ice-cold bath for a minimum of one hour. Then, the pale-yellow crystals of phenyl hydroxyl amine were filtered with suction and drained well. Finally, the phenyl hydroxyl amine was synthesized as shown in Scheme 2.

SYNTHESIS OF α-CINNAMIC ARYL-N-ARYL NITRONE

At this temperature, a good yield of the product is obtained, and the temperature starts to drop. After adding the mixture of phenylhydroxylamine (0.1 mol, 10.9g) and cinnamaldehyde (0.1 m, 10.0 g) to the available ethanol, it refluxed for an hour at room temperature. The phenylhydroxylamine is used to create nitrones, which are synthetic intermediates, by condensation with the pure form of cinnamon aldehyde in ethanol at room temperature and in the dark. The development of basic cinnamaldehyde nitrone might benefit from it. After being cooled, it crystallized with solvents and became devoid of moisture. Ethanol was used to filter and recrystallized it. We have obtained pure synthetic nitrones through this process. Scheme 3 illustrates how Cinnamaldehyde nitrone was obtained in its pure form.



Scheme 3: Synthesis α-cinnamic aryl-N-aryl Nitrone

SYNTHESIS OF CHALCONE((4E)-1,5-DIPHENYL-2,4-DIEN-1-ONE)

Cinnamaldehyde (7 ml) and acetophenone (6 ml) are dissolved in 20 ml of ethanol. The pellets and equimolar NaOH (20 grams) were added simultaneously to this solution. After that, the reaction mixture was agitated for forty minutes. After agitating the mixture for 40 minutes at 40^0C, further ethanol was added. It was then cooled and diluted with cold water. The process outlined above is used to make the chalcone.

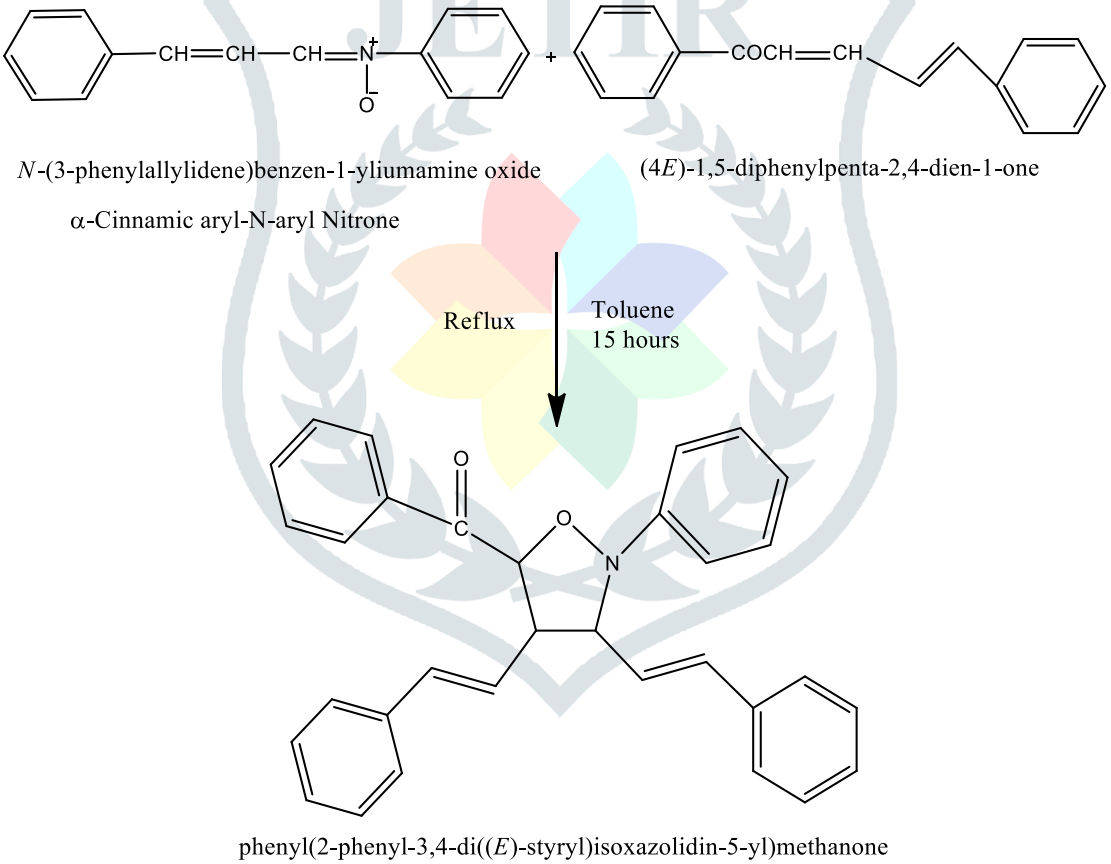
SYNTHESIS OF NOVEL ISOXAZOLIDINE

Cycloaddition of α-cinnamic aryl-n-aryl nitrone with (4E)-1,5-diphenyl-2,4-dien-1-one

The artificially produced Cinnamaldehyde Chalcone 2 [0.22g (0.01m)] and α-Cinnamic aryl-N-aryl nitrone 1 [0.223g (0.01m)] were refluxed for 8 to 10 hours in the presence of toluene to produce a mixture, and the TLC method was used to identify the intervals between the reaction conditions. Using ethyl acetate-pet ether (7:3) as an eluent, column chromatography is used to purify isoxazolidine chemical 3 before it is recrystallized. Scheme 1 illustrates the synthesis of isoxazolidine.

RESULTS AND DISCUSSION

It is very interesting to perform isoxazolidine synthesis by the cycloaddition of cinnamaldehyde nitrone as well as cinnamaldehyde chalcone. Nitrones are a constant component that are frequently employed in 1,3-dipolar cycloaddition as dipoles in our previous studies.[16] Cinnamaldehyde nitrone refluxed in toluene for 8-10hours. A high yield of substituted isoxazolidines is obtained through the (1,3-DC) reaction between α-cinnamic aryl-n-aryl nitrone and substituted (4E)-1,5-diphenyl-2,4-dien-1-one. After the completion of the reaction, the product is identified as isoxazolidine by the TLC and crude. NMR sample of the reaction mixture. After column chromatography is used to purify the products, the isoxazolidine of those products showed a single set of peaks in their ^{1}H and ^{13}C NMR spectra. The completion of the reaction and the achievement of a good yield (95%), as determined by TLC monitoring of the reaction mixture, required a duration of 18 hours. In the current context, isoxazolidine have been synthesized through the (1,3-DC) reaction of α-cinnamic aryl-n-aryl nitrone with (4E)-1,5-diphenyl-2,4-dien-1-one, which has biological interest. With the help of ^{1}H and ^{13}C NMR spectral data, the structure of the synthesized compounds is established. By combining substituted chalcone and nitrone, the 5-membered substituted isoxazolidine is achieved. When anticipated to produce a bis-isoxazolidine compound, however, this product contains at least one isoxazolidine. Nevertheless, the corresponding cycloadduct is a mixture of isoxazolidines when dipolarophile is cycloadditionally added to different types of chalcone. These Regio isomers are easily separated using NMR analysis in addition to column chromatography with silica gel. This procedure's breadth and universality are demonstrated with reference to different chalcones and modified nitrones. This seems like a very easy, quick, and innovative method.



N-(3-phenylallylidene)benzen-1-yliumamine oxide

α-Cinnamic aryl-N-aryl Nitrone

(4*E*)-1,5-diphenylpenta-2,4-dien-1-one

phenyl(2-phenyl-3,4-di((*E*)-styryl)isoxazolidin-5-yl)methanone

Scheme 1: Synthesis of isoxazolidine

Through the spectroscopic analysis of the ^{1}H and ^{13}C NMR spectra, the structures of all the cycloadducts were determined. The 5.94 (d, J = 51.3 Hz, 4H), 5.03 (s, 2H), and 3.62 (s, 2H) signals seen in the ^{1}H NMR spectra attest to the creation of the new isoxazolidine. The isoxazolidine ring is confirmed by UV absorption at 259 nm. Figure 2 displays the spectra in the FT-IR spectrum. It was observed that the C=O stretching vibration is responsible for the peak at approximately 1606 cm-1. The C=C bending vibration at ~713 cm-1 is shown by the peaks. The production of 3, which leads to the creation of the isoxazolidine ring system, is confirmed by these results.

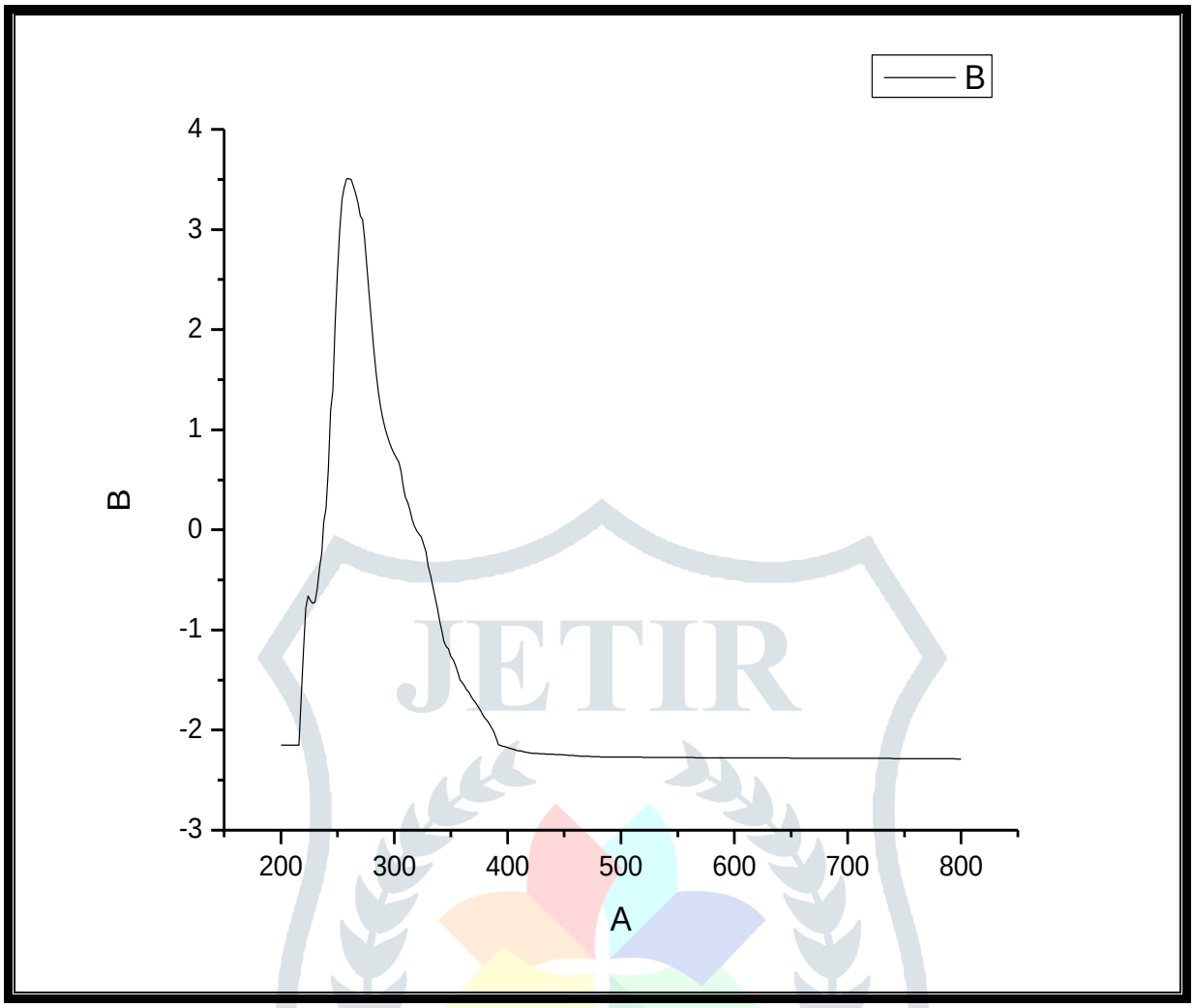


Figure 1: UV-Visible spectra of the synthesized novel isoxazolidine 3

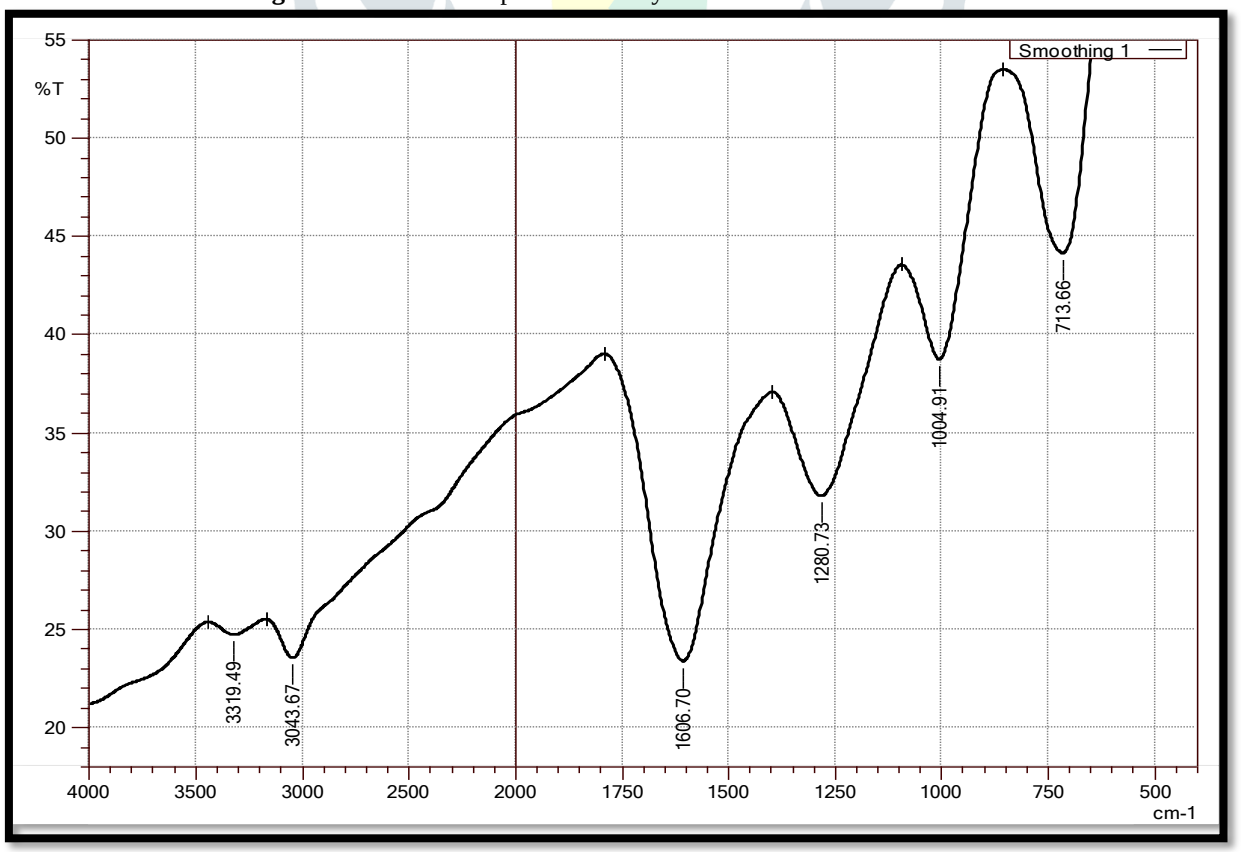


Figure 2: FT-IR spectra of the synthesized novel isoxazolidine 3

Table 1: Synthesis of novel isoxazolidine using different types of dipolarophiles

COMPOUND	R	TIME(h)	YIELD (%)
3a	**2-Cl**	**18**	**85**
3b	**4-Cl**	**18**	**87**
3c	**2-Br,4-Cl**	**20**	**90**
3d	**2-F**	**16**	**85**
3e	**2-NO_2**	**17**	**86**
3f	**4-OH,2-OCH_3**	**20**	**90**
3g	**2-CH_3**	**18**	**87**
3h	**4-NO_2**	**17**	**86**
3i	**4-OH**	**19**	**89**
3j	**2-OH**	**20**	**90**

Spectral data of phenyl(2-phenyl-3,4-di((E)-styryl)isoxazolidin-5-yl)methanone

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.92 – 7.80 (m, 4H), 7.44 (s, 2H), 7.40 – 7.35 (m, 4H), 7.35 – 7.24 (m, 15H), 7.20 (d, *J* = 2.3 Hz, 5H), 7.17 – 7.11 (m, 4H), 6.87 – 6.50 (m, 10H), 5.94 (d, *J* = 51.3 Hz, 4H), 5.03 (s, 2H), 3.62 (s, 2H), 2.74 (s, 2H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 194.83 (s), 147.03 (s), 137.50 (s), 136.85 – 136.64 (m), 134.97 (s), 133.68 (s), 133.26 (s), 130.98 (s), 129.27 – 129.01 (m), 128.87 – 128.67 (m), 128.67 – 128.47 (m), 128.35 – 127.93 (m), 127.66 – 127.45 (m), 122.33 (s), 116.39 – 116.00 (m), 84.69 (s), 71.71 (s), 50.82 (s).

Spectral data of (4-((E)-2-chlorostyryl)-2-phenyl-3-((E)-styryl)isoxazolidin-5yl)(phenyl)methanone

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.95 – 7.82 (m, 2H), 7.44 (s, 1H), 7.40 – 7.35 (m, 2H), 7.35 – 7.29 (m, 2H), 7.26 (dd, *J* = 10.2, 2.0 Hz, 4H), 7.20 – 7.08 (m, 5H), 6.87 (s, 1H), 6.77 (s, 1H), 6.72 – 6.57 (m, 3H), 6.03 (s, 1H), 5.69 (s, 1H), 5.03 (s, 1H), 3.62 (s, 1H), 2.74 (s, 1H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 194.83 (s), 147.03 (s), 137.50 (s), 136.75 (s), 133.68 (s), 133.45 (s), 133.26 (s), 132.66 (s), 131.17 (d, *J* = 3.3 Hz), 130.98 (s), 129.43 (s), 129.27 – 129.01 (m), 128.76 (s), 128.67 – 128.47 (m), 128.30 – 127.93 (m), 127.57 (t, *J* = 2.8 Hz), 124.73 (s), 122.33 (s), 116.39 – 116.00 (m), 84.69 (s), 71.71 (s), 50.82 (s).

Spectral data of (4-((E)-4-chlorostyryl)-2-phenyl-3-((E)-styryl)isoxazolidin-5yl)(phenyl)methanone

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.88 – 7.76 (m, 2H), 7.43 (s, 1H), 7.37 – 7.18 (m, 11H), 7.18 – 7.12 (m, 2H), 6.68 (s, 1H), 6.64 (s, 1H), 6.61 – 6.52 (m, 2H), 6.48 (s, 1H), 5.98 (s, 1H), 5.84 (s, 1H), 4.41 (s, 1H), 3.62 (s, 1H), 2.74 (s, 1H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 194.83 (s), 147.03 (s), 137.50 (s), 136.75 (s), 135.95 (s), 134.97 (s), 134.72 (s), 133.68 (s), 133.26 (s), 130.98 (s), 129.62 – 129.26 (m), 129.26 – 129.01 (m), 128.76 (s), 128.67 – 128.41 (m), 128.35 – 127.93 (m), 127.66 – 127.45 (m), 122.33 (s), 116.39 – 116.00 (m), 84.69 (s), 71.71 (s), 50.82 (s).

Spectral data of (2-bromophenyl)(4-((E)-4-chlorostyryl)-2-phenyl-3-((E)-styryl)isoxazolidin-5yl)(phenyl)methanone

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.61 (s, 1H), 7.47 (s, 1H), 7.38 – 7.16 (m, 11H), 7.16 – 7.10 (m, 2H), 6.97 – 6.52 (m, 4H), 6.43 (s, 1H), 6.01 (d, *J* = 15.6 Hz, 2H), 5.03 (s, 1H), 3.62 (s, 1H), 2.74 (s, 1H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 194.74 (s), 147.03 (s), 139.04 (s), 137.50 (s), 136.75 (s), 135.95 (s), 134.97 (s), 134.72 (s), 133.91 (s), 131.73 (s), 130.98 (s), 129.62 – 129.22 (m), 129.22 – 129.02 (m), 128.93 (s), 128.76 (s), 128.63 – 128.41 (m), 128.35 – 128.02 (m), 127.66 – 127.47 (m), 127.33 (s), 123.08 (s), 122.33 (s), 116.39 – 116.00 (m), 84.51 (s), 71.71 (s), 50.82 (s).

Spectral data of (2-fluorophenyl)(2-phenyl-3,4-di((E)-styryl)isoxazolidin-5yl)(phenyl)methanone

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.81 (s, 32H), 7.44 (d, *J* = 1.4 Hz, 4H), 7.44 – 7.35 (m, 96H), 7.34 – 7.25 (m, 162H), 7.24 (s, 37H), 7.20 (dd, *J* = 2.7, 1.4 Hz, 25H), 7.19 – 7.08 (m, 178H), 6.67 (d, *J* = 4.0 Hz, 64H), 6.59 (t, *J* = 9.4 Hz, 102H), 6.04 (s, 34H), 5.89 (s, 33H), 5.03 (s, 33H), 3.62 (s, 33H), 2.74 (s, 33H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 192.65 (s), 160.91 (s), 147.03 (s), 137.50 (s), 136.85 – 136.64 (m), 135.98 (s), 134.97 (s), 130.98 (s), 129.98 (s), 129.22 – 129.01 (m), 128.87 – 128.66 (m), 128.35 – 128.02 (m), 127.66 – 127.45 (m), 125.25 (s), 122.33 (s), 121.23 (s), 116.82 (s), 116.26 – 116.00 (m), 84.51 (s), 71.71 (s), 50.82 (s).

Spectral data of (4-((E)-2-nitrostyryl-2-phenyl-3-((E)-styryl)isoxazolidin-5yl)(phenyl)methanone

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.18 – 8.04 (m, 6H), 7.88 – 7.75 (m, 6H), 7.58 – 7.42 (m, 9H), 7.39 – 7.29 (m, 12H), 7.29 – 7.23 (m, 6H), 7.19 (s, 3H), 7.17 – 7.11 (m, 6H), 6.74 (d, *J* = 73.9 Hz, 8H), 6.67 (s, 4H), 6.67 – 6.53 (m, 11H), 6.07 (d, *J* = 55.8 Hz, 5H), 5.99 (s, 1H), 5.03 (s, 3H), 3.62 (s, 3H), 2.74 (s, 2H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 194.83 (s), 147.50 (s), 147.03 (s), 142.97 (s), 137.50 (s), 136.75 (s), 134.97 (s), 133.68 (s), 133.26 (s), 130.98 (s), 129.27 – 129.01 (m), 128.76 (s), 128.67 – 128.35 (m), 128.35 – 127.93 (m), 127.66 – 127.45 (m), 124.76 – 124.54 (m), 122.33 (s), 116.39 – 116.00 (m), 84.69 (s), 71.71 (s), 50.82 (s).

Spectral data of (4-((E)-4-hydroxy-2-methoxystyryl)-2-phenyl-3-((E)-styryl)isoxazolidin-5yl)(phenyl)methanone

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.93 – 7.81 (m, 4H), 7.43 (s, 2H), 7.39 – 7.30 (m, 8H), 7.28 – 7.22 (m, 4H), 7.20 – 7.04 (m, 8H), 6.68 – 6.55 (m, 5H), 6.97 – 6.34 (m, 14H), 6.68 – 6.34 (m, 9H), 6.40 (d, *J* = 16.5 Hz, 4H), 6.02 (s, 2H), 5.64 (s, 2H), 5.03 (s, 2H), 4.13 (s, 2H), 3.85 – 3.81 (m, 6H), 3.62 (s, 2H), 2.74 (s, 2H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 194.83 (s), 159.25 (d, *J* = 9.6 Hz), 147.03 (s), 137.50 (s), 136.75 (s), 133.68 (s), 133.26 (s), 130.98 (s), 130.21 (s), 129.27 – 129.01 (m), 128.76 (s), 128.67 – 128.40 (m), 128.33 – 127.93 (m), 127.66 – 127.45 (m), 126.20 (s), 122.33 (s), 118.85 (s), 116.39 – 116.00 (m), 109.80 (s), 101.04 (s), 84.69 (s), 71.71 (s), 56.79 (s), 50.82 (s).

Spectral data of (2-phenyl-3,4-di((E)-styryl)isoxazolidin-5-yl)(o-tolyl)methanone

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.70 (s, 1H), 7.39 – 7.13 (m, 15H), 6.69 (s, 1H), 6.62 (t, *J* = 5.9 Hz, 3H), 6.43 (s, 1H), 5.97 (d, *J* = 49.3 Hz, 2H), 5.03 (s, 1H), 3.62 (s, 1H), 2.74 (s, 1H), 2.42 – 2.38 (m, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 197.39 (s), 147.03 (s), 140.34 (s), 137.50 (s), 136.85 – 136.64 (m), 134.97 (s), 134.46 (s), 132.92 (s), 131.74 (s), 130.98 (s), 129.31 (s), 129.20 – 129.01 (m), 128.87 – 128.66 (m), 128.35 – 128.02 (m), 127.55 (dt, *J* = 5.7, 2.9 Hz), 122.33 (s), 116.39 – 116.00 (m), 84.51 (s), 71.71 (s), 50.82 (s), 20.24 (s).

Spectral data of (4-((E)-4-nitrostyryl-2-phenyl-3-((E)-styryl)isoxazolidin-5yl)(phenyl)methanone

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.18 – 8.04 (m, 6H), 7.88 – 7.75 (m, 6H), 7.58 – 7.42 (m, 9H), 7.39 – 7.29 (m, 12H), 7.29 – 7.23 (m, 6H), 7.19 (s, 3H), 7.17 – 7.11 (m, 6H), 6.74 (d, *J* = 73.9 Hz, 8H), 6.67 (s, 4H), 6.67 – 6.53 (m, 11H), 6.07 (d, *J* = 55.8 Hz, 5H), 5.99 (s, 1H), 5.03 (s, 3H), 3.62 (s, 3H), 2.74 (s, 2H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 194.83 (s), 146.96 (d, *J* = 16.6 Hz), 137.50 (s), 136.75 (s), 133.68 (s), 133.34 (d, *J* = 19.5 Hz), 131.26 (s), 130.98 (s), 130.63 (s), 130.19 (s), 129.74 (s), 129.27 – 129.01 (m), 128.76 (s), 128.67 – 128.34 (m), 128.33 – 127.93 (m), 127.66 – 127.45 (m), 125.33 (s), 122.33 (s), 116.39 – 116.00 (m), 84.69 (s), 71.71 (s), 50.82 (s).

Spectral data of (4-((E)-4-hydroxystyryl-2-phenyl-3-((E)-styryl)isoxazolidine-5yl)(phenyl)methanone

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.93 – 7.81 (m, 8H), 7.44 (s, 4H), 7.40 – 7.35 (m, 8H), 7.35 – 7.24 (m, 14H), 7.24 (s, 2H), 7.21 – 7.12 (m, 20H), 6.81 – 6.72 (m, 8H), 6.68 (d, *J* = 8.8 Hz, 8H), 6.60 (t, *J* = 4.1 Hz, 12H), 6.00 (s, 3H), 5.86 (s, 5H), 5.03 (s, 4H), 3.97 (s, 4H), 3.62 (s, 4H), 2.74 (s, 4H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 194.83 (s), 158.47 (s), 147.03 (s), 137.50 (s), 136.75 (s), 134.97 (s), 133.68 (s), 133.26 (s), 130.98 (s), 129.57 – 129.23 (m), 129.23 – 129.01 (m), 128.76 (s), 128.67 – 128.48 (m), 128.39 (s), 128.30 – 127.93 (m), 127.66 – 127.45 (m), 122.33 (s), 116.40 (s), 116.39 – 116.00 (m), 84.69 (s), 71.71 (s), 50.82 (s).

Spectral data of (4-((E)-2-hydroxystyryl-2-phenyl-3-((E)-styryl)isoxazolidin-5yl)(phenyl)methanone

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.95 – 7.82 (m, 2H), 7.44 (s, 1H), 7.40 – 7.34 (m, 2H), 7.34 – 7.25 (m, 3H), 7.25 – 7.23 (m, 1H), 7.18 (t, *J* = 5.0 Hz, 3H), 6.69 (d, *J* = 8.1 Hz, 2H), 6.65 – 6.59 (m, 2H), 6.49 (s, 1H), 6.39 (s, 1H), 6.34 (s, 1H), 6.02 (s, 1H), 5.54 (s, 1H), 5.10 (s, 1H), 5.04 (d, *J* = 13.2 Hz, 2H), 4.05 – 4.01 (m, 2H), 3.62 (s, 1H), 2.74 (s, 1H), 0.52 (s, 1H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 194.83 (s), 156.32 (s), 147.03 (s), 137.50 (s), 136.75 (s), 133.68 (s), 133.26 (s), 130.98 (s), 130.67 (s), 129.27 – 129.01 (m), 128.64 (dd, *J* = 14.1, 8.9 Hz), 128.27 – 127.93 (m), 127.66 – 127.45 (m), 124.79 (s), 122.33 (d, *J* = 0.5 Hz), 120.83 (s), 117.57 (s), 116.39 – 116.00 (m), 84.69 (s), 71.71 (s), 50.82 (s).

Antibacterial activity

To evaluate the antibacterial activities of the synthesized isoxazolidine compound 3 against four bacterial strains, agar was used and cultivated for 48 hours at 25°C (Table 3). For bacteria to thrive on agar plates, a dimethyl sulfoxide (DMSO) solution containing 20 milligrams of the material was sufficient.[17, 18] As demonstrated in Figure 3, specific species containing gram-positive bacteria like Staphylococcus aureus (22 mm) and Staphylococcus epidermidis (08 mm) and gram-negative bacteria like Escherichia coli (12 mm) and Klebsiella oxytoca (10 mm) dilutions of 100 µL include isoxazolidine compound 3.

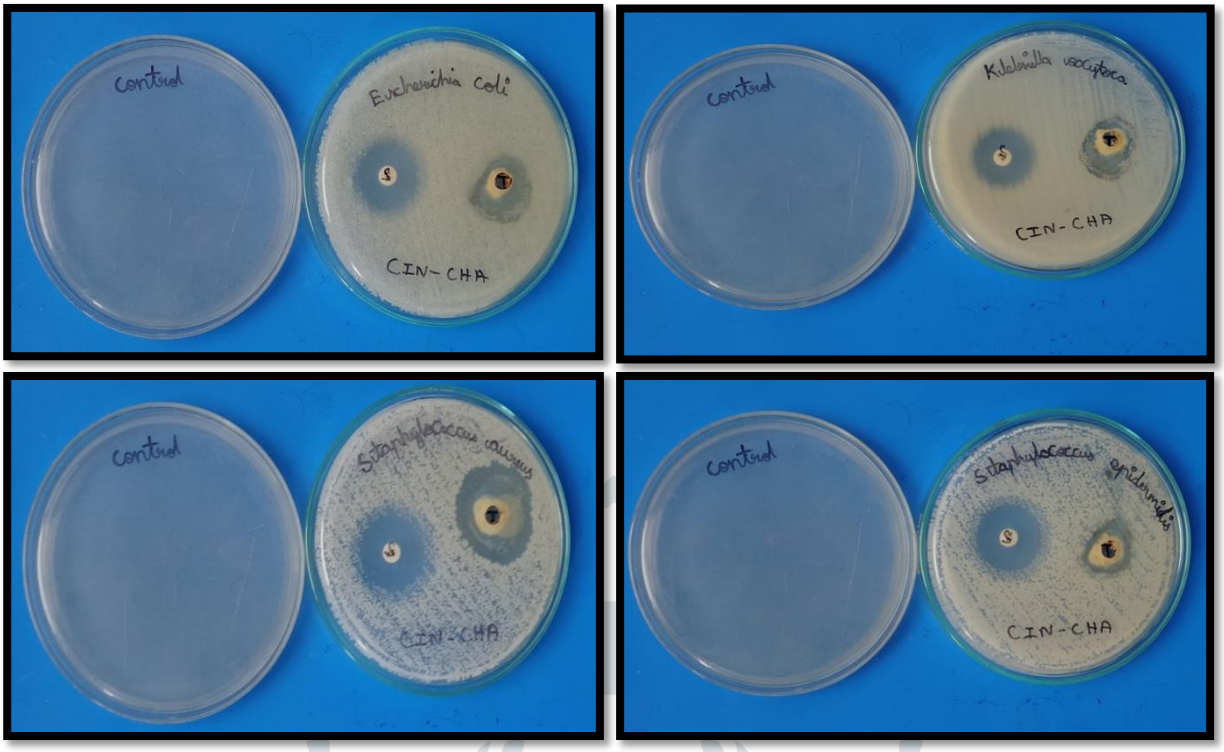


Figure 3: Escherichia coli, Klebsiellaoxytoca, Staphylococcus aureus and Staphylococcus epidermidis of **phenyl(2-phenyl-3,4-di((E)-styryl)isoxazolidin-5-yl)methanone**

Table 3:Organisms and values of **phenyl(2-phenyl-3,4-di((E)-styryl)isoxazolidin-5-yl)methanone**

SL.NO	ORGANISM NAME	GRAM POSITIVE OR NEGAYIVE BACTERIA	STANDARD DISC	TEST	DILUTION
1	*Escherichia coli*	Gram negative	AK-18mm	12mm	100µl
2	*Klebsiellaoxytoca*	Gram negative	AK-18mm	10mm	100µl
3	*Staphylococcus aureus*	Gram positive	AK-18mm	22mm	100µl
4	*Staphylococcus epidermidis*	Gram positive	AK-18mm	08mm	100µl

CONCLUSION

With reference to the above study we have been confirming that acknowledged a excellent vintage of novel isoxazolidine compound through the (1,3-DC) reaction & establishing the general methodology applicable to the synthesis of cinnamaldehyde nitrone like highly substituted different chalcone. Confirmation of substituent's effect of the chalcone has also been analysed. The novel isoxazolidine structure construction has been confirmed through antimicrobial studies and ^{1}H NMR, ^{13}C NMR spectra.

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