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Article

A Study on Microwave Preparation and Stability of Some Organic Reagent Derivatives of 2- (2,3 Dimethyl Phenylamino) Benzoic Acid in Light and Darkness

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Abstract: Microwave-assisted chemistry has attracted much interest as a new tool in green chemistry with regard to its efficiency, energy saving, and environmental friendliness. Separating the present invention is known to increase the speed of organic synthesis, providing tremendous benefits over the old-fashioned techniques. The use of microwave irradiation as an alternative to classical heating methods for the synthesis of organic derivatives has received increasing attention in particular the synthesis of substituted and derivatives of 2-(2,3 dimethyl phenylamino) benzoic acid which are important for their pharmaceutical applications due to a wide range of biological activity. Microwave-assisted synthesis has been demonstrated to be an efficient method for improving the reaction process, however, the stability of these compounds in different conditions, especially under light and dark, have not yet been investigated. Moreover, this gap in knowledge restricts the generalisation of these methods to industrial processes. Abstract: In this study, we derive organic reagents from 2-(2,3 dimethyl phenylamino) benzoic acid under microwave radiation which are both stable in solution and high performing over a range of environmental conditions. The compounds were synthesized from the solvents free, green method, and then characterization was done using UV-Vis, IR, and NMR spectroscopy. Reagent stability was also evaluated, demonstrating a high stability of reagents in the light and dark with some compounds exhibiting increased stability from the effect of a blocking group. It fills important informational gaps in the literature and provides new details on the stability and environmental behavior of organic reagents that are synthesized by microwave. The results highlight microwave-assisted methods as effective, scalable synthetic techniques for generating organic compounds that are thermally stable and produced in high yields, with important implications for sustainable chemical processes in research and industry.

Keywords: Green reaction, Microwave, Stability, Triazole, Thiazolidinone

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1. Introduction

Microwave-assisted chemistry has become increasingly important in the last few years as a clean, rapid, and inexpensive alternative methodology in organic synthesis. Using this method, the preparation of organic reagents has become completely different and this approach has shown remarkable superiority over conventional heating process [1]. Microwave radiation can be employed in organic synthesis, as it selectively excites polar bonds, allowing for faster, cleaner and more efficient processes and thus reducing the consumption of energy. This includes a novel rational application of microwave irradiation for the preparation of organic derivatives from 2-(2,3 dimethyl phenylamino) benzoic acid. A key aspect that has not yet been explored in the literature on microwave-

assisted organic synthesis is the efficiency and stability of these compounds over a range of conditions and this study addresses this fundamental issue [2].

Microwaves are known for accelerating reactions and improving yields and have previously, effectively applied to preparation of functional organic compounds like triazoles and thiazolidinones. We have been proven that microwave increase reaction rates and also decrease reaction times. To the best of our knowledge, the studies by Polshettiwar and Ali have shown that microwave-assisted synthesis is an efficient method for the preparation of high-quality organic compounds with better yields and purity [3]. Despite the extensive investigation of microwave-assisted preparation of diverse organic reagents, their stability and behavior in environmental conditions are still poorly understood. This lack of existing knowledge encourages the analysing of microwave-synthesised reagents in terms of their stability both in light and dark and also the applications in which they could potentially be entered into many industries.

We are specifically interested in the stability of the organic reagents imprinted from 2-(2,3 dimethyl phenylamino) benzoic acid, and their performance under light and dark conditions. Microwave-synthesized compounds were applied for stability testing through time-related analysis of absorption properties. Method – The method uses greener, solvent free synthesis of different derivatives, further the fully characterized derivative by UV-Visible, IR and NMR. This method helps to understand the efficiency of microwave-assisted synthesis while being in the situation of the potential environment benefits for employing such methods during organic synthesis [4].

This study is expected to produce stable organic reagents with excellent yields and strong stability under different environmental conditions. The results are intended to illustrate the benefits of microwave-assisted organic synthesis over larger feedstock quantities. This work must additionally gain valuable information regarding the structural features in the reagents that can permit the construction of greater sustainable and environmentally friendly chemical methodologies [5].

This paper fills some obvious gaps in the literature by thoroughly investigating microwave-assisted preparation, stability and characterization of few organic reagents based on 2-(2,3 dimethyl phenylamino) benzoic acid. Our study would explore this actual potential from the angle of the microwave-assisted organic syntheses, and not only contribute to more practical microwave-assisted organic syntheses, but also providing implications on the sustainable chemical processes and perspectives toward the green chemistry [6].

2. Materials and Methods

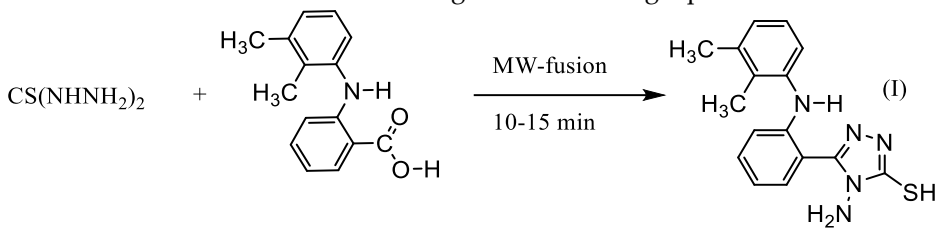
Materials and Methods

Electro Thermal 9300 was used to measure the melting point, which did not achieve corrected values. The absorption values (λmax) were recorded from the Jascow32 (UV-Visible) Spectrophotometer V-500, Scale (200-800) nm. While IR spectroscopy was recorded with FTIR spectrophotometer 8400 S, Shimadzu Corporation, with KBr disks with a scope of (4000-400) cm-1, NMR spectra of 1H-NMR, and 13C-NMR measurements, which were performed using 1H-NMR Ultra shield recorded on 500 MHz Bruker, using DMSO with TMS as an internal reference. The Micro-radiation ranged between 400-480 w, which was gained from microwave oven. Thin film photocopy TLC silicagel, fluorocent (1.2) mm and iodization were materials used directly without re-crystallization, equipped by companies of Merck, Fluka, Aldrich and BDH [7][8].

Preparation of Derived Amino of 1,2,4 -Triazole with Microwave Radiation [I] (10)

Radiation was performed on a mixture of 1,3 Diamino-2-thiourea and 2- (2,3-Dichathyl Phenylamino) by mixing (1:1) moles in microwave oven at 400 watts and at melting point for (10-15) minutes with pause for (1) min per (5) minutes. The output was obtained and then was left to cool at room temperature. After that, it was mixed with aqueous solution of crystallization with 10% of sodium bicarbonate. Then, the crystallized precipitate was collected and washed with distilled water; and its crystallization of

absolute ethanol was reconstituted according to the following equation:



Preparation of Amino-Arylidines of 1,2,4-Triazole with Microwave Radiation [II1-10] (11)

About (0.02 g, 0.002 m) of compound [I] was mixed with 0.002 mol of benzaldehyde derivatives with a drop of glacial acetic acid in a heat-resistant glass vial with stirring until homogenization. Then, it was mixed in microwave oven and irradiated for (10-12) minutes at 400 watts [9]. Next, the output was obtained and left to cool at room temperature. The product was collected and recrystallized from ethanol, see Table 1.

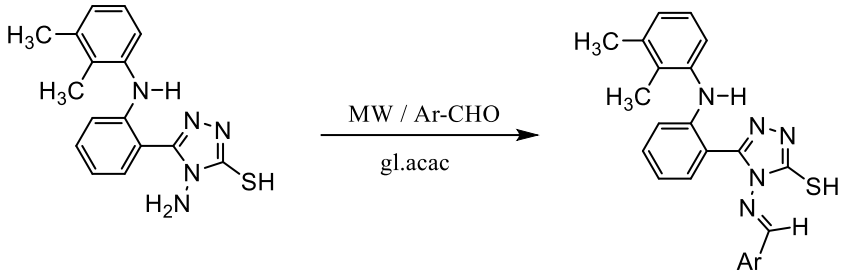


Table 1. Some physical properties of prepared arylidinamino 1,2,4-triazoles [II1-10]

Comp. No.	SubstituteAr2	Molecular Formula Molecular Weight	M.P ºC	Color	Yield (%)	Cryst. Sol.
I_1	H	$C_{23}H_{21}N_5S$ 399.35	144 -146	Dark Brown	78	MeOH
I_2	4-OH	$C_{23}H_{21}N_5SO$ 415.35	166 – 168	Poor White	90	MeOH
I_3	2,4,di OH	$C_{23}H_{21}N_5SO_2$ 431.35	93-95	Green yellow	93	EtOH
I_4	2-OH 5-Cl	$C_{23}H_{20}N_5SOCl$ 449.45	122 - 124	Orange	83	MeOH
I_5	4- Cl	$C_{23}H_{20}N_5SCl$ 433.45	171 - 173	Red	85	EtOH
I_6	4-Br	$C_{23}H_{20}N_5SBr$ 477.90	180 - 182	Dark Brown	90	MeOH
I_7	4-$N(CH_3)_2$	$C_{25}H_{20}N_6S$ 422.38	195 - 197	Brown	75	MeOH
I_8	4-NH_2	$C_{23}H_{22}N_6S$ 414.36	188- 190	Red	88	MeOH
I_9	2-NO_2	$C_{23}H_{20}N_6SO_2$ 444.36	174-176	Brown	92	MeOH
I_{10}	4-NO_2	$C_{23}H_{20}N_6SO_2$ 444.36	174-176	Brown	93	MeOH

Preparation of Thiazolidinones in the Microwave [III 1-10] (12)

About (0.002 ml, 0.7 ml) of 2-mercapto acetic acid was mixed with (0.002 mol) of compounds [II1-11] with drops of dry dioxan until formed as a soft paste. Then, (0.002g) of anhydrous zinc chloride was added with stirring [10][11]. After that, micro-radiation was performed on the mixture for (10-12) minutes at 400 watts. Then, the mixture was left to cool, and then washed with a cold solution of bicarbonate. The precipitate was filtered

and recrystallized with an appropriate solvent. Table 2 shows some physical properties of the prepared compounds.

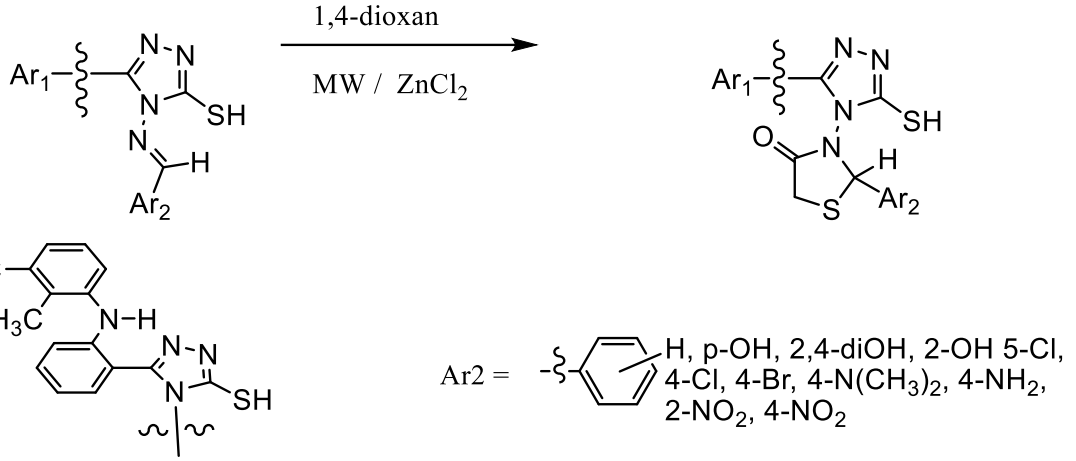


Table 2. Some physical properties of prepared thiazolidinones[III1-10]

Comp. No.	Substitute A1	Molecular Formula	M.P ºC	Color	Yield(%)	Cryst. Sol.
III_1	H	$C_{25}H_{23}N_5OS$	179 - 181	Brown	66	EtOH
III_2	4-OH	$C_{25}H_{23}N_5SO_2$	166- 168	red	73	EtOH
III_3	2,4,di OH	$C_{25}H_{23}N_5SO_3$	193- 195	Yellow	63	MeOH
III_4	2-OH, 5-Cl	$C_{25}H_{22}N_5OS_2Cl$	182- 184	Yellow	56	EtOH
III_5	4- Cl	$C_{25}H_{22}N_5OS_2Cl$	149- 151	Brown	81	MeOH
III_6	4-Br	$C_{25}H_{22}N_5OS_2Br$	172- 174	Purple	68	MeOH
III_7	4-N$(CH_3)_2$	$C_{27}H_{28}N_6OS_2$	198 - 200	Yellow	55	EtOH
III_8	4-NH_2	$C_{25}H_{24}N_6OS_2$	159-161	Light Red	74	EtOH
III_9	2-NO_2	$C_{25}H_{22}N_6O_3S_2$	194- 196	red	89	EtOH
III_{10}	4-NO_2	$C_{25}H_{22}N_6O_3S_2$	190- 192	red	78	EtOH

Preparation of Solutions

Solution of Organic Prepared Reagents [II1-10] (13)

The reagent solution was prepared at a concentration of3-10 molar by dissolving the appropriate amount (as illustrated in table 3) in 100 ml of aqueous solution of sodium hydroxide 0.1 N; and then the volume was completed using distilled water in a 500 ml volumetric flask [12]. The pH of the reagent solution measurement is shown in table 3.

Table 3. Weights and Acidity of Solutions 3-10 molar for Prepared Reagents (II1-10)

Comp. No.	pH	Used weights
II_1	11.50	0.199
II_2	9.78	0.207
II_3	9.82	0.215
II_4	9.90	0.224
II_5	10.53	0.216
II_6	11.20	0.238
II_7	11.06	0.221
II_8	11.01	0.207
II_9	10.30	0.222
II_{10}	10.19	0.222

Sodium Hydroxide Solution

Sodium hydroxide solution was prepared with an approximate concentration of 0.1 N. This was done by dissolving 2 g of NaOH in the boiled and cooled distilled water (to expel CO2) in a 500 ml flask to the marked limit [13].

Determination of the λmax Value of Reagents

The wavelength was adopted at the maximum absorption value in the UV-Vis area at a concentration of 5-10×8 molar.

The Stability of Reagents

The stability of reagents was examined by taking 2 ml of the solution of each reagent [II1-10] at a concentration of 10-3 molar. Then, they were diluted with distilled water in a 25 ml volume vial till the mark to give the final concentration. The measurement of absorption was performed at different times (5, 10, 15, 20, 25, 30 minutes and 24 hours) in light and dark. The Blanc solution is made by taking 2 ml of solvent (0.1 N, NaOH). After that, it was diluted with distilled water in a 25 ml volume bottle till the mark [14].

3. Results and Discussion

IR spectra of compound [I]

It showed the main stretching peaks for C=C, C=N, S-H, C-H, ArC-H, NH2, NH, which were (1566, 1496) 1651, 2637, (2853, 2918) 3071, 3344, 3371, 3478 cm 1-. In addition, the C-N stretch was at 1239 cm 1-. This result was identical to the study [15], see figure 1.

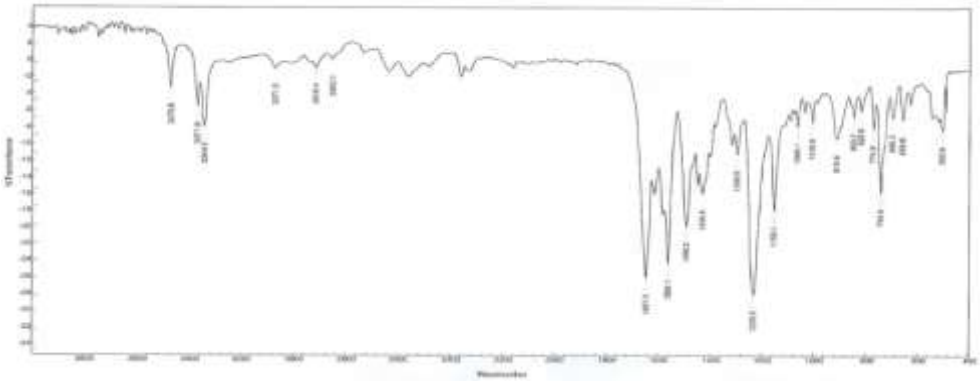


Figure 1. IR spectra of compound [I]

1H-NMR spectrum of compound [I]

It showed signals at locations 2.08(s) 2.28(s), 3.34(s), 5.34(s), 7.88-6.68(m), 9.42(s) ppm, to protons diCH3, S-H, NH2, ArC-H, NH, respectively. This result was consistent with the study [16], see figure 2.

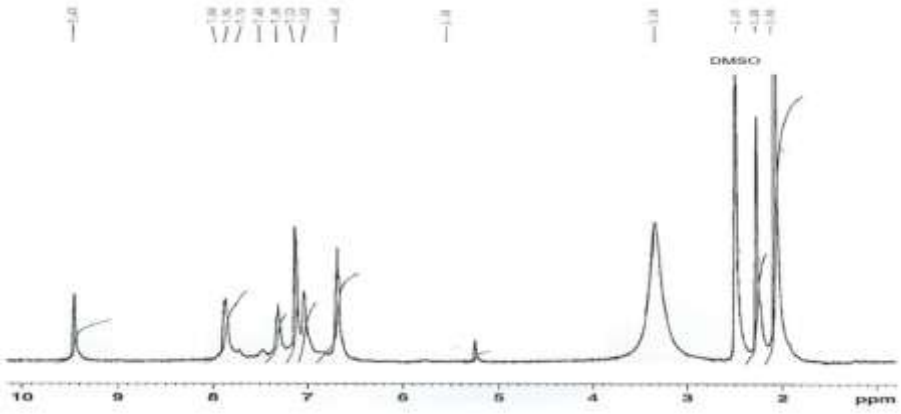


Figure 2. 1H-NMR spectrum of compound [I]

13C-NMR spectrum of compound [I]

It showed two signals at 20.71, 14.14 ppm attributed to carbon of diCH3 groups; (40.57-39.47) ppm attributed to the solvent DMSO- d6; (111.79-147.29) ppm attributed to the aromatic carbons at 151.69 ppm related to the carbonate (CN) and a signal at 167.14 ppm attributed to the C-S, see Figure 3 [17].

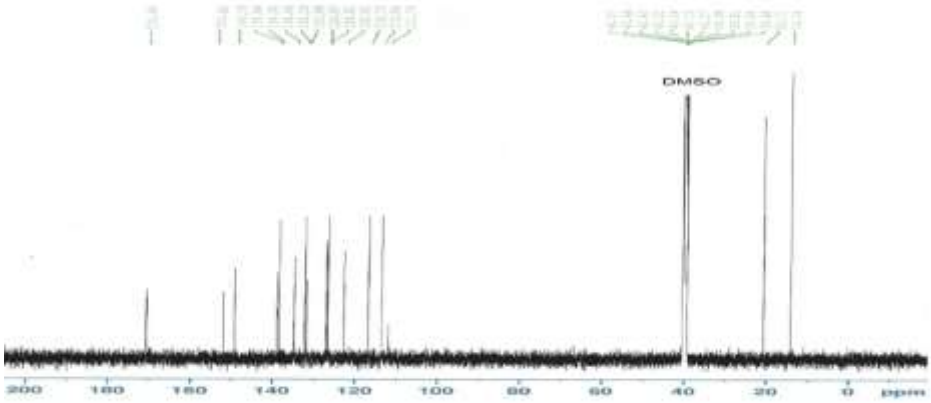
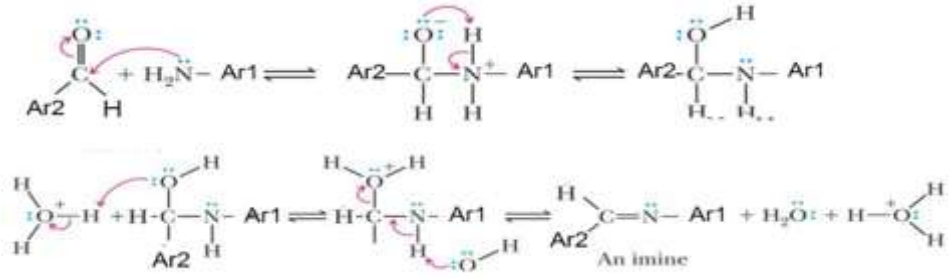


Figure 3. 13C- NMR spectrum of the compound [I]

Preparation of prepared arylidines of amino 1,2,4 - triazole [II1-10]

The imines [II1-10] from the reaction of amino 1,2,4-triazole [I] with the appropriate aldehydes in the micro-smelting method are presented without solvent according to the following general method [18]:



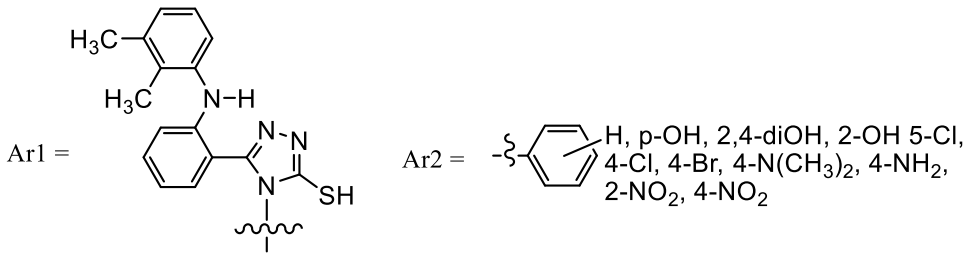


Table 4. Infrared data for compounds [II1-10]

Comp No.	IR ν (cm^{-1})						
	OH	N-H	Ar –H	C-H	S-H	C=N	C=C
II_1	-----	3308 m))	3071 w))	2921 2728(m)	2641 (m)	1647 (s)	1573 (s)
II_2	3550 br))	3344 (m)	3049 (w)	2961(w) 2791	2644 (w)	1649 (s)	1575 (s)
II_3	3476 (br)	3443 (m)	3018 (w)	2984(m) 2887	2638 (m)	1646 (s)	1593 (s)
II_4	3561 (br)	3440 (m)	3001 (w)	2934(m) 2876	2632 (m)	1644 (s)	1584 (s)

II_5	-----	3443 (m)	3050 (w)	2918(w) 2856	2637 (w)	1649 (s)	1566 (s)
II_6	-----	3344 (m)	3005 (w)	2867 (m)	2638 (m)	1650 (s)	1567 (s)
II_7	----	3307 (m)	3010 (w)	2858(m) 2788	2640 (w)	1645 (s)	1573 (s)
II_8	----	3441 (m)	3045 (m)	2993(w) 2891	2642 (m)	1649 (s)	1573 (s)
II_9	----	3446 (m)	3004 (w)	2931(m) 2869	2636 (w)	1650 (s)	1589 (s)
II_{10}	----	3444 (m)	3051 (w)	2978(m) 2876	2639 (m)	1656 (s)	1581 (m)

Infrared spectra of compounds [II1-10]

Infrared spectra of the imines were shown in the bands C = C, C = N, SH, CH, ArC-H, NH, OH which appeared within ranges (1566-1593, 1644-1656, 2632-2644, 2728-2993, 3001-3071, 3307-3446, 3476-3561) cm-1, respectively. This result was identical to the work, see Table 4 and Figures 4-6.

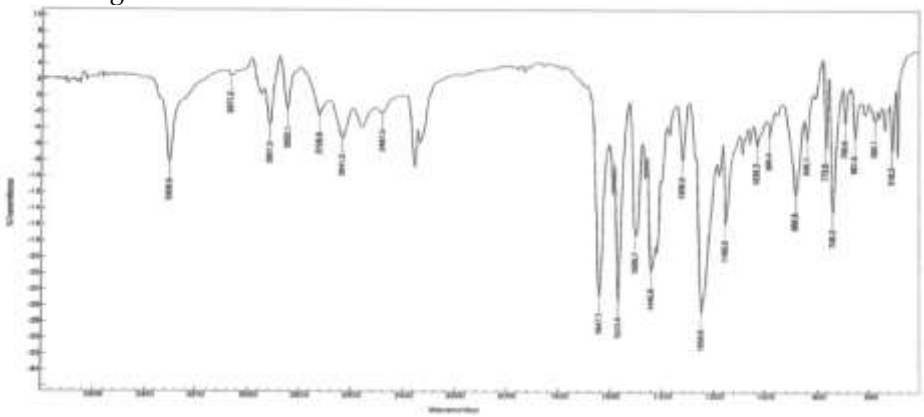


Figure 4. IR spectrum of compound [II1]

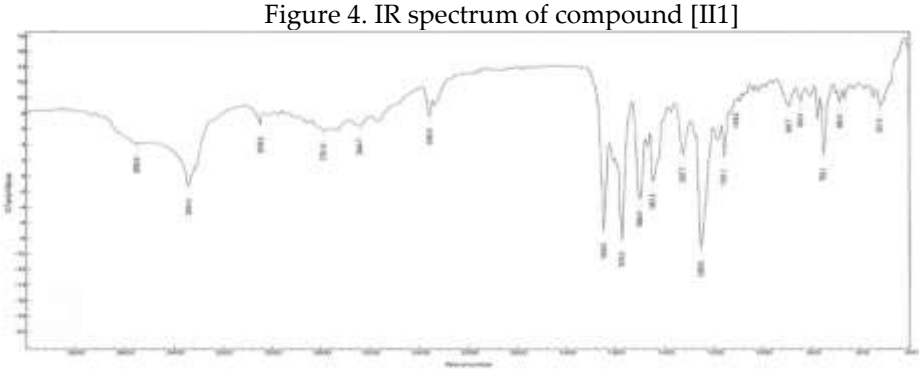


Figure 5. IR spectrum of compound [II2]

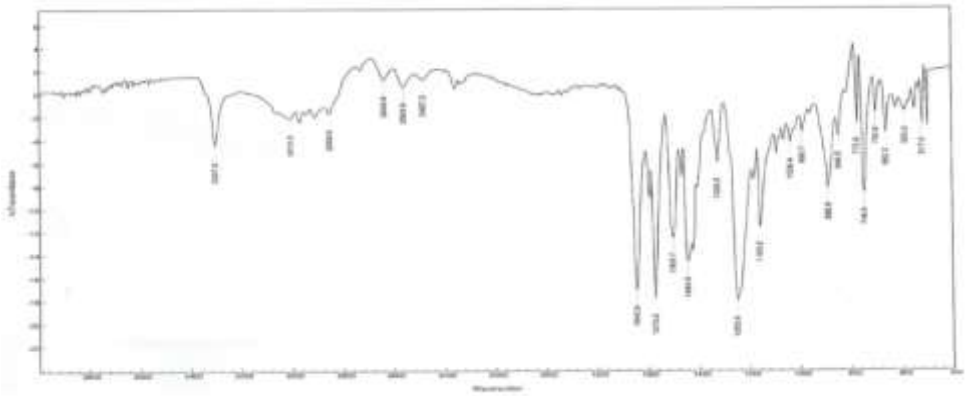


Figure 6. IR spectrum of compound [II7]

1H-NMR spectra of compounds [II1,2,8]

1H-NMR spectra of the recorded imines [II1,2,8] were observed and a reference of the solvent DMSO- d6 was shown at (2.50-2.51) ppm with compatible signals and beams Infrared spectra of prepared compounds as shown below:

Compound [II1]

It showed two signals at 2.25 (s) and 2.10 (s) ppm parts per million attributed to protons of the two groups of methyl (diCH3); a signal at 3.34 (s) 6.67 (m) ppm attributed to aromatic rings protons; and a single indication at 8.62 (s) ppm attributed to the proton of the imine group (N=CH). In addition to a single signal at 9.46 (s) ppm to the proton group (NH), see Figure 7.

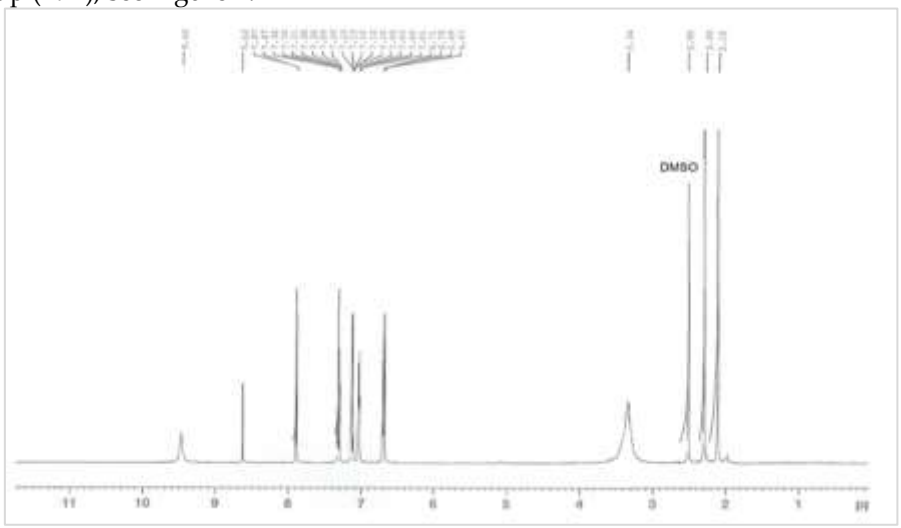


Figure 7. IR spectrum of compound [II1]

Compound [II2]

It showed two single signals at 2.28 (s) ppm, 2.09 (s) ppm attributed to protons of the (diCH3) groups; a single signal at 3.36 (s) ppm for proton group (SH); a multi-signal at range of 7.88-6.23 (m) for aromatic rings proton and a single signal at 8.99 (s) ppm for (N=CH). In addition to the appearance of a single signal at 10.23 (s) ppm of the OH group and at 10.97 (s) ppm attributed to (NH), see Figure 8.

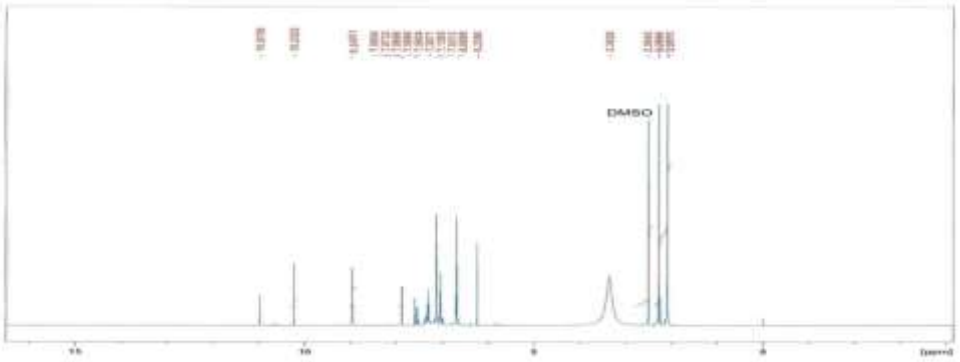


Figure 8. IR spectrum of compound [II2]

Compound

It showed two single signals at 2.29 (s) ppm, 2.10 (s) ppm attributed to protons of the two groups of methyl (diCH3). It also showed a single signal at 3.46 ppm (s) to (SH) and a single signal at 5.74(s) ppm for (NH2). In addition to a multi-signal at range (6.68-7.89) ppm (m) for aromatic rings proton, and the mono signal at 8.74(s) ppm for (N = CH). The signal at 9.48(s) ppm was attributed to proton group amine (NH), see Figure 9.

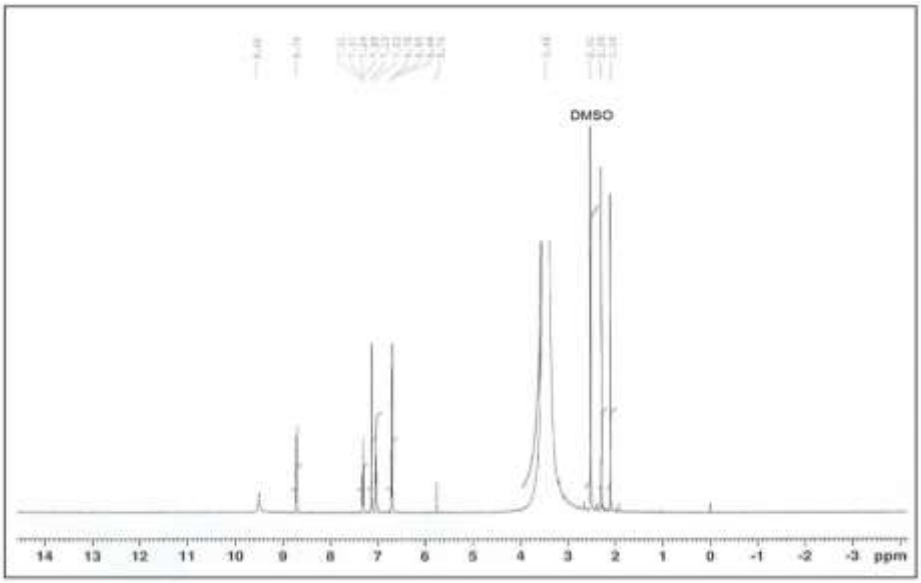


Figure 9. IR spectrum of compound [II8]

13C-NMR Compound [II3]

It showed two signals at (20.72, 14.15) ppm attributed to (diCH3) and others at (40.58-39.49) ppm, DMSO-d6 and multiple signals at range (111.68-149.23) ppm carbon represented the aromatic rings. Also, the appearance of a reference at the site 149.23 ppm was attributed to the C-N site. A sign at site 154.12 ppm carbon was attributed to the carbon group (N=C); as well as two signals at 169.11 and 165.61 ppm for C-O band, and the signal at 172.92 ppm, representing the Carbon of (C-S), see Figure 10.

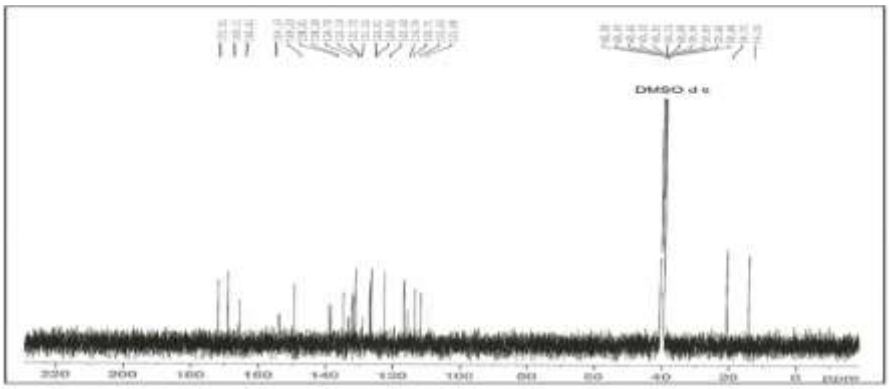
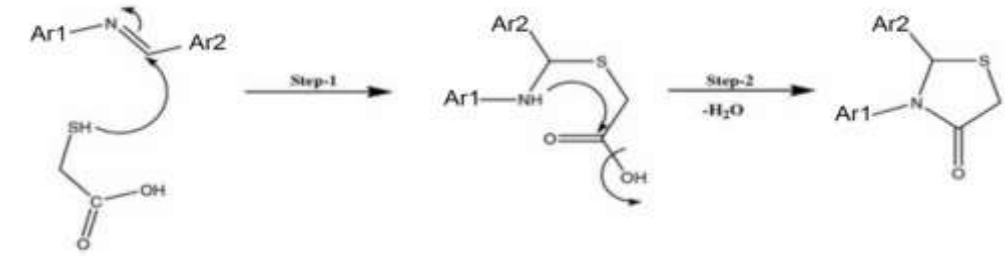
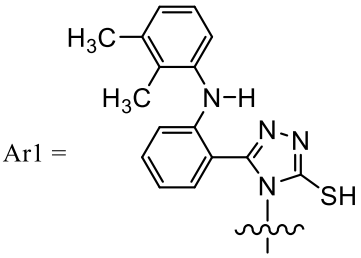


Figure 10. IR spectrum of compound [II3]

Preparation of Thiazolidinones from Corresponding Arylidines of 1,2,4-Triazole [III1-10]

The five-member thiazolidinone derivatives were prepared using microwave radio-fusion of the imines [II1-10] with 2-mercapto acetic acid compounds with dioxan as a solvent, as follows:





Ar1 =

Ar2 = H, p-OH, 2,4-diOH, 2-OH 5-Cl, 4-Cl, 4-Br, 4-N(CH$_3$)$_2$, 4-NH$_2$, 2-NO$_2$, 4-NO$_2$

Infrared Spectra of compounds [III1-10]

The main stretching band showed C = C, C = O, S-H, C-H, ArC-H, NH, OH, which were within the ranges (1618-1566, 1730-1704, 2643-2618, 2983-2730, 3166-3004, 3444-3343, 3666-3551) cm-1, respectively. The peaks were identical to the work, see Table 5 and Figures 11 -13 [19].

Table 5. Infrared data for compounds [III1-10]

Comp NO	IR ν (cm^{-1})						
	OH	NH	Ar-H	C-H	S-H	C=O	C=C
III$_1$	---	3444 (m)	3090 (w)	2966(m) 2869	2640 (w)	1716 (m)	1587 (s)
III$_2$	3441 (br)	3348 (m)	3004 (m)	2928 (w)	2638 (w)	1709 (w)	1594 (s)
III$_3$	3420 (br)	3275 (br)	3166 (w)2844	2972(s) 2844	2641 (w)	1721 (s)	1618 (s)
III$_4$	3465 (br)	3386 (m)	3092 (m)	2983(w) 2851	2643 (m)	1726 (w)	1589 (s)
III$_5$	---	3343 (s)	3006 (m)	2915 (m)2851	2636 (m)	1722 (s)	1566 (s)

III_6	---	3344 (m)	3071 (m)	2954 (w)	2639 (w)	1730 (m)	1567 (s)
III_7	---	3384 (br)	3000 (w)	2972 (m)2827	2618 (m)	1721 (w)	1618 (s)
III_8	---	3344 (m)	3052 (m)	2963 (w)	2640 (w)	1704 (m)	1593 (s)
III_9	---	3346 (m)	3013 (w)	2967 (w)	2634 (m)	1719 (m)	1573 (s)
III_{10}	---	3344 (s)	3071 (m)	2954 (m)2849	2639 (m)	1648 (w)	1567 (s)

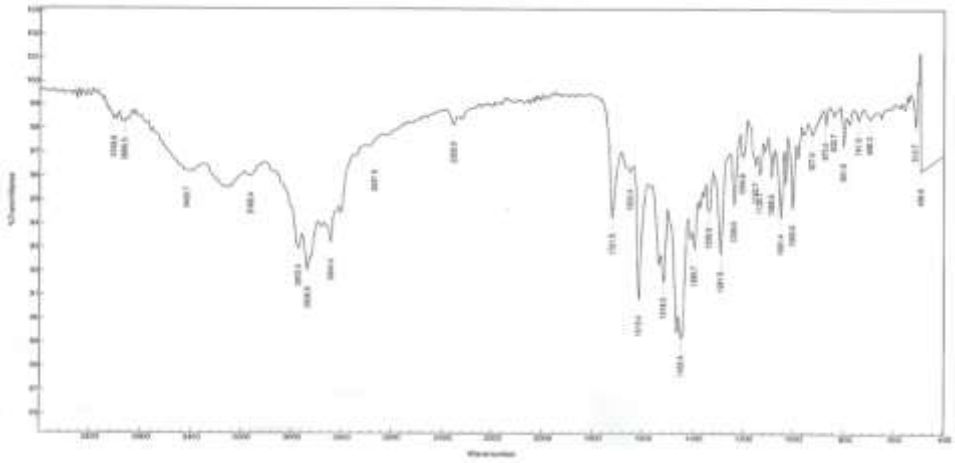


Figure 11. Infrared Spectrum of Compound [III3]

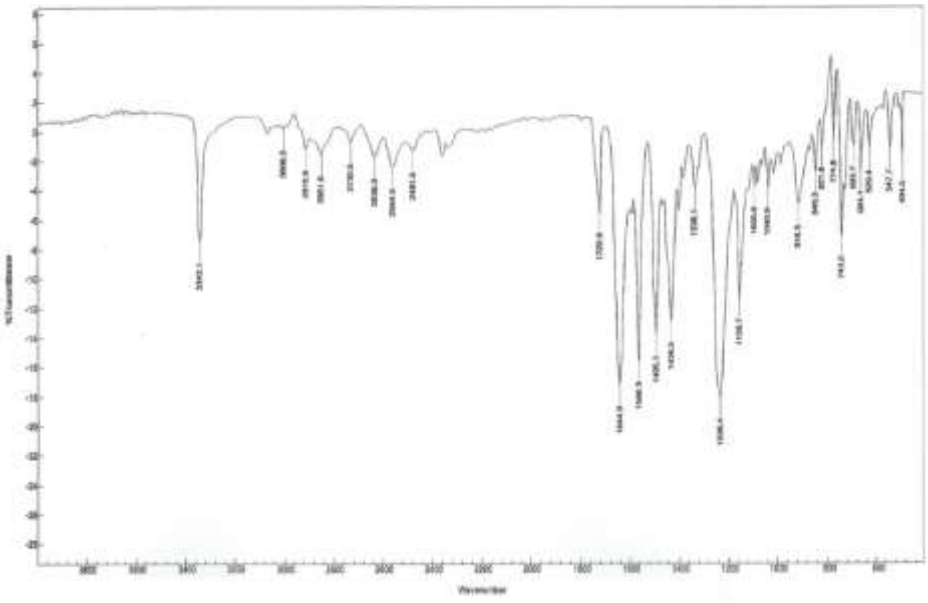


Figure 12. Infrared Spectrum of Compound [III5]

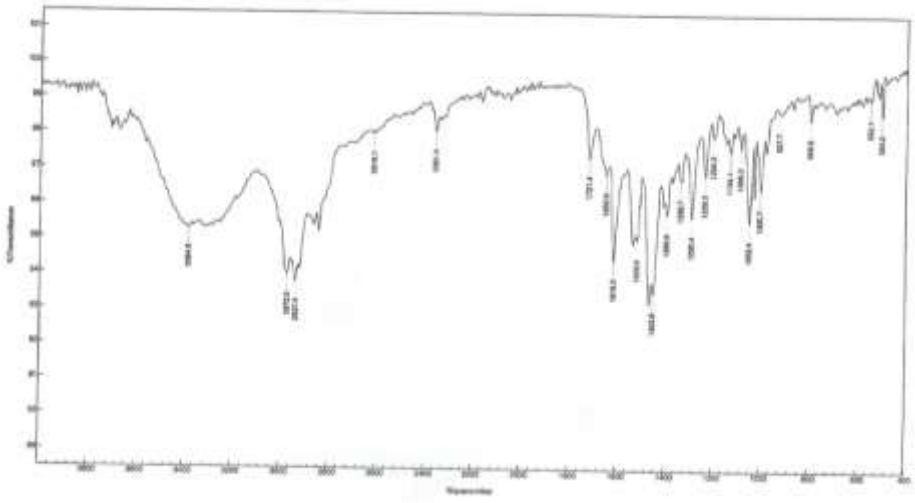


Figure 13. Infrared Spectrum of Compound [III7]

Nuclear Magnetic Resonance Spectrometry 1HNMR and 13CNMR for Compounds [III2,8]

13CNMR spectra of compound

It showed two signals at 20.70, 14.14 ppm of (diCH3) and 59.91 ppm (C-S) for thiazolidinone ring; a signal at 68.56 ppm carbon (N-C-S) and a multiple signal within the range 149.23-111.69 ppm attributed to the aromatic proton and signals of 149.69 m in the (C-N) group and 166.44 ppm attributed to the C-O group [20]. The location sign was 167.32 ppm (C-S) and a signal at 170.69 ppm (C=O) (20), see Figure 14.

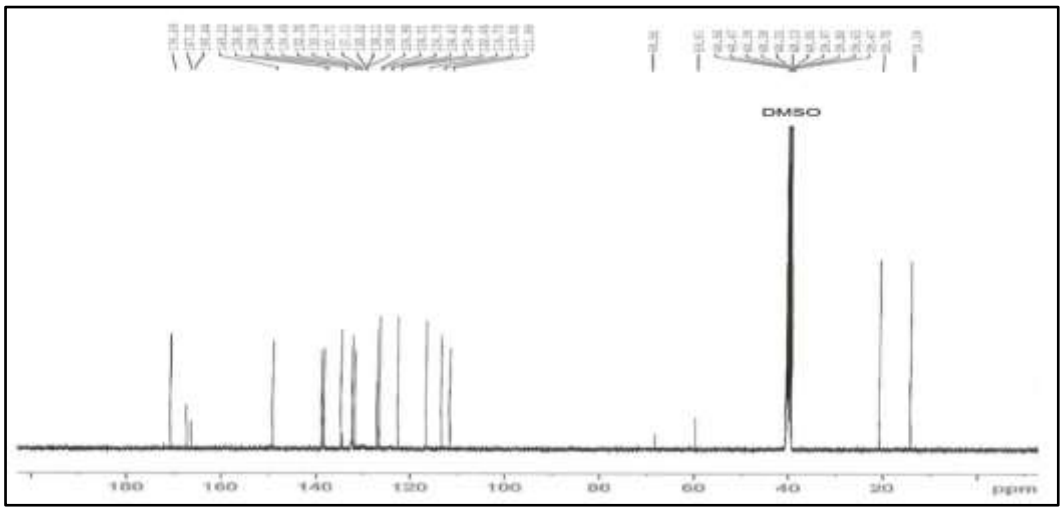


Figure 14. 13C-NMR spectrum of compound [III2]

1HNMR Spectra of Compound [III8]

It showed two single signals at 2.29 (s), 2.10 (s) parts per million attributed to protons of the two groups of methylation (diCH3) with a single signal of 3.48 (s) ppm attributed to the group (SH). In addition to the appearance of a single signal 3.78 (s), a fraction of a million attributed to protons, (CH2) in the thiazolidinone ring; a single signal of 5.10 (s) of the (NH2) group; a single signal of 6.36 (s) ppm, (NCH); a multiple signal within the range (6.39-7.89) (m) fraction ppm attributed to the aromatic proton (ArC-H) and a single 9.93-ppm related to group (NH) (21), see Figure 15.

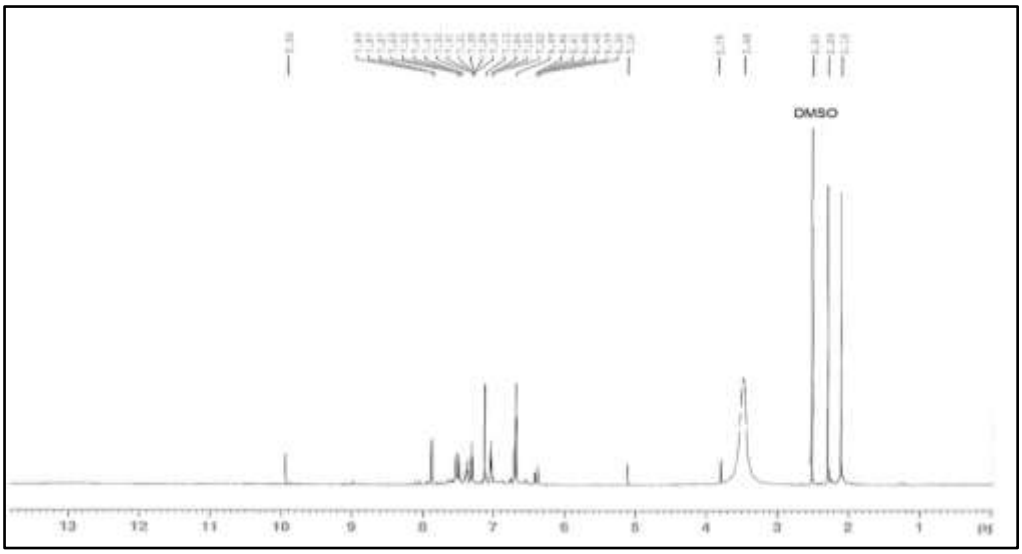


Figure 15. 1H-NMR spectrum of compound [III8]

Stability of prepared reagents [II1-10]

Table (6) shows the absorption values of the prepared reagents at a final concentration of 8×10-5 molar at different times and the values of the pH confirmed in it. It is noteworthy that the λmax values with time were constant, but the absorption values for [II1] were stable only in darkness. On the other hand, were stable in light and dark [21]. This stability may be due to their composition which contains activity inhibitory groups in the aromatic rings, the nitro and halogen groups. This indicates the stability of the compounds as an organic reagent, see Figures 16-26.

Table 6. Effect of time factor on stability of prepared reagents [II1-10]

Reagent II_1, pH=11.50, λmax= 296				Reagent II_2, pH=9.78, λmax=288			
Light		Dark		Light		Dark	
Time (min)	Absorption	Time (min)	Absorption	Time (min)	Absorption	Time (min)	Absorption
5	3.351	5	3.385	5	1.576	5	1.577
10	3.318	10	3.383	10	1.578	10	1.574
15	3.215	15	3.382	15	1.577	15	1.569
20	3.186	20	3.380	20	1.577	20	1.566
25	3.154	25	3.379	25	1.576	25	1.562
30	3.148	30	3.376	30	1.576	30	1.558
24 hrs.	3.060	24 hrs.	3.372	24 hrs.	1.568	24 hrs.	1.421
Reagent II_3, pH=9.82, λmax=303				Reagent II_4, pH=9.90 , λmax=313.5			
Light		Dark		Light		Dark	
Time (min)	Absorption	Time (min)	Absorption	Time (min)	Absorption	Time (min)	Absorption
5	2.241	5	2.250	5	2.117	5	2.130
10	2.230	10	2.246	10	2.102	10	2.122
15	2.217	15	2.241	15	2.090	15	2.119
20	2.201	20	2.237	20	2.077	20	2.115
25	2.190	25	2.232	25	2.067	25	2.111
30	2.186	30	2.230	30	2.057	30	2.105
24 hrs.	2.142	24 hrs.	2.221	24 hrs.	1.995	24 hrs.	2.088
Reagent II_5, pH=10.53, λmax=302				Reagent II_6, pH=11.20, λmax=			
Light		Dark		Light		Dark	
Time (min)	Absorption	Time (min)	Absorption	Time (min)	Absorption	Time (min)	Absorption

5	2.123	5	2.124	5	1.908	5	1.908
10	2.123	10	2.124	10	1.907	10	1.908
15	2.121	15	2.123	15	1.907	15	1.908
20	2.121	20	2.122	20	1.906	20	1.908
25	2.120	25	2.122	25	1.905	25	1.908
30	2.118	30	2.120	30	1.905	30	1.907
24 hrs.	2.116	24 hrs.	2.117	24 hrs.	1.903	24 hrs.	1.905
Reagent II$_7$, pH=11.06, λmax=287				Reagent II$_8$, pH=11.01, λmax= 307			
Light		Dark		Light		Dark	
Time (min)	Absorption	Time (min)	Absorption	Time (min)	Absorption	Time (min)	Absorption
5	2.848	5	2.848	5	0.584	5	0.592
10	2.842	10	2.839	10	0.579	10	0.591
15	2.751	15	2.825	15	0.578	15	0.590
20	2.740	20	2.819	20	0.565	20	0.589
25	2.717	25	2.805	25	0.564	25	0.586
30	2.704	30	2.791	30	0.552	30	0.587
24 hrs.	2.682	24 hrs.	2.786	24 hrs.	0.546	24 hrs.	0.584
Reagent II$_9$, pH=10.30, λmax=304				Reagent II$_{10}$, pH=10.19, λmax=			
Light		Dark		Light		Dark	
Time (min)	Absorption	Time (min)	Absorption	Time (min)	Absorption	Time (min)	Absorption
5	2.275	5	2.279	5	2.626	5	2.626
10	2.275	10	2.275	10	2.624	10	2.626
15	2.274	15	2.274	15	2.622	15	2.625
20	2.273	20	2.274	20	2.620	20	2.624
25	2.272	25	2.274	25	2.619	25	2.623
30	2.271	30	2.273	30	2.618	30	2.622
24 hrs.	2.271	24 hrs.	2.272	24 hrs.	2.613	24 hrs.	2.622

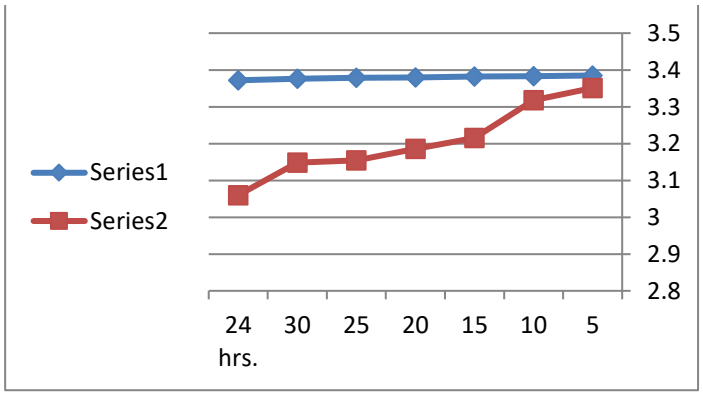


Figure 16. Change the Absorption Values over Time of Compound II1

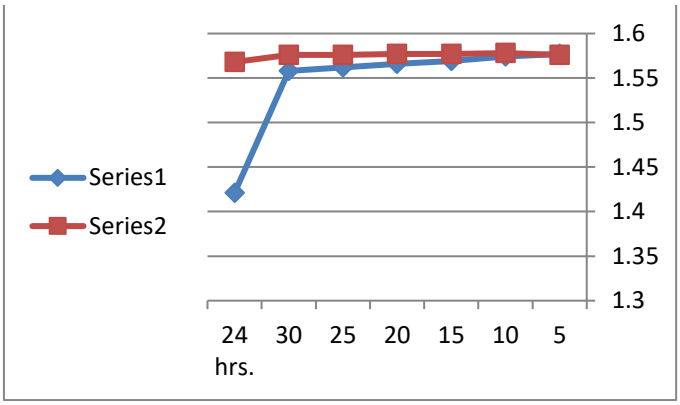


Figure 17. Change the Absorption Values over Time of Compound II2

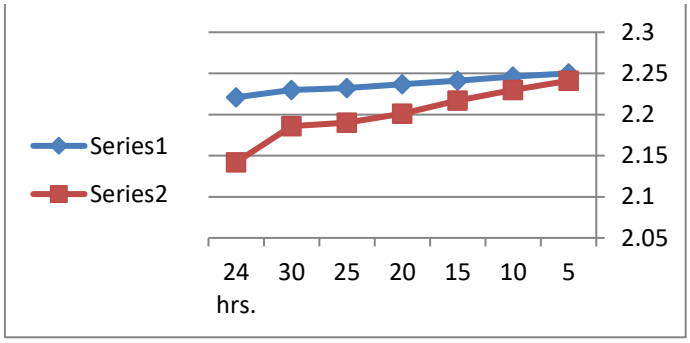


Figure 18.: Change the Absorption Values over Time of Compound II3

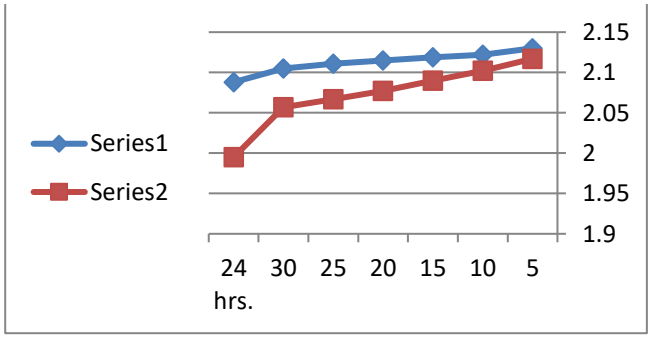


Figure 19. Change the Absorption Values over Time of Compound II4

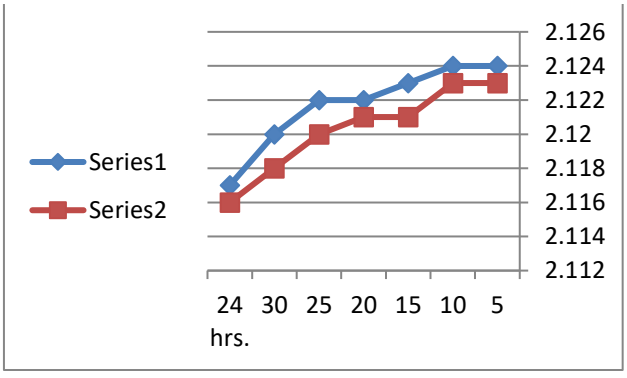


Figure 20. Change the Absorption Values over Time of Compound II5

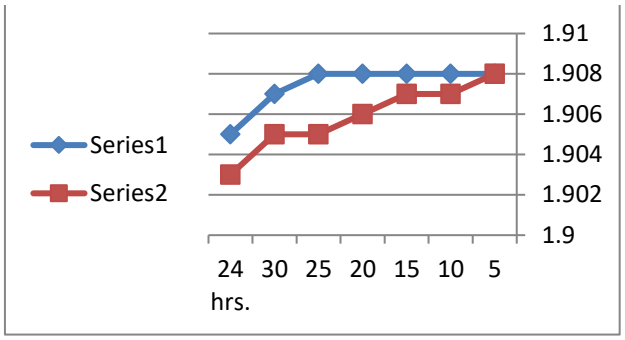


Figure 21. Change the Absorption Values over Time of Compound II6

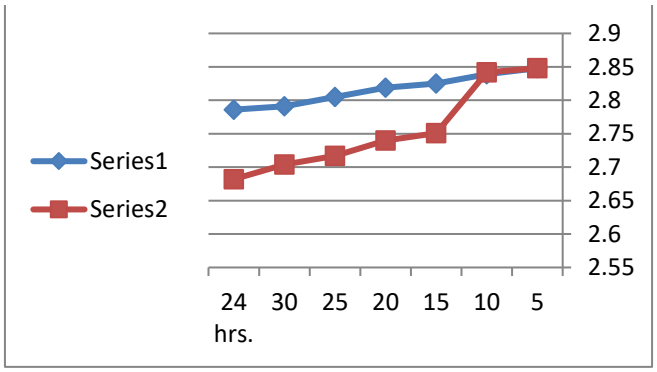


Figure 22. Change the Absorption Values over Time of Compound II7

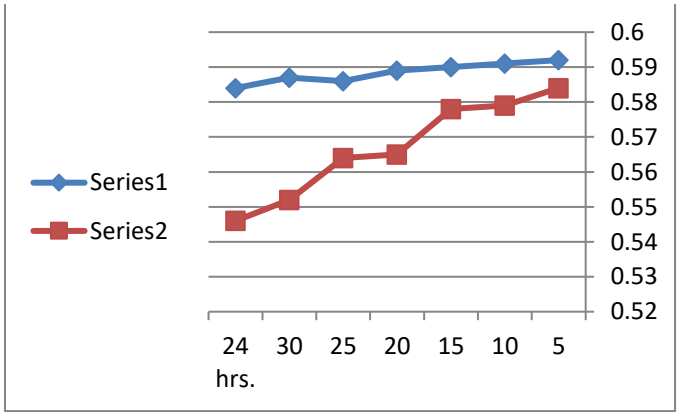


Figure 23. Change the Absorption Values over Time of Compound II8

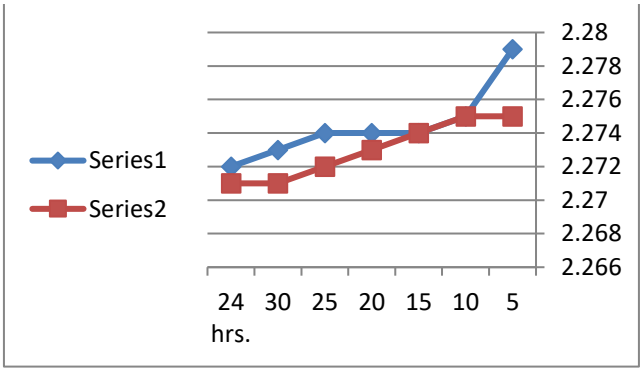


Figure 24. Change the Absorption Values over Time of Compound II9

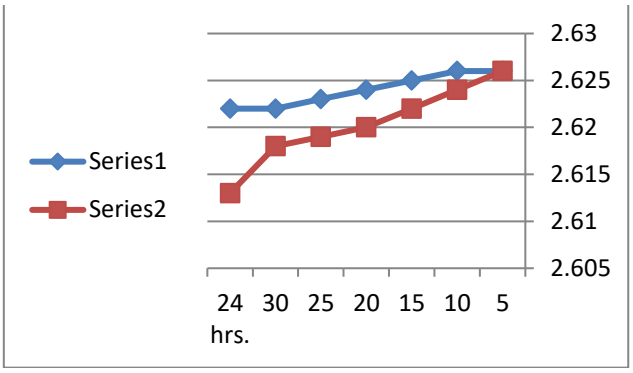


Figure 25. Change the Absorption Values over Time of Compound II10

After observing the stability of the four reagents compounds (II5,6,9,10), it was compared with strength of C=N by the infrared spectrum with the arylidinic groups change as the only structural variable. The results indicated that the strength bond is increasing with the presence of inhibitory groups of aromatic rings, see Figure 26.

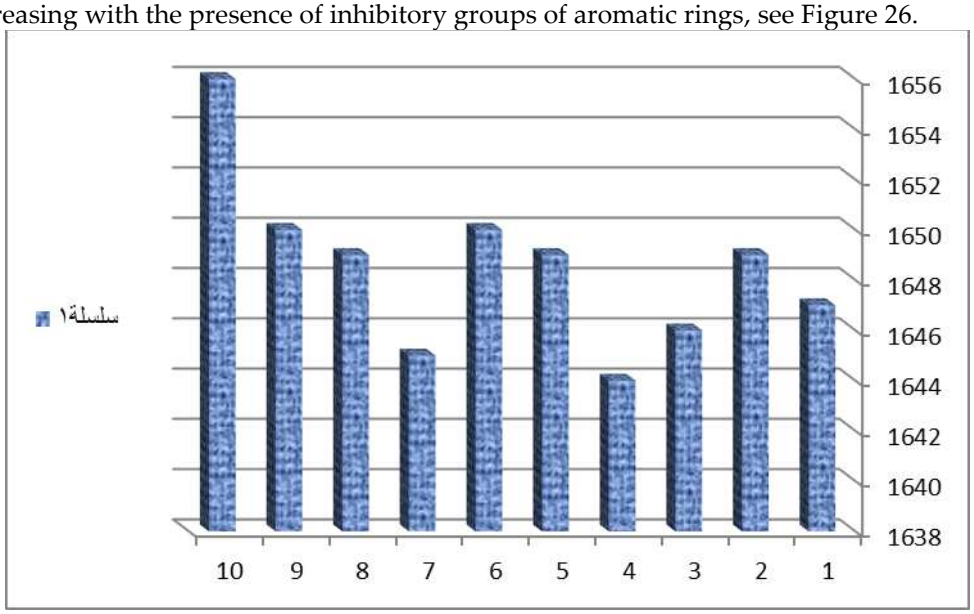


Figure 26. Comparison of the absorption values of the C = N group with the change of substituted groups (II1-10)

4. Conclusion

This paper demonstrates this method of microwave-assisted preparation of organic reagents starting from the base compound, 2-(2,3 dimethyl phenylamino) benzoic acid. Microwave radiation was employed to improve the efficiency of the reactions giving a wide range of derivatives in good yields. Under light and dark conditions, the stability of the preparative reagents was assessed, yielding excellent robustness even in the presence of disruptive groups such as nitro and halogen. The compounds were well characterized by UV, IR and NMR spectroscopy to confirm their structures. These results exemplify use of microwave-assisted strategies in green chemistry towards efficient synthesis of stable and high-yield organic species. Further work is needed to see if this method can be extended to other classes of chemicals, and to explore the environmental footprint of these types of reactions, as compared to conventional synthetic methodology. Put together, additional studies will be essential for this long-term stability of said compounds as well as their industrial applicability to be fully understood.

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