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Synthesis of some new Schiff bases derived from 2 and 4 -aminoacridin-9(10H) - one

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Abstract: A classical Ullmann condensation reaction was used by reaction of benzene-1,2-diamine (1) or benzene-1,4-diamine (2) with o-chlorobenzioc acid to produce 2-[(2 or 4-aminophenyl)amino]benzoic acid compounds (3 and 4). Cyclisation of these compounds in PPA produce 2 and 4-aminoacridin-9(10H)-ones (5 and 6) respectively. A new series of Schiff bases (8a-h and 9a-h) has been synthesized from the reaction of (5 and 6) with different aldehydes. Reaction product followed by TLC, purified by Column chromatography. Spectral data for the synthesized compounds, UV-Visible, I.R, ^{1}H-NMR, ^{13}C-NMR and the MS of some of the prepared compounds were reported.

Keywords: Acridine derivative, Aminoacridone, Schiff base.

Introduction

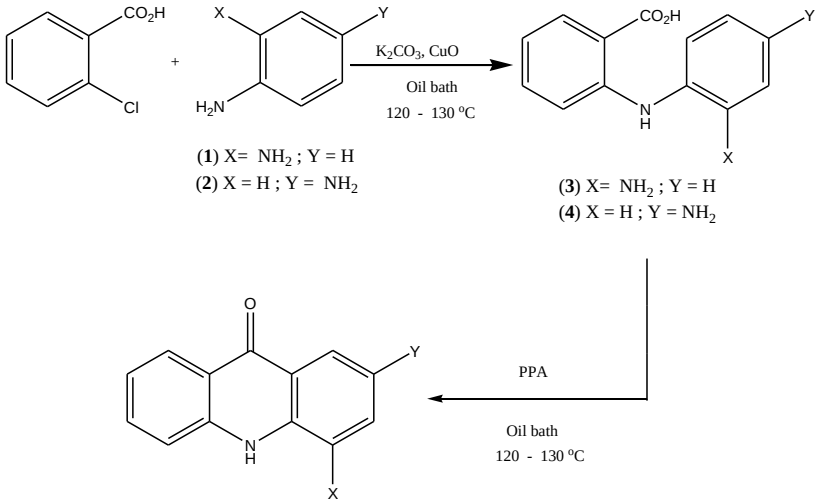
Acridone is one of the biologically active fused heterocyclic rings. The literature demonstrates that acridone shows anticancer [1,2], antimalarial [3, 4], anti- inflammatory and analgesic [5, 6], antibacterial activities [7,8]. Many researches interested in acridone alkaloids and revered their properties [9-11]. Numerous acridone derivatives have been found to possess considerable biological activities, which stimulated the research activity in this field [12-15]. 2-Aminoacridin-9(10H)-one was used as mild and selective labeling reagent for malondialdehyde in urinaryl samples [16]. Natural and synthetic acridines / acridones as antitumor agents were reviewed [17].

As part of our ongoing research on the synthesis of new heterocyclic compounds [18-20] that may have some expected biological activities. We have reported on the synthesis of a new Schiff bases contains acridone moiety. These compounds derived from 2 and 4-aminoacridin-9(10H)-one derivatives as depicted in Scheme **1** and **2**.

Result and Discussion

The most commonly used synthetic method to make acridones involves the condensation of o-halobenzoic acids with substituted aniline in the presence of copper powder and potassium carbonate to give N-(substituted phenyl) anthranilic acids (Ullmann synthesis). The N-(substituted phenyl) anthranilic acids are cyclized to corresponding acridones under the influence of strong acids [22]. Our synthetic pathway was based first on the preparation of 4-aminoacridin-9(10H)-one(5) and 2-aminoacridin-9(10H)-one (**6**). These compounds were used for the preparation of the Schiff bases (**8a-h**) and (**9a-h**) respectively. The condensation of benzene-1,2-diamine (**1**) or benzene-1,4-diamine (**2**) with o-chlorobenzioc acid by using cupric oxide and anhydrous potassium carbonate gave the 2-[(2-or4-aminophenyl) amino]benzoic acid (**3**) and (**4**) respectively [21]. Cyclisation of these compounds in refluxing polyphosphoric acid (PPA) led to the formation of 4-aminoacridin-9(10H)-one (**5**) and 2- aminoacridin-9(10H)- one (**6**) by intramolecular Friedle - Crafts acylation [22] (Scheme **1**). The Schiff bases (**8a-h**) and (**9a-h**) were synthesized by the equimolar reaction of **5 or 6** with different aldehydes under reflux using dry methanol [23] (Scheme **2**).

The structure of these compounds was confirmed on the bases of spectral data. The IR spectrum of **8a-h** and **9a-h** showed the presence of C=N absorptions at υ 1620-1630 cm^{-1}, 1660 –1680 cm^{-1} for C=O group [24]. The UV spectra of **9a-h** show the presence of three bands at: λ_{max} (nm), ε_{max} ($L.mol^{-1}.cm^{-1}$) in MeOH; (248-278 nm), (4.0623-4.2220),for π-π* transition of the aromatic rings, 320-364nm for π-π* transition of C=N group and 390-410nm for n-π* transition within intramolecular charge transfer (CT) transition involving the whole molecule. While the spectra of the Schiff bases **8a-h** exhibit mainly two bands; the first at 246-286,(4.0755-4.4448), for the π-π* transitions of aromatic rings and C=N group and the second at 406-424, (3.8624-4.1320) for n-π* transition within intramolecular charge transfer (CT) transition involving the whole molecule. The ^{1}H- NMR spectral data for (**8a-h**) and (**9a-h**) shows the absence of the NH proton and the appearance of imines proton (N = CH) at (8.63 – 9.12 ppm).

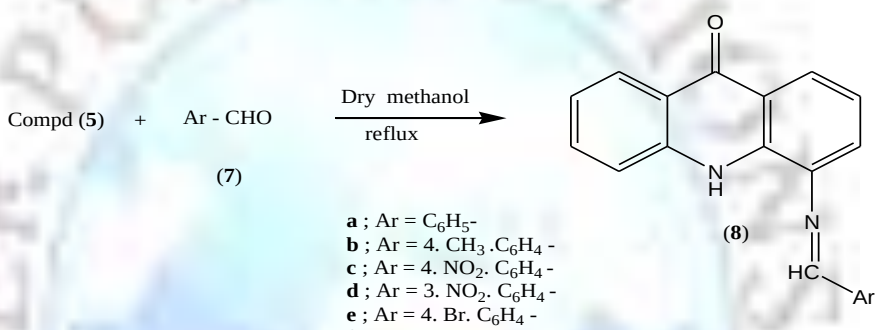


(**1**) X= NH_2 ; Y = H
(**2**) X = H ; Y = NH_2

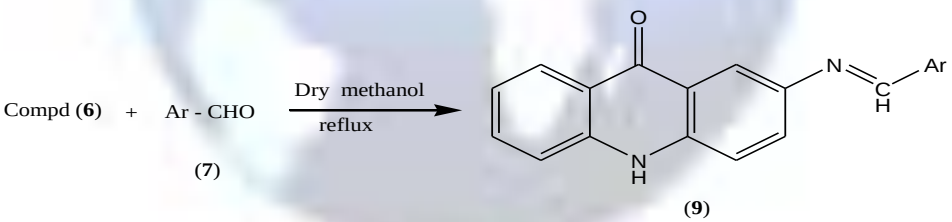
(**3**) X= NH_2 ; Y = H
(**4**) X = H ; Y = NH_2

(**5**) X= NH2 ; Y = H
(**6**) X = H ; Y = NH2

Scheme 1



a ; Ar = C_6H_5-
b ; Ar = 4. CH_3 .C_6H_4 -
c ; Ar = 4. NO_2. C_6H_4 -
d ; Ar = 3. NO_2. C_6H_4 -
e ; Ar = 4. Br. C_6H_4 -
f ; Ar = 4. HO. C_6H_4 -
g ; Ar = 2. Cl. C_6H_4 -
h ; Ar = C_6H_5-CH=CH-



a ; Ar = 4. NO_2. C_6H_4-
b ; Ar = 3. NO_2. C_6H_4-
c ; Ar = 4. Br. C_6H_4-
d ; Ar = 4. Cl. C_6H_4-
e ; Ar = 2. Cl. C_6H_4-
f ; Ar = 4. CH_3. C_6H_4-
g ; Ar = 3. CH_3O. 4.HO. C_6H_4-
h ; Ar = C_6H_5CH=CH-

scheme 2

Experimental

General

Melting pointes were determined using Electro thermal IA9000 Digital-series melting point Apparatus, (uncorrected). All reagents and chemicals were used from commercial source, only solvents dried by standard procedure. The purity

of the compounds was ascertained by thin layer chromatography (TLC) on precoated silica G plates using either UV absorption or iodine staining for visualization. Column chromatography was carried out using 100–200 mesh silica gel (BDH). IR spectra were recorded using FTIR-600 Bio tech Engineering Management spectrophotometer UK using KBr disc. UV spectra were recorded on Shimadzu UV-1650 pc, UV- Visible spectrophotometer using methanol as a solvent. ^{1}H-NMR and ^{13}C-NMR spectra were obtained from a Bruker avance 300 MHz, NMR spectrometer, the chemical shifts are reported in δ, ppm values for DMSO- d_6 solution using TMS as internal standard, and coupling constant, J(Hz) in that order with the use of the following abbreviations; s, singlet; d, doublet; t, triplet; m, multiplet; br, broad. GC - Mass spectra (MS) were obtained from a Perkins Elmer Clarus 500 Gas Chromatograph Mass Spectrometer in CH_2Cl_2.

Synthesis of N-Aryl anthranilic acids (3 and 4); General procedure [21]

In a 1-litre round bottomed flask, equipped with an air condenser, a mixture of (0.04 mol, 6.26g) of o-chlorobenzioc acid, (0.08 mol) of substituted aniline, (0.04 mol, 5.52g) of anhydrous potassium carbonate and 0.2 g of cupric oxide were mixed. The mixture was refluxed in oil bath at 120 -130 ^{o}C for 2 hour. The mixture, after cooling, excess of substituted aniline was removed by steam distillation then 1g of decolorizing carbon was added to the residual solution. The mixture was boiled for 15 minutes, filtered at the pump and the filtrate was neutralized by 1:1 acetic acid. The solid was collected by suction and dried. Crystallization from ethanol gave the N-aryl anthranilic acids **3** and **4** as pure compound for the next uses.

2-[(2-Aminophenyl)amino]benzoic acid (3).

A mixture of (40mmol, 6.26g) of o-chlorobenzioc acid, (80mmol, 8.64g) of compound **1**, (40mmol, 5.52g) of anhydrous potassium carbonate and 0.2g of cupric oxide was refluxed in oil bath at 120 -130 ^{o}C for 2 hour. A brownish red powder, mp 195^{o}C (5.9g, yield 65%), Rf 0.38 ($CHCl_3$: CH_3OH - 9.5:0.5). ^{1}H-NMR (DMSO-d_6) δ: 3.49-3.51 (br, 2H, NH_2), 6.44 (m, 4H), 6.64 (d,1H, J=7.5 Hz), 6.97 (t, 1H, J=7.5Hz), 7.04 (d, 1H, J=7.5Hz), 7.31 (t, 1H, J=7.5 Hz), 7.86 (d, 1H, J=7.5 Hz), 9.05(br, 1H). ^{13}C-NMR(DMSO-d_6) δ: 111.82, 113.69, 115.69, 116.33, 117.05, 125.24, 126.59, 126.76, 132.03, 134.49, 144.62, 149.62, 170.59.

2-[(4-Aminophenyl)amino]benzoic acid. Compound (4).

A mixture of (40mmol, 6.26g) of o-chlorobenzioc acid, (80mmol, 8.64g) of compound **2**, (40mmol, 5.52g) of anhydrous potassium carbonate and 0.2g of cupric oxide was refluxed in oil bath at 120 -130 ^{o}C for 2 hour. A purple powder, mp = 190^{o}C, (3.64g, yield 40%), Rf 0.48 ($CHCl_3$:CH_3OH - 9.5:0.5). ^{1}H-NMR (DMSO-d_6) δ: 3.56-4.30(br, 2H, NH_2), 6.67, m,3H; 6.84, d, 1H (J 8 Hz); 6.99, d, 2H (J 8 Hz); 7.36 t, 2H (J 7 Hz); 7.82, d,1H (J 8 Hz); 9.27 (br, 1H). ^{13}C-NMR(DMSO-d_6) δ: 110.83, 113.02, 115.12, 115.12, 115.72, 126.38, 126.38, 128.63, 132.13, 134.57, 146.61, 150.51, 170.63.

Synthesis of 2 and 4-amino-acridin-9(10H)-one (5 and 6): General procedure [22]

The preceding acid **(3)** or **(4)** (10g) was heated with polyphosphoric acid (PPA) (100 ml) at 120 - 130 ^{o}C until a homogeneous solution resulted, reflux continued for 3hrs. Product was precipitated by addition of H_2O and basification with NH_4OH. The product was filtered off by vacuum and washed several time with tape water and air dried.
4-Aminoacridin-9(10H)-one (**5**).

Compound 3 (10g) was heated with (100ml) of PPA at 120-130 ^{o}C. A brown powder, mp 292 - 294^{o}C dec. (8.75g, yield 95%), Rf 0.59 ($CHCl_3$: CH_3OH - 9.5:0.5). ^{1}H-NMR (DMSO-d_6) δ: 3.50(br, 2H, NH_2); 7.02, d, 2H (J 4.5 Hz); 7.23, t, 1H (J 7 Hz); 7.54, t, 1H (J 4.5 Hz); 7.69, m, 2H; 8.20, d,1H (J 7.8 Hz); 10.66(s, 1H, NH). ^{13}C-NMR(DMSO-d_6) δ: 113.95, 116.38, 118.02, 120.45, 120.45, 121.37, 121.94, 126.38, 130.12, 133.52, 137.31, 141.07, 177.45.

2-Aminoacridin-9(10H)-one (6).

Compound **4** (10g) was heated with(100ml) of PPA at 120-130 ^{o}C. A green powder, mp = 250 ^{o}C (sub.), (7.82g, yield 85%), Rf 0.3 ($CHCl_3$:CH_3OH - 9.5:0.5). ^{1}H-NMR(DMSO-d_6) δ:3.85-3.99 (br, 2H,NH_2); 7.01, m, 2H; 7.41, m, 3H; 7.61, s, 1H; 8.17, d, 1H (J 8 Hz), 11.48 (s, 1H, NH). ^{13}C-NMR(DMSO-d_6) δ: 106.54, 117.56, 118.57, 119.75. 120.26, 122.28, 123.95. 126.39, 132.32, 133.43. 140.71, 143.81, 176.51.

4-{[(1E)-Arylmethylene]amino}acridin-9(10H)-one (8): General procedure [23].

In 25 ml dry methanol, (0.1g, 0.47mmol) of 4-aminoacridin-9(10H)-one (5) was dissolved by stirring. To this solution (0.47mmol) of aldehyde (**7**) was added and the solution was refluxed with stirring for at least 6hrs. The reaction was

monitored by TLC. The mixture was cooled and left overnight. The greenish yellow powder products (**8**) was filtered and dried in air.

4-{[(1E)-phenyl methylene]amino}acridin-9(10H)-one (8a).

Compound **5** (0.1g, 0.47mmol) and **7a** (0.049g, 0.47mmol) of benzaldehyde were used to prepare **8a** as a greenish yellow powder (0,09g) Yield: 64%, Rf 0.92 ($CHCl_3$: EtOAc - 9:1). mp 147-148 ^oC. ^{1}H-NMR (DMSO-d_6) δ:7.29 , s, 2H; 7.6, m, 5H; 8,m, 2H; 8.24, m, 3H; 8.91(s, 1H, HC=N); 10.81(s, 1H, NH). ^{13}C-NMR (DMSO-d_6) δ: 119.02, 120.96, 121.46, 121.76, 124.44, 126.30, 129.02, 129.02, 129.16, 129.73, 129.73, 130.24, 132.39, 133.31, 133.71, 136.43, 139.71, 141.12, 161.93, 177.19.

4-{[(1E)-(4-methylphenyl)methylene]amino}acridin-9(10H)-one (8b).

Compound **5** (0.1g, 0.47mmol) and **7b** (0.057g, 0.47mmol) of p-tolualdehyde were used to prepare **8b** as a yellow powder, (mp = 180 ^oC) (0.09g, yield 65%), Rf 0.67 ($CHCl_3$: EtOAc - 9:1). ^{1}H-NMR(DMSO-d_6) δ: 2.36, s,3H; 7.29, m,4H; 7.40, d,1H(J 7.3 Hz); 7.68, d, 1H(J 7.3 Hz); 7.74, m, 1H; 7.84, d,1H(J 8 Hz); 8.05, d, 1H(J 8 Hz); 8.14, m,1H; 8.26,d,1H(J 8 Hz); 8.87(s,1H,HC=N); 10.80(s,1H,NH). ^{13}C-NMR(DMSO-d_6) δ: 21.58, 119.04, 120.82, 121.46, 121.81, 124.22, 126.29, 129.57, 129.57, 129.79, 129.79, 130.27, 133.68, 133.93, 139.79, 141.11, 142.56, 143.46, 161.66, 167.78, 177.20.

4-{[(1E)-(4-nitrophenyl)methylene]amino}acridin-9(10H)-one (8c).

Compound **5** (0.1g, 0.47mmol) and **7c** (0.07g, 0.47mmol) of p-nitrobenzaldehyde were used to prepare **8c** as a red powder (mp=274-276^oC)(0.08g, yield50%), Rf 0.88 ($CHCl_3$:CH_3OH-9.5:0.5). ^{1}H-NMR(DMSO-d_6) δ: 7.29, m, 2H; 7.75,m,2H; 8.02,d,1H(J 8.3 Hz); 8.22, m,2H; 8.42, m, 4H; 9.04(s,1H,HC=N); 10.85(s,1H,NH). ^{13}C-NMR(DMSO-d_6) δ:118.97, 121.16, 121.35,121.89, 121.95, 124.21, 124.21, 125.55, 126.31, 131.09, 131.09, 131.45, 133.82, 136.72, 138.75, 141.07, 141.83, 149.43, 159.66, 177.12.

4-{[(1E)-(3-nitrophenyl)methylene]amino}acridin-9(10H)-one (8d).

Compound **5** (0.1g, 0.47mmol) and **7d** (0.07g, 0.47mmol) of m-nitrobenzaldehyde were used to prepare **8d** as a yellownish red powder (mp=225 ^oC) (0.07g, yield43%) Rf 0.92 ($CHCl_3$:CH_3OH - 9.5:0.5). ^{1}H-NMR(DMSO-d_6) δ: 7.29,s,2H; 7.80, m, 3H; 8.00, s, 1H; 8.21, m, 2H; 8.41 ,s, 1H; 8.66, s, 1H; 9.02, m, 2H; 10.89(s,1H,NH), ^{13}C-NMR(DMSO-d_6) δ: 118.99, 121.23, 121.39, 121.92, 124.47, 124.47, 125.18, 126.31, 126.46, 126.46, 130.73, 133.79, 136.03, 136.55, 137.93, 139.03, 141.10, 148.65, 160.01, 177.13.

4-{[(1E)-(4-bromophenyl)methylene]amino}acridin-9(10H)-one (8e).

Compound **5** (0.1g, 0.47mmol) and **7e** (0.088g, 0.47mmol) of p-bromobenzaldehyde were used to prepare **8e** as a yellow powder (mp=251 ^oC) (0.08g, yield47%) Rf 0.86 ($CHCl_3$:CH_3OH - 9.5:0.5).^{1}H-NMR(DMSO-d_6) δ: 7.29, m, 2H; 8.2, m, 9H; 8.93 (s,1H,HC=N); 10.82 (s,1H,NH). ^{13}C-NMR(DMSO-d_6) δ: 118.98, 120.92, 121.44, 121.44, 121.89, 124.72, 125.66, 126.30, 132.02, 132.02, 132.24, 132.24, 132.24, 133.78, 135.65, 136.55, 139.35, 141.10, 160.78, 177.16. (EIMS, m/z = 377 (M^+), 16%) ; Base peak m/z =207 (100%) ; m /z = 223 (72%) ; m/z =224 (44%) ; m/z = 297 (42.8%) ; m/z = 91 (10%) .

4-{[(1E)-(2-hydroxyphenyl)methylene]amino}acridin-9(10H)-one (8f).

Compound **5** (0.1g, 0.47mmol) and **7f** (0.058g, 0.47mmol) of salicylaldehyde were used to prepare **8f** as a green powder (mp=224 ^oC) (0.06g, yield40%) Rf 0.86 ($CHCl_3$;CH_3OH - 9.5:0.5). ^{1}H-NMR(DMSO-d_6) δ: 7.03, m, 2H; 7.3, m, 2H; 7.48, t, 1H (J 7.5 Hz); 7.58, d, 1H(J 7.5 Hz); 7.73, t, 1H(J 7.9 Hz); 7.90, m, 2H; 8.17,d,1H(J 7.9 Hz); 8.25,d,1H(J 7.9 Hz); 9.02(s,1H,HC=N), 10.92(s,1H,NH), 11.4(s,1H,OH). ^{13}C-NMR(DMSO-d_6) δ: 117.06, 118.94, 119.77, 121.15, 121.19, 121.58, 121.72, 121.92, 122.53, 124.37, 126.28, 132.34, 133.76, 134.22, 135.74, 139.84, 141.25, 160.01, 163.62, 177.12.

4-{[(1E)-(2-chlorophenyl)methylene]amino}acridin-9(10H)-one (8g).

Compound **5** (0.1g, 0.47mmol) and **7g** (0.06g, 0.47mmol) of o-chlorobenzaldehyde were used to prepare **8g** as a greenish yellow powder (mp=147 ^oC) (0.08gm, yield53%), Rf 0.82 ($CHCl_3$: EtOAc - 9:1).^{1}H-NMR (DMSO-d_6) δ: 7.47, m, 5H; 8.30, m, 3H; 8.95, m, 3H; 9.12 (s, 1H, HC=N); 10.82 (s, 1H, NH). ^{13}C-NMR(DMSO-d_6) δ: 111.05, 118.99, 121.10, 121.26, 121.90, 125.04, 126.30, 127.67, 127.95, 130.44, 131.06, 131.26, 133.07, 133.77, 136.12, 136.49, 139.69, 141.12, 157.37, 177.12.

4-{[(1E,2E)-3-phenylprop-2-enylidene]amino}acridin-9(10H)-one (8h).

Compound 5 (0.1g, 0.47mmol) and 7**h** (0.062g, 0.47mmol) of cinnamaldehyde were used to prepare **8h** as a orange crystal (mp=264 ^{o}C) (0.06g, yeild40%); Rf 0.83 ($CHCl_3$:EtOAc - 9:1). ^{1}H-NMR(DMSO-d_6) δ: 7.28, t, 2H (J 7.5 Hz); 7.47, m, 6H; 7.72, m, 3H; 8.03, d, 1H(J 8 Hz); 8.13, d, 1H(J 8 Hz); 8.24, d, 1H(J 8 Hz); 8.68, d, 1H(J 8.5 Hz); 10.91(s,1H,NH). ^{13}C-NMR(DMSO-d_6) δ: 118.95, 120.52, 121.08, 121.45, 121.80, 124.25, 126.26, 126.26, 128.13, 128.13, 128.95, 129.62, 130.41, 133.77, 135.81, 136.46, 138.51, 140.05, 141.15, 145.60, 163.12, 177.16.

2-{[(1E)-(4-nitrophenyl)methylene]amino}acridin-9(10H)-one (9a).

Compound **6** (0.1g, 0.47mmol) and **7a** (0.07g, 0.47mmol) of p-nitrobenzaldehyde were used to prepare **9a** as a brownish red powder (mp = 344 ^{o}C dec)(0.08g, 50%), Rf 0.57 ($CHCl_3$:CH_3OH - 9.5:0.5). ^{1}H-NMR(DMSO-d_6) δ: 7.28, d, 1H (J 6.72 Hz); 7.71, m, 4H; 8.30, m, 6H; 9.02 (s,1H,HC=N), 11.91(s,1H,NH). ^{13}C-NMR(DMSO-d_6) δ: 117.99, 119.11, 120.89, 121.10, 121.83, 124.50, 126.49, 128.89, 130.01, 133.52, 133.85, 134.06, 137.45, 139.26, 141.01, 143.52, 144.23, 148.64, 158.07, 177.34.

2-{[(1E)-(3-nitrophenyl)methylene]amino}acridin-9(10H)-one (9b).

Compound **6** (0.1g, 0.47mmol) and **7b** (0.07g, 0.47mmol,) of m-nitrobenzaldehyde were used to prepare **9b** as a greenish-yellow crystal (mp>344 ^{o}C) (0.007g, yield43%); Rf 0.72 ($CHCl_3$:CH_3OH - 9.5:0.5). ^{1}H-NMR(DMSO-d_6) δ: 7.27, d, 1H(J 7.0 Hz); 7.60, m, 2H; 7.78, m, 3H; 8.22, m, 2H; 8.40, m, 2H; 8.80, m, 1H; 9.02, d, 1H (J 7.0 Hz); 11.88(s, 1H, NH). ^{13}C-NMR(DMSO-d_6) δ:117.61, 117.97, 119.08, 120.96, 121.26, 121.77, 123.17, 125.95, 126.50, 129.00, 130.96, 134.03, 135.00, 138.27, 140.36, 141.14, 144.05, 148.73, 158.16, 177.26. (EIMS , m/z =343 (M^+) 10%); m/z = 209(92%) ; Base m/z = 282(100%) ; m/z = 267(53%) ; m/z = 208(46%) ; m/z = 119 (39%).

2-{[(1E)-(4-bromophenyl)methylene]amino}acridin-9(10H)-one (9c).

Compound **6** (0.1g, 0.47mmol) and **7c** (0.088g, 0.47mmol) of p-bromobenzaldehyde were used to prepare **9c** as a green powder (mp =335 ^{o}C)(0.08g, yield 47%); Rf 0.64 ($CHCl_3$: CH_3OH - 9.5:0.5). ^{1}H-NMR(DMSO-d_6) δ: 7.28, t, 1H (J 7.5 Hz); 7.60, m, 2H; 7.77, m,4H; 7.94, t, 2H(J 8 Hz); 8.11, d, 1H (J 6 Hz); 8.25, t, 1H (J 7.5 Hz); 8.82(d,1H,HC=N), 11.911(s, 1H, NH). ^{13}C-NMR(DMSO-d_6) δ: 117.22, 117.93, 118.99, 120.05, 121.50, 121.70, 125.34, 126.48, 128.84, 130.91, 130.91, 132.36, 132.36, 133.98, 136.02,144.49, 148.78, 149.52, 159.10, 177.25.

2-{[(1E)-(4-chlorophenyl)methylene]amino}acridin-9(10H)-one (9d).

Compound **6** (0.1g, 0.47mmol) and **7d** (0.06g, 0.47mmol,) of p-chlorobenzaldehyde were used to prepare **9d** as a green powder (mp = 310 ^{o}C) (0.079g, yield 50%); Rf 0.61 ($CHCl_3$:CH_3OH - 9.5:0.5). ^{1}H-NMR(DMSO-d_6) δ: 7.26, s,1H; 7.60, m,4H; 7.42, m, 3H; 8.06, m, 3H; 8.24, s,1H; 8.84(s, 1H, HC=N); 11.91(s1H,NH). ^{13}C-NMR(DMSO-d_6) δ:117.22,117.94, 118.99, 120.89, 121.27, 121.69, 126.48, 128.85, 128.85, 129.43, 129.43, 130.71, 133.97,135.53, 136.51, 140.07, 141.14,144.64, 158.96, 177.17.

2-{[(1E)-(2-chlorophenyl)methylene]amino}acridin-9(10H)-one (9e).

Compound **6** (0.1g, 0.47mmol) and **7e** (0.06g, 0.47mmol) of o-chlorobenzaldehyde were used to prepare **9e** as a green powder (mp = 325 ^{o}C) (0.06g, yield 40%); Rf 0.48 ($CHCl_3$:CH_3OH - 9.5:0.5). ^{1}H-NMR(DMSO-d_6) δ: 7.29, t, 1H (J 8 Hz), 7.58, m, 5H; 7.80, m, 2H; 8.11, s, 1H; 8.21, m, 2H; 9.04(s,1H,HC=N); 11.90(s,1H,NH). ^{13}C-NMR(DMSO-d_6) δ: 117.65, 117.97, 119.19, 120.10, 121.00, 121,77, 124.13, 126,48, 128.16, 128.54, 128.81, 130.58, 133.31, 134.04, 136.24, 137.12, 140.15, 141.14, 155.64, 177.19.

2-{[(1E)-(4-methylphenyl)methylene]amino}acridin-9(10H)-one (9f).

Compound **6** (0.1g, 0.47mmol) and **7f** (0.057g, 0.47mmol) of p-tolualdehyde were used to prepare **9f** as a greenish-yellow crystal (mp = 320 ^{o}C) (0.06g, yield42%); Rf 0.62 ($CHCl_3$:CH_3OH - 9.5:0.5). ^{1}H-NMR(DMSO-d_6) δ: 2.4(s,3H,CH_3), 7.27, t, 1H(J 7.5 Hz); 7.35, d, 2H (J 8 Hz) 7.58, m, 2H; 7.77, m, 2H; 7.89, d, 2H(J 8 Hz); 8.07, m, 1H; 8.25, d, 1H(J 8 Hz); 8.76(s,1H,HC=N), 11.88(s,1H,NH). ^{13}C(DMSO-d_6) δ; 21.65, 116.85, 117.91, 118.94, 120.64, 121.34, 121.60, 126.49, 128.83, 129.15, 129.91, 130.05, 130.19, 133.90, 134.13, 139.80, 141.13, 141.87, 145.21, 160.08, 177.18.

2-{[(1E)-(4-hydroxy-3-methoxyphenyl)methylene]amino}acridin-9(10H)-one (9g).

Compound **6** (0.1g, 0.47mmol) and **7g** (0.072g, 0.47mmol) of vanillin were used to prepare **9g** as a yellow powder (mp = 280 ^{o}C) (0.04g, yield25%) Rf 0.46 ($CHCl_3$:CH_3OH- 9.5:0.5). ^{1}H-NMR(DMSO-d_6) δ: 3,87(s,3H,OCH_3), 6.91, d,

1H(J 8 Hz); 7.26,t,1H(J 8 Hz); 7.40,d, 1H(J 8 Hz); 7.57, m, 3H; 7.74, m, 2H; 8.02, s, 1H; 8.24, d, 1H(J 8 Hz); 8.63(s,1H,HC=N), 9.73(9s,1H,OH),11.86(s,1H,NH). ^{13}C-NMR(DMSO-d_6) δ: 56.04, 111.00, 115.85, 116.40, 117.88, 118.88, 120.23, 121.41, 121.53, 124.50, 126.49, 128.92, 132.02, 134.21, 139.24, 141.12, 145.65, 150.35, 153.53, 159.95, 177.01.

2-{[(1E,2E)-3-phenylprop-2-enylidene]amino}acridin-9(10H)-one (9h).

Compound **6** (0.1g, 0.47mmol) and **7h** (0.062g, 0.47mmol) of cinnamaldehyde were used to prepare **9h** as a yellow powder was collected (mp=295) (0.08g, yield 53%); Rf 0.68 ($CHCl_3$:CH_3OH- 9.5:0.5). ^{1}H-NMR(DMSOd_6)δ: 7.48, m,12H; 8.02, s, 1H; 8.25, d, 1H(J 7 Hz); 8.59, t,1H(J 8 Hz), 11.90(s,1H,NH). ^{13}C-NMR(DMSO-d_6) δ: 116.83, 117.92, 118.97, 120.64, 121.32, 121.63, 126.48, 128.04, 128.04, 128.68, 129.02, 129.43, 129.43, 130.00, 133.91, 136.06, 139.88, 141.11, 144.45, 145.22, 161.63, 177.18.

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