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Research Article

SYNTHESIS AND CHARACTERIZATION OF NOVEL SUBSTITUTED-1-(4-SUBSTITUTED BENZYL)-1H-INDOLO (2, 3-B) QUINOXALINE N-BENZYL INDOLE-2,3-DIONE MOIETIES

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ABSTRACT

Indole and its derivatives have occupied a unique place in the chemistry of nitrogen heterocyclic compounds. The indole derivatives were known for their dying properties. Hetero cyclic compounds represent an important class of biological molecules. The hetero cyclic molecules which posses indole, thiazole and tetrazole moieties exhibit wide range of biological activities. Indoles are one of the most important alkaloids molecules found extensively in biological systems, which play vital role in many of the biochemical process. Various novel Schiff bases derivatives were synthesized by a chain of reactions. Substituted isonitroso acetanilide were synthesized from substituted aniline and then further substituted-indole-2,3 dione (isatin) subsequently synthesized from substituted isonitroso acetanilide and finally yield different substituted-1-(4-substituted benzyl)-1H-indolo(2,3-b) quinoxaline N-benzyl indole-2,3-dione. All the synthesized compounds were identified by various methods and finally characterized by spectral analysis (IR, MS and NMR). Elemental analysis was also performed. Physical characteristics of Bromo-1-(4-methyl benzyl)-1H-indolo (2,3-b) quinoxaline N-benzyl indole-2,3-dione (compound QX5) was brownish solid; Yield: 80±4.14; Mol. Formula: $C_{22}H_{16}N_3Br$, Mol.Wt: 402.26; Melting Point: 192 -194°C, Rf values: 0.62±0.16 Maximum wave length (λ_{max}) in nm284; FTIR Spectra (KBr, cm^{-1}): 3054-CH stretching (aromatic); 2919-CH stretching (aliphatic); 2847-CH stretching (aliphatic); 1607-C-N stretching; 1H-NMR (DMSO, δppm)– 8.65-7.12-15H, Ar H, 5.67-2H, N-CH_2, 2.28-3H, CH_3; ^{13}C NMR-145.68-21.16; MS Spectra-402.28 and Physical characteristics of chloro-1-(4-methyl benzyl)-1H-indolo (2,3-b) quinoxaline N-benzyl indole-2,3-dione (compound QX4) was brownish solid Yield: 80±3.94; Mol. Formula: $C_{22}H_{16}ClN_3$ Mol. Wt: 357.82; Melting Point: 193-196°C, Rf values: 0.58±0.12, Maximum wave length (λ_{max}) in nm was 284; FTIR Spectra (KBr, cm^{-1}): 3056-CH stretching (aromatic); 2916-CH stretching (aliphatic); 2844-CH stretching (aliphatic); 1614 -C-N stretching; 1H-NMR (DMSO, δppm)– 8.52-7.1611H, Ar-H, 5.71-2H, N-CH_2, 2.36- 3H, CH_3; ^{13}C NMR-145.84-21.16; MS Spectra-357.83; CHN analysis- C%73.59 (73.84) H%3.23 (4.51) N%67.01 (11.75).

Key words: Isatin, Schiff bases, Quinoxaline N-benzyl indole-2,3-dione

INTRODUCTION

Isatin or 1*H*-indole-2, 3-dione is an indole derivative (**figure 1**). The compound was first obtained by Erdman and Laurent in 1841 as a product from the oxidation of indigo dye by nitric acid and chromic acids [1].

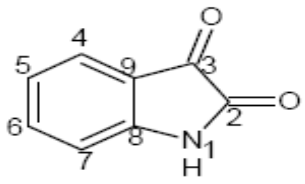

Figure 1: Isatin or 1*H*-indole-2, 3-dione or indole derivative

Isatin ring system consists of pyrrole ring fused with benzene ring [2]. A literature survey identified several isatin derivatives in the development phase as potential new drugs. In recent years, isatin are reported to exhibit a broad range of biological and pharmacological properties and are widely used as starting materials for the synthesis of a broad range of heterocyclic compounds and as substrates for drug synthesis [1]. Isatin moeity shows biological activites like antioxidant and anti-inflammatory [3], antimicrobial [4], antituberculosis [5], anticancer [6], anti-HIV [7], antiviral [8], anticonvulsant [9] activities.

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Many compounds of indole derivatives having the structural resemblance to the ancient dye indigo are known in the literature. A large number of naturally occurring compounds, like alkaloids, were found to possess indole nucleus. This synthetic technique is based on the empirical observation that some organic reactions proceed much faster and with higher yields under microwave irradiation as compared to conventional heating. In many cases reactions that normally require many hours at reflux temperature under classical conditions can be completed within several minutes or even seconds in a microwave oven [4, 7, 10-11].

Recent simplifications of MORE (microwave organic reaction enhancement) technique have increased safety and practical utility of the microwave oven for their use in organic laboratories without any modification. An eco-friendly method is an important salient feature of MORE chemistry, since it requires no solvent (dry media synthesis) or very little solvent as energy transfer medium. The focal point of chemical research in recent years is the development of resource and environmentally benign processes in terms of sustainable chemistry. In this regard development of new eco-friendly reactions, applications of microwave (MW) technology as nonconventional heating source are gaining considerable interest in the scientific community and pharmaceutical industry. Similarly, chemical processes with high atom economy have received growing interest from a green chemistry point of view. Pure products in quantitative yields have been reported with the use of microwave. Low boiling point, toxic and poisonous solvents are often avoided in microwave synthesis to avoid accidents. The use of microwave for the synthesis of organic compounds has proved to be efficient, safe and an environmentally benign technique with shorter reaction time [12-13].

Survival of the fittest is being the basis for life, so for the human being also. The biggest threats for human beings were disease and are still fighting against it with various forms of medications. Today's developed medicines are results of relentless effort made by human civilization time to time. When the era of synthetic drugs began, it opened thousand doors for the development of various synthetic molecules with potential action. But developing a new molecule every time was neither easy nor a wise Step too, so concept of derivatisation came. It is always better to synthesize a derivative of known molecule with known properties rather than to synthesize a totally unknown new molecule. In fact it is a wise step, in minimizing the toxicity as well as improving potency of the parent molecule. It is a rational approach towards the drug design and development, based upon the various physical and physiochemical Parameters [14].

Indole ring constitutes an important basic Skelton and development of the drug [15-17]. The classical indole drugs are indomethacin and indoxole. Indole derivetives found to posses high which includes, antibacterial, analgesic, antipyretic, antifungal, antiinflamatory, anthelmintic, cardiovascu-lar, anticonvalsant and selective COX-2 inhibitary activities [18].

Indoles are one of the most important alkaloids molecules found extensively in biological systems, which play vital role in many of the biochemical process. Various novel Schiff bases derivatives were synthesized by a chain of reactions. Substituted isonitroso acetanilide were synthesized from substituted aniline and then further substituted-indole-2,3 dione (isatin) subsequently synthesized from substituted isonitroso acetanilide and finally yield different substituted-1-(4-substituted benzyl)-1H-indolo(2,3-b) quinoxaline N-benzyl indole-2,3-dione. All the synthesized compounds were identified by various methods and finally characterized by spectral analysis (IR, MS and NMR). Elemental analysis was also performed.

MATERIALS & METHOD

All the chemicals and solvents used in the synthesis of Schiff bases were purchased as LR grade from S. D. Fine Chem. Ltd., Mumbai and Ranbaxy Fine Chemicals Ltd, New Delhi, India and were used directly without any further purification. Melting points were determined by open capillary method with Cambell Electronics, Bombay, India instrument. UV-Visible Spectrometer was UV-1800, Shimadzu, Tokyo, Japan. Infrared spectra (vmax in cm^{-1}) of synthesized compounds were recorded on Prestige-21, Shimadzu, Tokyo, Japan in the range of 400-4000 cm^{-1}. Mass spectra were recorded on JEOL SX 102/ DA-600 instrument. 1HNMR spectra (ppm, δ) were recorded on Bruker ultraspec 500 HZ/AMX 400MHZ/300MHZ spectrometer. CHN elemental analyzer was Perkin-Elmer CHN elemental analyzer.

METHODS:

Identification of starting materials:

Physical appearance:

Starting materials were inspected visually for physical appearance. It was physically characterized on the basis of organoleptic properties like color and odor.

Melting points and/or Boiling point

Melting points of starting materials (e.g. aniline, 4 methyl aniline, 4 chloro aniline, 4 bromo aniline, 4 nitro aniline) were determined by using a digital capillary melting point apparatus (Cambell Electronics, Bombay, India) by capillary fusion method. A capillary was taken and bringing it near the burner flame then sealed its one end. The open end of the capillary tube was pushed in to a small heap of chemicals, so that a small plug of the powder was collected in the open end and the tube was tapped gently, so that collected material was settled down. This process was repeated several times. Then the capillary tube was placed in the melting point determination apparatus and observed the temperature at which sample changes its state from solid to liquid. The experiment was performed in triplicate. The temperature at which starts to melt was noted with the help of thermometer.

Boiling points of all the starting compounds were determined by capillary method in liquid paraffin bath with the help of digital thermometer.

Thin layer chromatography:

All the starting materials (e.g. aniline, 4 methyl aniline, 4 chloro aniline, 4 bromo aniline, 4 nitro aniline) were further identified and confirmed by Thin Layer Chromatographic (TLC) study on readymade TLC plate in Toluene + methanol (95:5)V/V mixed solvent system and R_f values were matched with earlier reported values [1-2].

Ultraviolet spectrum:

20 mg of all the starting materials were dissolved individually in a 100 ml of respective solvent system. Then from this solution 10 ml was taken and volume was made up to 100 ml with respective solvent system, to make the solution concentration of 20 µg/ml & the resulting solution was scanned between 200-600 nm using UV-Visible spectrophotometer (UV-1800, Shimadzu, Tokyo, Japan). If the starting material is liquid in nature, then it was scanned directly in the range of 200-600 nm using UV-Visible spectrophotometer. The UV Spectra of the all starting materials were recorded and matched with earlier reported values.

SYNTHESIS OF SUBSTITUTED-INDOLE-2, 3 DIONE (ISATIN) AND FINAL PRODUCTS:

SCHEME (figure 2)

A. Synthesis of substituted isonitroso acetanilide from substituted aniline

B. Synthesis of substituted-indole-2,3 dione (isatin) from substituted isonitroso acetanilide

C. Synthesis of substituted-1-(4-substituted benzyl) indole-2,3-dione.

D. Substituted-1-(4-substituted benzyl)-1H-indolo(2,3-b) quinoxaline N-benzyl indole-2,3-dione

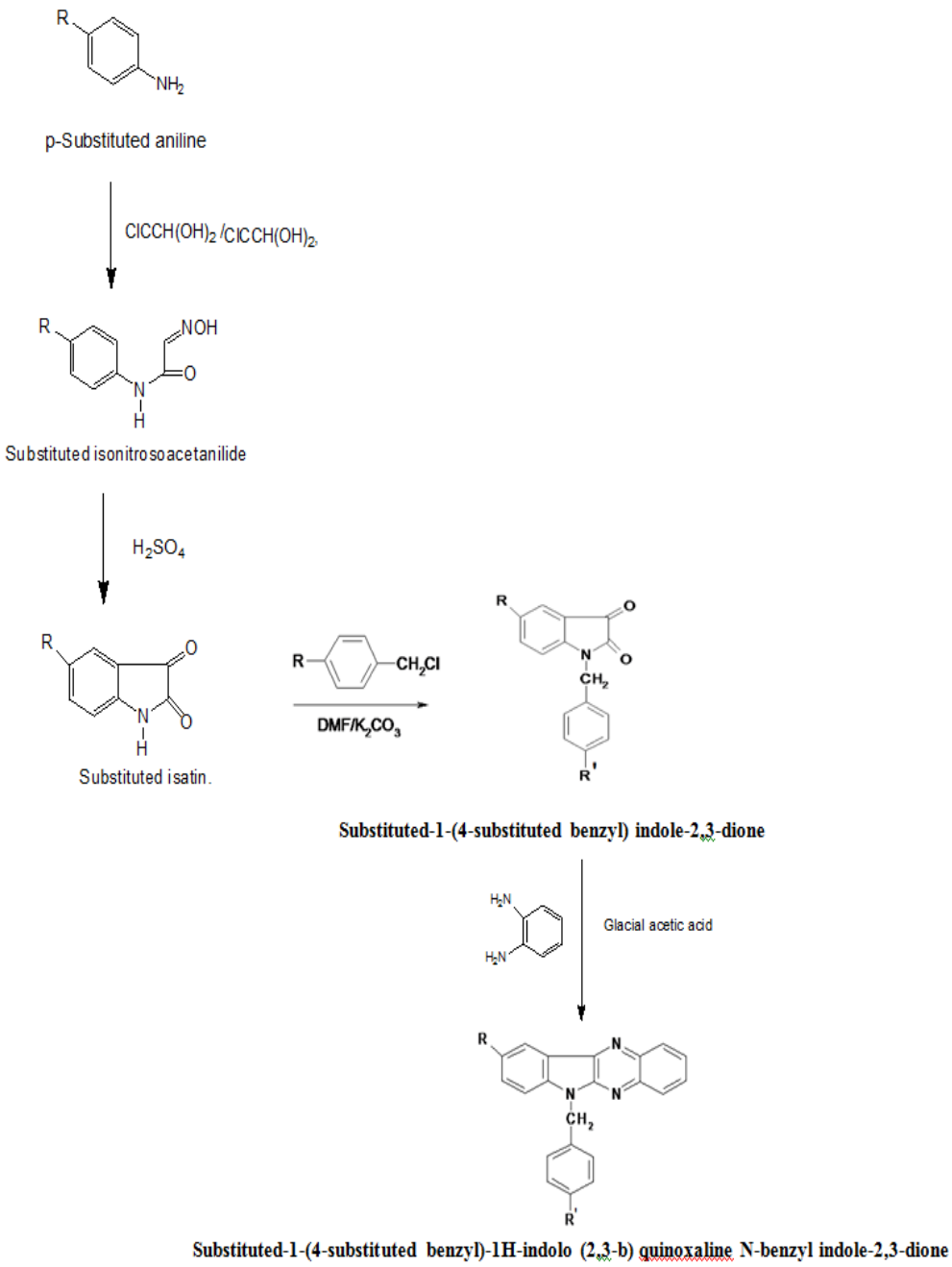


Figure 2: Scheme for the Synthesis of Proposed Schiff base

Derivatives of Isatin

Where R and R' are:

Compound	R	R'
QX1	Br	F
QX2	CH_3	F
QX3	CH_3	CH_3
QX4	Cl	CH_3
QX5	Br	CH_3

The experiment work comprises of [3-10]:

(A) Preparation of substituted isonitroso acetanilide from p-substituted aniline:-

100 ml round bottom flask was taken and 3.6 gm (0.05M) of chloral hydrate and 48 ml of purified water was taken in it. Then 44 gm of crystallized anhydrous sodium sulfate was added in it and a solution of substituted aniline (0.05 M) in 12 ml of water with 1.7 ml (0.052M) of concentrated hydrochloric acid was added to dissolve the amine, and finally, a solution of 4.5gm (0.158M) of hydroxylamine hydrochloride in 20 ml of water. The flask was heated over a heating mantle, so that vigorous boiling begins in about 40-45 minutes. After 1-2 minutes of vigorous boiling the reaction completes and during the heating period, some crystal of substituted isonitroso acetanilide separates. The final solution was cooled down under the running water and crystallized material was filtered on suction, and air dried.

(B) Preparation of substituted isatin from substituted isonitroso acetanilide:-

32.5 ml of concentrated sulfuric acid was warmed upto 50°C in a 100 ml round bottom flask with continuous stirring, and 7.5 gram of (0.046 M) of dry substituted isonitroso acetanilide was added to such a rate that to keep the temperature 60-70 but not higher. External cooling was applied at this stage to carry out the reactions more rapidly. After the addition of the substituted isonitroso acetanilide compound was finished, the solution was heated to 80°C and kept at this temperature for about 10 minutes to complete the reaction. Then the reaction mixture was cooled to room temperature and poured to 10-12 times its volume of cracked ice. After standing for about one and half hour the substituted isatin was filtered with suction, washed several times to cold water to remove the sulfuric acid, and then dried in the air. For purification the dried substituted isatin was dissolved in the 50 ml of hot water and suspension was made, to this hot reaction mixture added the solution of sodium hydroxide (5gm in 10 ml) till the complete dissolution of the substituted isatin. The resulting clear solution was neutralized slowly with dilute hydrochloric acid. Filtered the solution and made the solution acidic with the dilute hydrochloric acid. Cooled the solution and the crystals of different substituted isatins were separated. Filtered the product and dried in oven. The yield values and melting points were recorded of different substituted isatins like unsubstituted Isatin, 5-Chloro isatin, 5-Bromo isatin, 5-Methyl isatin and 5-Nitro isatin, and all the values were compared with reported values.

(C) Method of preparation of substituted N-benzyl indole-2,3-dione from substituted isatin.

In the round bottom flask take indole-2,3-dione (isatin) 0.00337 M and equimolar quantity of benzyl chloride mixed with 20 ml of dimethyl formamide (DMF) and to this mixture added 2 gm of potassium carbonate. After gentle mixing of this reaction mixture, reflux for 2 hour, cooled and poured to 100 ml of ice water cold water. The resultant precipitate collected washed with water and dried and recrystallised from ethanol-water mixture. Dried and checked the melting point.

(D) Method for preparation of substituted 1-benzyl-1H-indolo (2,3-b) quinoxaline FROM substituted N-benzyl indole-2,3-dione.

To the orange colored 1- (4 - substituted benzyl) - 1,3 - di hydro – indole - 2, 3-dione (1gm) equimolar quantity of orthophenylenediamine and 0.50 ml of glacial acetic acid was added and refluxed in 100ml of ethanol for two hours on water bath. The initial Colored solution slowly changes in to some fluffy solid crystals in the end of the reaction, which was verified by TLC on silica plates. Excess ethanol was removed and after drying, the compound purified by ethanol.

Identification and characterization of the compounds

The identification and characterization [4-8, 11-15] of the compound were carried out by the following procedure to ascertain structure and chemical nature of newly synthesized compounds-

- Physical appearance
- Melting points & boiling points
- Thin layer chromatography
- Ultraviolet spectrum
- I.R (Infra red spectroscopy)
- NMR (1H NMR, 13C NMR)
- FAB - MS
- Elemental CHN analysis

(i) Physical appearance:

All the intermediates and final synthesized products were inspected visually for physical appearance. It was physically characterized on the basis of organoleptic properties like color, odor and taste.

(ii) Determination of Melting points & Boiling point

This determination was obtained using a digital capillary melting point apparatus (Cambell Electronics, Bombay, India) by capillary fusion method. A capillary was taken and bringing it near the burner flame then sealed its one end. The open end of the capillary tube was pushed in to a small heap of drug, so that a small plug of the powder was collected in the open end and the tube was tapped gently, so that collected material was settled down. This process was repeated several times. Then the capillary tube was placed in the melting point determination apparatus and observed the temperature at which sample changes its state from solid to liquid. The experiment was performed in triplicate. The temperature at which starts to melt was noted with the help of thermometer.

Boiling points of all the intermediates and final synthesized products were determined by capillary method in liquid paraffin bath and all the data were matched with reported values (if available).

(iii) Thin layer chromatography:

All the synthesized materials were further identified and confirmed by Thin Layer Chromatographic (TLC) study on readymade TLC plate in a mixed solvent system and R_f values were matched with earlier reported values.

(iv) Ultraviolet spectrum:

UV/Visible spectra enables us o study the absorption pattern of the molecule and determination of λ_{max} which is useful for the quantitative estimation of the compound. 20 mg of all the synthesized materials were dissolved individually in a 100 ml of methanol. Then from this solution 10 ml was taken and volume was made up to 100 ml with methanol, to make the solution concentration of 20 µg/ml & the resulting solution was scanned between 200-600 nm using UV-Visible spectrophotometer (UV-1800, Shimadzu, Tokyo, Japan). The UV Spectra of the drug was recorded.

(v) IR Spectrum:

The IR spectrum of all the synthesized materials was recorded, which showed stretching and bending vibration levels of molecules in potassium bromide pellet by FTIR Spectrophotometer (Prestige-21, Shimadzu, and Tokyo, Japan) to monitor the identifications of drug between the ranges of 400 to 4000 cm^{-1}. The IR Spectra of the all the synthesized materials was recorded.

(vi) ^{1}HNMR spectra:

NMR spectroscopy enables us to record differences in magnetic properties of the various magnetic nuclei present and to deduce in the large measure about the position of these nuclei within the molecule. We can deduce how many different kinds of environments are there in the molecules and also which atoms are present in neighboring groups. The proton NMR spectra enable us to know different chemical and magnetic environments corresponding to protons in molecules.^{1}HNMR spectra of synthesized materials were recoeded in $CDCl_3$ and d6-DMSO on a Bruker ultraspec 500 HZ/AMX 400MHZ/300MHZ spectrometer at IISC Bangalore. The reported chemicals shifts were measured against TMS.

(vii) Mass spectra:

The advent of FABMS in which ion generation is achieved by bombardment of the sample by a beam of fast rare gas atoms resolved the limitation problem that the conventional electron impact mass spectrometry used to have in the characterization of high molecular weight cluster compounds. The FABMS spectra of these species are presented as a number of peaks with well resolved fine structures arising from the various possible isotopic combinations for a given molecular formula. FABMS is also extremely useful in determining the molecular formula of the parent cluster6. Assignments of the clusters fragments provide additional information about cluster composition. As an example the FAB spectrum for the supra cluster $[Pt_2 (AuPPh_3)_{10}Ag_{13}Cl_7]$ shows in the 4500 to 7000 range some masses assigned to molecular fragments. In general the most abundant peak in this range is due to the parent cluster molecular ion. Mass spectra were recorded by FAB-MS technique, at CDRI Lucknow.

(viii) Elemental CHN analysis:

Enables us to study the fragmentation pattern of the molecules and very important tool in determining the molecular mass of the unknown compound along with the C, H, N analysis. Perkin-Elmer CHN element analyzer was applied to ensure the accuracy of oxygenated percent in the liquid.

RESULTS & DISCUSSION

Identification of starting materials:

Table 1: Physical appearance of starting material [19-25]:

Sl. No.	Ingredients	Physical appearance	Compliance with reported values
1.	Aniline	Colorless, characteristic amine odor and burning taste	**Yes**
2.	4-methyl aniline	colorless solid, wine-like odor, and burning taste	**Yes**
3.	4-chloro aniline	Colorless crystals, slightly sweetish characteristic amine odor	**Yes**
4.	4-bromo aniline	Brown solid with a sweet odor	**Yes**

Table 2: Melting points and/or Boiling point [19-25]:

Sl. No.	Ingredients	Melting points	Boiling point	Compliance with reported values
1.	Aniline	-	183 -185 ^{o}C	**Yes**
2.	4-methyl aniline	44-46°C	200-202°C	**Yes**
3.	4-chloro aniline	69-71°C	232-234°C	**Yes**
4.	4-bromo aniline	60-63 °C	219-221 °C	**Yes**

Table 3: Thin layer chromatography of starting material [19-25]:

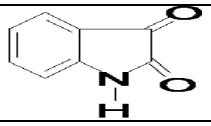
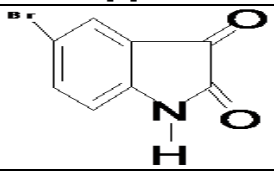
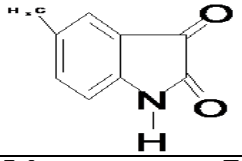
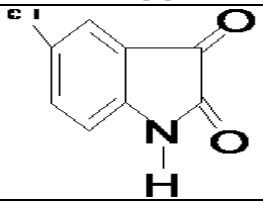
Sl. No.	Ingredients	Rf values (Toluene: Methanol - 95:5)	Compliance with reported values
1.	Aniline	**0.25±0.02**	**Yes**
2.	4-methyl aniline	**0.22±0.06**	**Yes**
3.	4-chloro aniline	**0.26±0.10**	**Yes**
4.	4-bromo aniline	**0.29±0.12**	**Yes**

Table 4: Ultraviolet spectrum of starting material [19-25]:

Sl. No.	Ingredients	Maximum wave length (λ_{max})	Compliance with reported values
1.	Aniline	230 nm in ethanol	**Yes**
2.	4-methyl aniline	294 nm in cyclohexane	**Yes**
3.	4-chloro aniline	242 nm in ethanol	**Yes**
4.	4-bromo aniline	245 nm in ethanol	**Yes**

CHARACTERIZATION OF THE INTERMEDIATE SYNTHESIZED COMPOUNDS

Table 5: Melting points and % yield of intermediate compounds

Sl. No.	Substituted Isatin or 1H-indole-2,3-dione	Structure of compound	Melting points (°C) Observed / (Reported)*	% yield
1.	Un-substituted Isatin		196-198°C (194-198°C)*	**75**
2.	5-Bromo isatin		248-250°C (247-252°C)*	**84**
3.	5-Methyl isatin		186-188°C (184-188°C)*	**79**
4.	5-Chloro isatin		243-246°C (240-246°C)*	**76**

***Matched with reported values [26]**

Starting materials was identified on the basis of physical characteristics like physical appearance, melting point, boiling point, R_f values, UV spectrums, it was compared.

Physical appearance of starting materials was tabulated in **table 1** and physical appearance of all the starting materials e.g., aniline, 4-methyl aniline, 4-chloro aniline and 4-bromo aniline were matched and complied with earlier reported parameters.
In the same way, melting points, boiling points of all the starting materials was tabulated in **table 2** and were matched and complied with earlier reported values.

TLC were carried out in toluene: methanol solvent system in a ratio of 95:05v/v and R_f values of all the starting materials were calculated and put into **table 3.** R_f values were fully complied with earlier reported values it was in a range between 0.22±0.06-0.29±0.12.

UV spectrums of all the starting materials were tabulated in **table 4** and were fully complied with earlier reported values.

Intermediate and final synthesized compound were characterized on the basis of various parameters like physical appearance, melting points (table 5), Thin Layer Chromatography, ultraviolet spectrum, FTIR (FT-Infra red spectroscopy), NMR (1H NMR, 13C NMR), FAB – MS and elemental CHN analysis.

CHARACTERIZATION OF THE SYNTHESIZED COMPOUNDS:

Physical characteristics of Bromo-1-(4-fluro methyl benzyl)-1H-indolo (2,3-b) quinoxaline N-benzyl indole-2,3-dione (QX1): was yellowish solids; **Yield:** 83±2.06%; **Mol. Formula:** $C_{21}H_{13}BrFN_3$; **Mol. Wt:** 406.13; **Melting Point:** 213-215°C, **Rf values:** 0.32±0.02, **Maximum wave length (λ_{max})** 284nm; **FTIR Spectra (KBr, cm^{-1}):** 3065-CH stretching (aromatic); 2917-CH stretching (aliphatic); 2848-CH stretching (aliphatic) 1604-C-N stretching; **1H-NMR (DMSO, δppm)–** 8.32-6.95-11H, Ar-H; 5.662H, N-CH_2.

Physical characteristics of Methyl-1-(4-fluro benzyl)-1H-indolo (2,3-b) quinoxaline N-benzyl indole-2,3-dione (QX2) was yellowish solid; **Yield:** 79±3.04%; **Mol. Formula:** $C_{22}H_{16}FN_3$; **Mol.Wt:** 341.25; **Melting Point:** 224-226°C, **Rf values-** 0.41±0.06, **Maximum wave length (λ_{max})** in nm was 243; **FTIR Spectra (KBr, cm^{-1}):** 3056- CH stretching (aromatic); 2917-CH stretching (aliphatic); 2848-CH stretching (aliphatic); 1604-C-N stretching; **1H-NMR (DMSO, δppm)–** 8.32-6.9811H, Ar-H; 5.66-2H, N-CH_2; 2.54-3H, CH_3.

Physical characteristics of methyl-1-(4-methyl benzyl)-1H-indolo (2,3-b) quinoxaline N-benzyl indole-2,3-dione (QX3) was yellowish solid, **Yield:** 78±2.46%; **Mol. Formula:** $C_{23}H_{19}N_3$, **Mol.Wt:** 337.41; **Melting Point:** 221-223°C, **Rf values-** 0.60±0.14, **Maximum wave length (λ_{max})** in nm was 242; **FTIR Spectra (KBr, cm^{-1}):** 3055-CH stretching (aromatic); 2922-CH stretching (aliphatic); 2852-CH stretching (aliphatic); 1617-C-N stretching; **1H-NMR (DMSO, δppm)–** 8.39-7.15-11H, Ar-H, 5.72-2H, N-CH_2, 2.59-3H, CH_3, 2.34- 3H, CH_3; **^{13}C NMR**-145.99-21.16; MS Spectra-337.42; CHN analysis found (reported) - **C%** 81.29 (81.88), **H%** 4.46 (5.69), **N%**12.25 (12.43).

Physical characteristics of chloro-1-(4-methyl benzyl)-1H-indolo (2,3-b) quinoxaline N-benzyl indole-2,3-dione (QX4) was brownish solid, **Yield:** 80±3.94%; **Mol. Formula:** $C_{22}H_{16}ClN_3$, **Mol. Wt:** 357.82; **Melting Point:** 193-196°C, **Rf values-** 0.58±0.12, **Maximum wave length (λ_{max})** in nm was 284; **FTIR Spectra (KBr, cm^{-1}):** 3056-CH stretching (aromatic); 2916-CH stretching (aliphatic); 2844-CH stretching (aliphatic); 1614 - C-N stretching; **1H-NMR (DMSO, δppm)–** 8.52-7.1611H, Ar-H, 5.71-2H, N-CH_2, 2.36- 3H, CH_3; **^{13}C NMR**-145.84-21.16; **MS Spectra**-357.83; CHN analysis found (reported) - **C%** 73.59 (73.84), **H%** 3.23 (4.51), **N%** 67.01 (11.75).

Physical characteristics of Bromo-1-(4-methyl benzyl)-1H-indolo (2,3-b) quinoxaline N-benzyl indole-2,3-dione (QX5) was brownish solid, **Yield:** 80±4.14%; **Mol. Formula:** $C_{22}H_{16}N_3Br$, **Mol.Wt:** 402.26; **Melting Point:** 192 -194°C, **Rf values-** 0.62±0.16, **Maximum wave length (λ_{max})** in nm was 284; **FTIR Spectra (KBr, cm^{-1}):** 3054-CH stretching (aromatic); 2919-CH stretching (aliphatic); 2847-CH stretching (aliphatic); 1607-C-N stretching; **1H-NMR (DMSO, δppm)–** 8.65-7.12-15H, Ar H, 5.67-2H, N-CH_2, 2.28-3H, CH_3; **^{13}C NMR**-145.68-21.16; MS Spectra-402.28.

CONCLUSIONS

Starting materials were identified by physical, chromatographic and spectral analysis. The chemical structures of the synthesized compounds were established on the basis of physical, chemical, analytical data. The purification of the compounds was carried by purification methods like recrystallization. Physical constant like melting point, boiling point etc, of the new compounds were determined. The purity and progress of the reactions were monitored by TLC, and column chromatography (if needed) by using suitable solvents and UV, FTIR, NMR, CHN analysis and MASS spectral data were used for the characterization of the synthesized compounds by sending the sample to various advanced research laboratory.

The main objective of the present investigation was to discover newer molecules with potent biological and pharmacological activity such as anti microbial activity on different microbial strain, Analgesic & Anti inflammatory activity on animal model and anthelmentic activity on Pheritma phosthuma and results of all this activities were not included in this article.

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