A New Avenue for the Synthesis of Some Biologically Active Isatin Derivatives

THESIS SUBMITTED IN PARTIAL FULFILLMENT FOR THE AWARD OF DEGREE

DOCTOR OF PHILOSOPHY

By

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SUMMARY AND CONCLUSION

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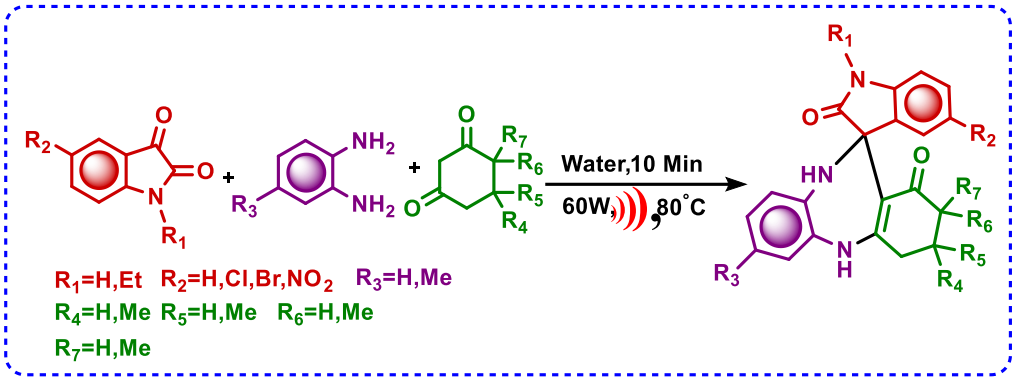
The thesis entitled "**A new avenue for the synthesis of some biologically active Isatin derivatives**" described the effective synthesis of biologically active isatin derivatives. The contents of the thesis have been divided into six chapters.

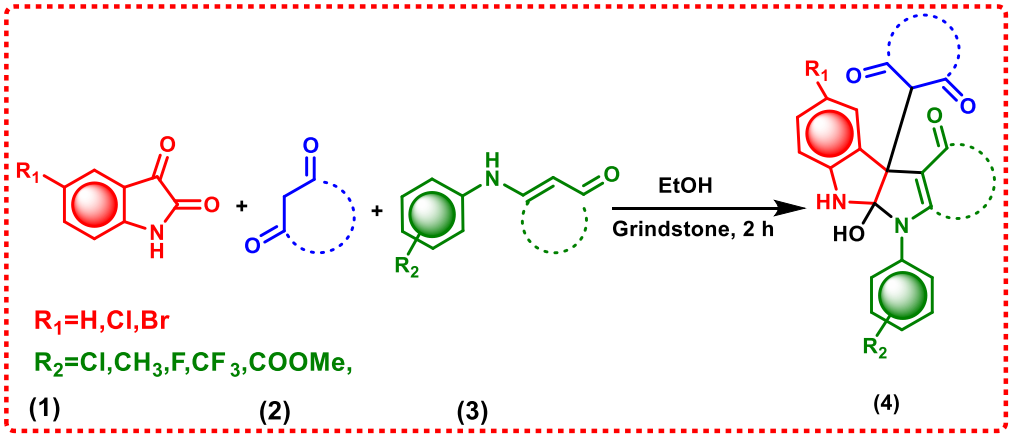
Chapter 1 Provide a general introduction to isatins, such as the synthesis of isatin, biological importance, and physical and chemical properties, and also adds the various synthetic application of isatin, i.e., N- substitution at isatin, the reactivity of carbonyl group of isatin, oxidation, reduction, the electrophilic aromatic substitution of isatin.

Chapter 2 described a facile and efficient multicomponent synthesis of a benzodiazepine ring via the reaction of isatin, diphenylamine, and 1,3-diketone under ultrasound irradiation in water. This method was successfully achieved by the condensation reaction of 1, 2-phenylenediamine with 1, 3-diketone in water, followed by intramolecular cyclization of isatin. This developed method offers advantages in terms of excellent yield, easy work-up procedure without column chromatography, short reaction time, and also validate without catalyst **(Scheme A)**.



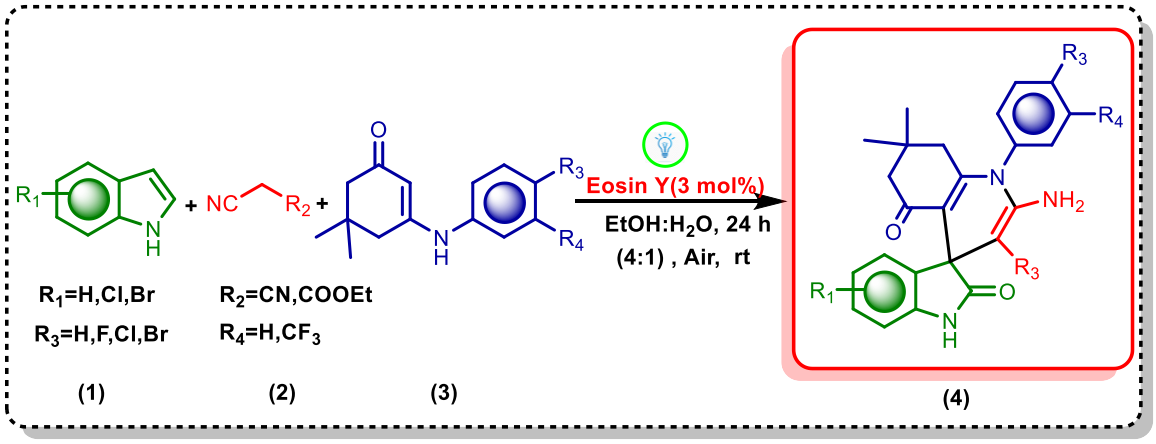
Scheme A Synthesis of benzodiazepine ring

Chapter 3 explained a grinding-induced catalyst-free, multicomponent synthesis of indoloindole pyrimidine from isatin, barbituric acid, and enaminone under ethanol as a solvent at room temperature. The grinding methodology has been exploited as a simple experimental setup, energy-efficient, economical, ecologically favorable procedure, and easy work-up without column chromatography. The present methodology includes isolating the product by a simple crystallization method **(Scheme B**).



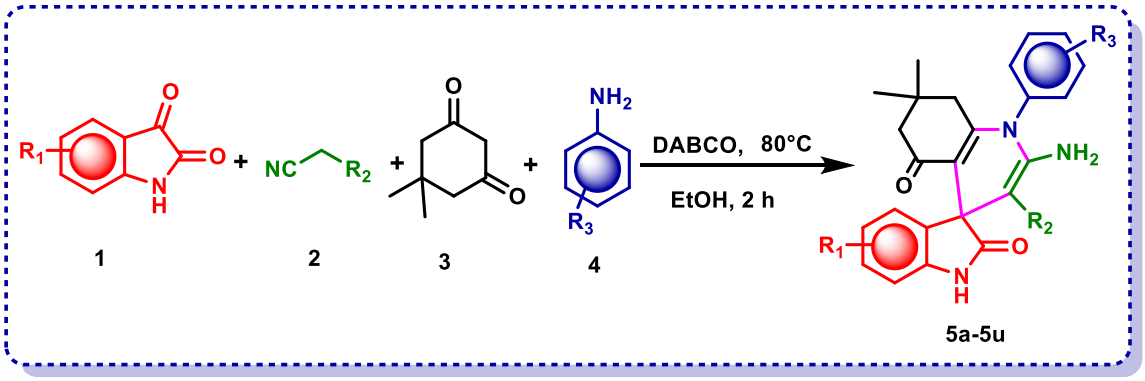
Scheme B Synthesis of indoloindole pyrimidine derivatives

Chapter 4 explores a facile and ecologically friendly one-pot multicomponent synthesis of biologically active spiro [indoline-3, 4'-quinoline] derivatives via oxidative coupling of indole with enaminone and malononitrile under EtOH: H2O (4:1) as a solvent. The reaction proceeded under eosin Y as a photocatalyst to form the product in good to excellent yields with a range of substrate scopes. Visible light has been exploited as an environment-friendly energy source, inexpensive and green, and yield of the product was obtained with high yields without any chromatographic purification **(Scheme C)**.



Scheme C Synthesis of biologically active spiro [indoline-3, 4'-quinoline] derivatives

Chapter 5 illustrated a facile, efficient and environment-friendly, easy work, short reaction time approach for the synthesis of Spiro[Indoline-3,4'-Quinoline] via one pot, four-component reaction of amine, dimedone, isatin, and malononitrile using DABCO in the presence of ethanol at 80 ^{0}C. This methodology used for the transformation of C-C and C-N bond formation takes place under mild reaction conditions (**Scheme D**).



Scheme D Synthesis of spiro [indoline-3, 4'-quinoline] derivatives

Conclusions

Various novel isatin derivatives were synthesized using environmentally benign methods such as ultrasound-assisted organic synthesis, grinding-induced organic synthesis, visible light-mediated organic synthesis, DABCO-catalyzed organic synthesis, and TBHP-mediated organic synthesis. Synthetic methodologies developed for the synthesis of isatin derivatives have many advantages, such as high yield, and mild reaction conditions, and the products can be isolated very easily without the use of column chromatography. The simplicity of the presented protocols makes it an interesting alternative to other approaches. Synthesized isatin derivatives can be attractive entities for biological investigations.

Scope for Future work

1. The synthesized compounds benzodiazepine ring , Indoloindolpyrimidine, spiro[indoline-3,4’-quinoline] derivative may be used for biological activities such as anti inflammatory,antimicrobial,antiviral ,antibacterial etc.
2. Further, explore the indole as a surrogate for the construction of some privileged heterocycles.
3. Development of different methodologies like metal-free, ultrasound assisted, grinding induced, and visible light irradiation to synthesize heterocyclic scaffold and biologically active compounds.