IJRAR.ORG E-ISSN: 2348-1269, P-ISSN: 2349-5138

INTERNATIONAL JOURNAL OF RESEARCH AND ANALYTICAL REVIEWS (IJRAR) | IJRAR.ORG

An International Open Access, Peer-reviewed, Refereed Journal

PREPARATION AND CHARACTERIZATION OF MEDICINALLY SIGNIFICANT 1,2-DIHYDROQUINOLINES

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ABSTRACT

It describes the general introduction of Quinoline, Sulphonamides and Amide derivatives with 1,2-dihydroquinoline and quinoline heterocyclic ring system and their biological importance, synthetic procedure developed in earlier works and their pharmacological applications. Deals with the synthesis of novel N-(1-(2-(4-substituted-sulfonamido) phenyl)-4-methyl-2-oxo-1,2-dihydroquinolin-7-yl) acetamide derivatives. The scaffold 1,2 dihydroquinoline ring was formed by the reaction of O-phenylenediamine with N (4 methyl-2-oxo-2H-chromen-7-yl) acetamide rearrangement takes place leading to ring opening and subsequent elimination of water afforded N-[1-(2-aminophenyl)-4 methyl-2-oxo-1,2-dihydroquinolin-7-yl] acetamide. Structures of the newly synthesized compounds were characterized by IR, 1H NMR, 13C NMR, LC-MS, HPLC spectra and CHNS elemental analysis. Reveals that the strategic synthesis of novel N-(1-(2-(2-substituted benzylamine) phenyl)-4-methyl-2-oxo-1,2-dihydroquinolin-7-yl) acetamides. Here key intermediate was prepared via the reaction of O-phenylenediamine with N (4-methyl 2-oxo-2H-chromen-7-yl) acetamide rearrangement takes place leading to ring opening and subsequent elimination of water afforded N-[1-(2-aminophenyl)-4-methyl-2-oxo 1,2-dihydroquinolin-7-yl] acetamide under conventional method. Structures of the newly synthesized compounds were characterized by IR, 1H NMR, 13C NMR, LC MS, HPLC spectra and CHNS elemental analysis. Deals about the synthesis of novel N-(2-(7-acetamido-4-methyl-2 oxoquinolin-1(2H)-yl) phenyl)-2-substituted-benzamides containing 1,2-dihydro quinoline nucleus. In this chapter, we synthesized eight amides. Structures of the newly synthesized compounds were characterized by IR, and elemental analysis.

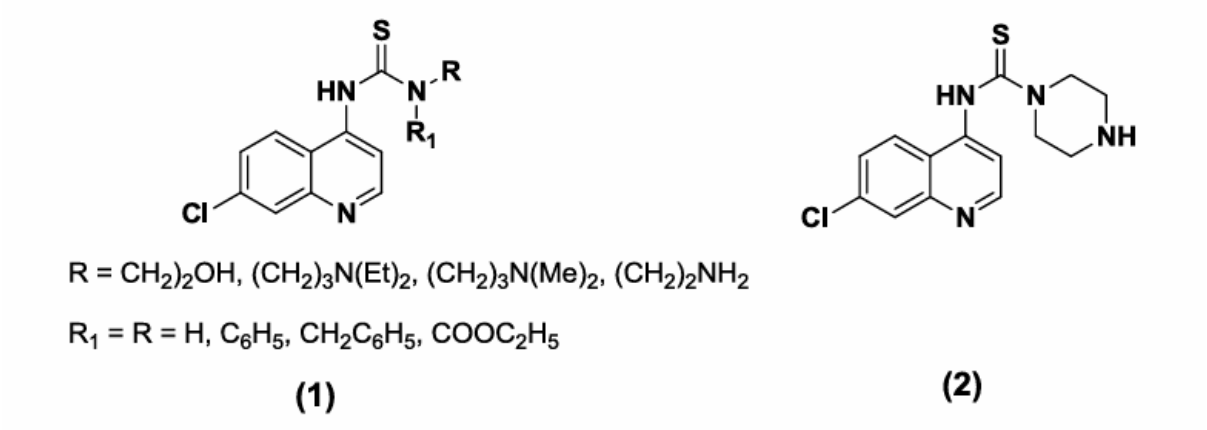
INTRODUCTION

1.Importance of Quinoline

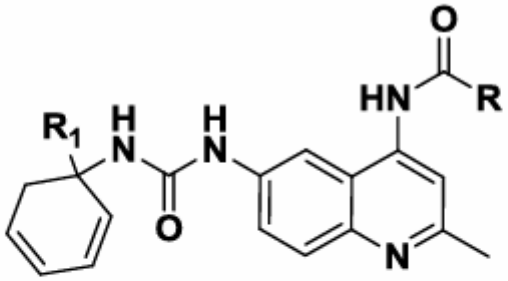
Quinoline is a heterocyclic base and was first isolated in 1834 by Runge [1] from coal tar and he named it as Leukol. Later in 1842 Gerhardt [2] isolated it by heating the alkaloid cinchonine with alkali and named as quinoline. Large numbers of quinoline derivatives have been isolated from petroleum products [3]. Certain quinoline substances derived from natural or synthetic origin find significant use in the field of medicinal chemistry. Quinoline motifs are widely used as bioactive agents [4-7]. These heterocycles are used in the preparation of virucides, biocides, alkaloids, rubber chemicals and fragrant substances [8]. In addition, these compounds are used in the chemistry of metal catalysts of transition elements for polymerization process and luminescence properties [9]. Quinoline derivatives are used at refineries in the form of antifoaming agents [10]. Therefore, great interest has been created among synthetic organic and medicinal chemists for the synthesis of quinolines. Based on the literature survey the following section discusses the important biological activities exhibited by the quinoline derivatives.

1.2 Antimalarial activity

Quinoline is one among the effective drug to treat malaria. Mahajan et al. [11] synthesized 7-chloroquinolinyl thioureas (1, 2) potential antimalarial agents.



Ureido-4-quinolinamides (3) have been synthesized by Modapa et al. [12] which exhibited antimalarial activity against Plasmodium falciparum which is a chloroquine sensitive.

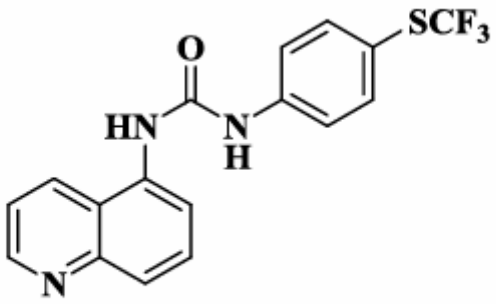


R = Me, Ph, CH_3Cl, 2-ClC_6H_5, 3-ClC_6H_5, 2-Furyl
R_1 = F, Cl, Br, CF_3

(3)

1.3 Analgesic activity

Gomtsyan et al. [13] synthesized a quinolone (4) based analgesic and its effect was result of antagonism on the receptors of Vanilloid.



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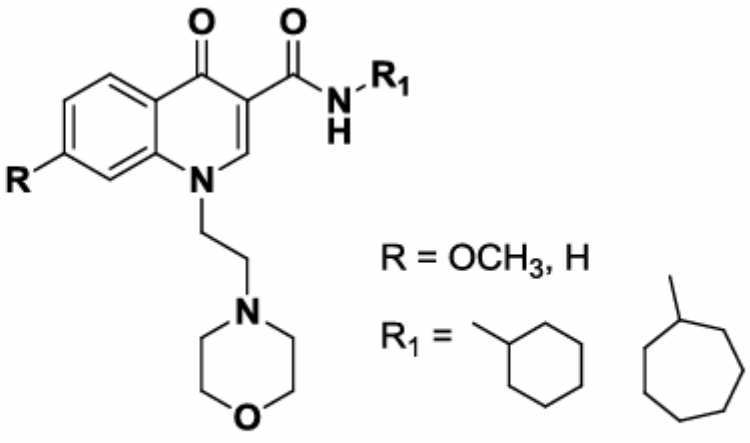
Manera et al. [14] have prepared quinoline derivatives (5) in order to find selective agents receptors of Cannabinoid CB2. Some of the compounds showed good activity.



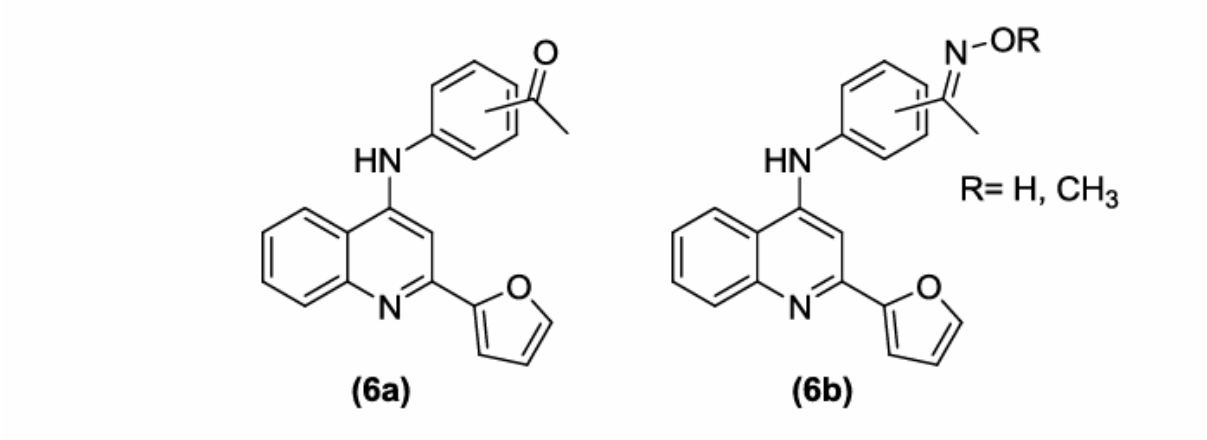
R = OCH_3, H

R_1 =

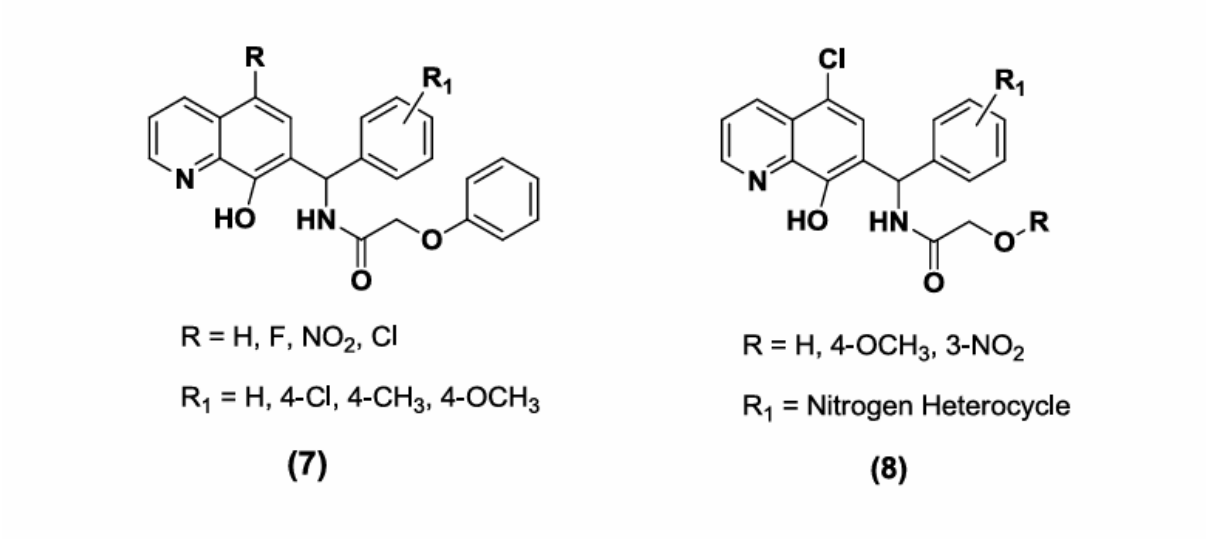
(5)

1.4 Anti-inflammatory activity

Chen et al. [15] developed Furan containing phenoxy-quinoline compounds (6a, 6b) and Chen et al reported that they inhibit lysozyme and b-glucuronidase release.

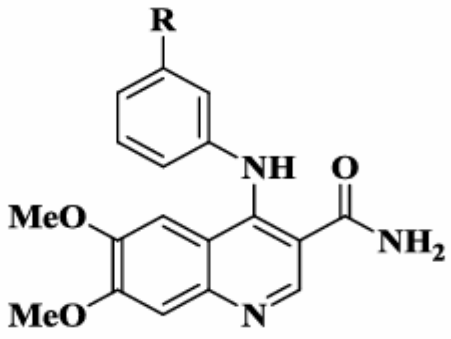


Gilbert et al. [16] developed certain quinoline derivatives (7, 8) for treating osteoarthritis.



1.5 **Antineoplastic activity**

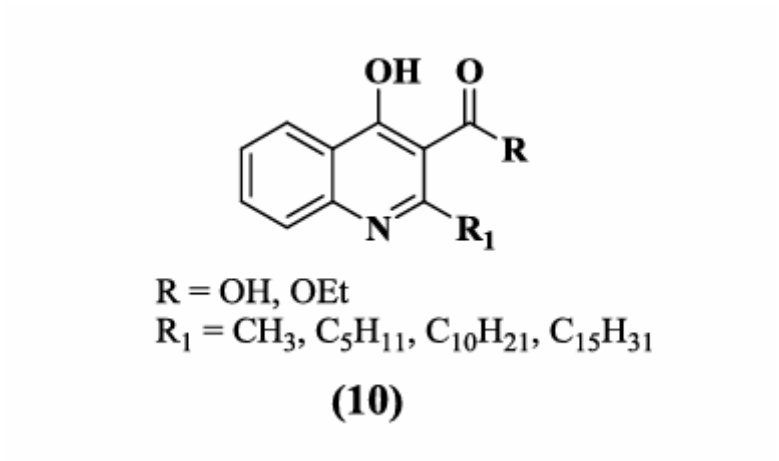
Scott et al. [17] prepared amido-anilino quinolines (9) and they behave as anti-tumour agents by inhibiting CSF-1R kinase.



R = F, Cl, Br, CH_3

(9)

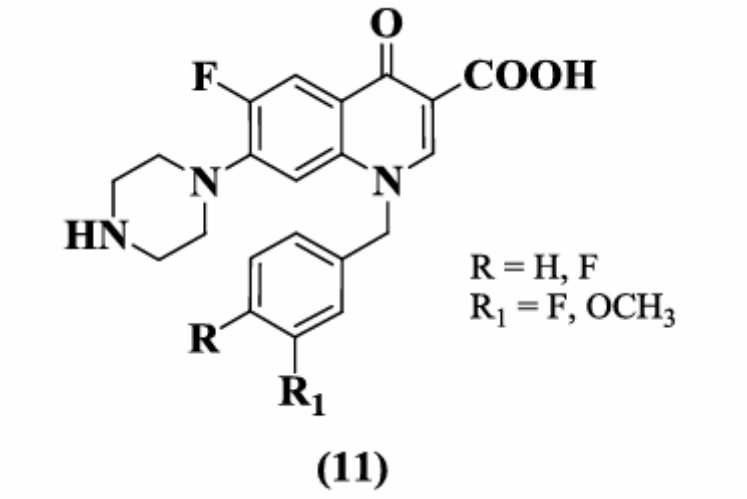
Mai et al. [18] synthesized novel 4-hydroxyquinolines (10) and they reported that 4 hydroxyquinolines inhibit histone acetyltransferase (HAT).



(10)

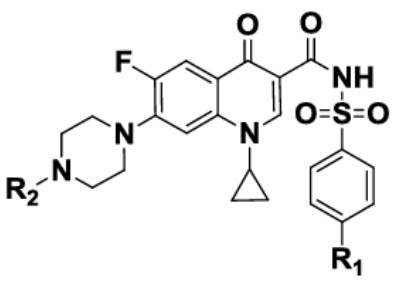
1.6 Antibacterial activity

Jain et al. [19] prepared a series of novel l-substituted piperazine dihydroquinoline carboxylic acids (11). The invitro activity of the prepared compounds was performed against various Gram -ve and Gram +ve bacteria. A few of them showed promising antibacterial activity.



(11)

Novel series of sulphonamide containing substituted piperazine quinoline carboxylic acids (12, 13) have been prepared and screened against various bacteria using cup plate method. Compounds proved promising antibacterial activity against selected bacterial strains [20].



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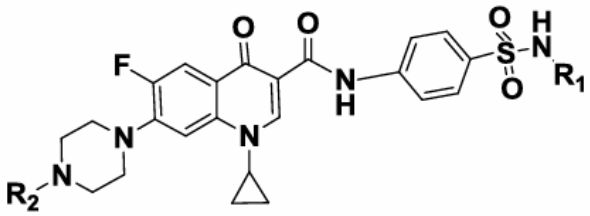
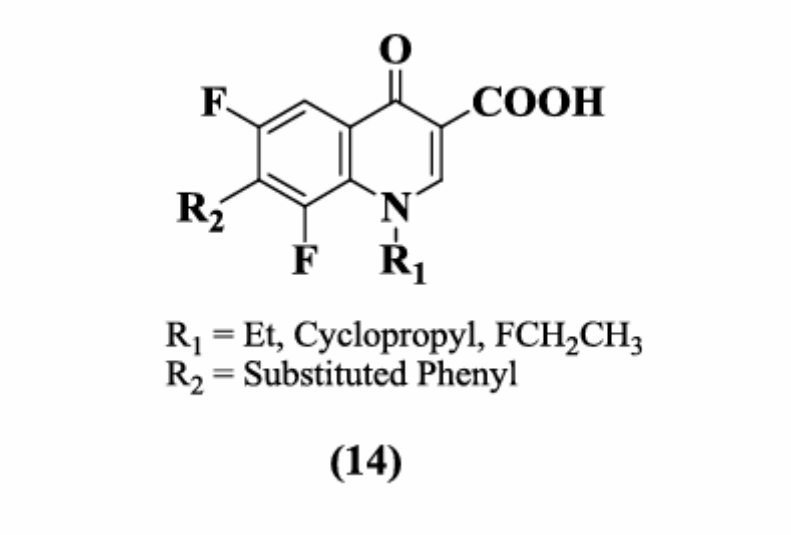


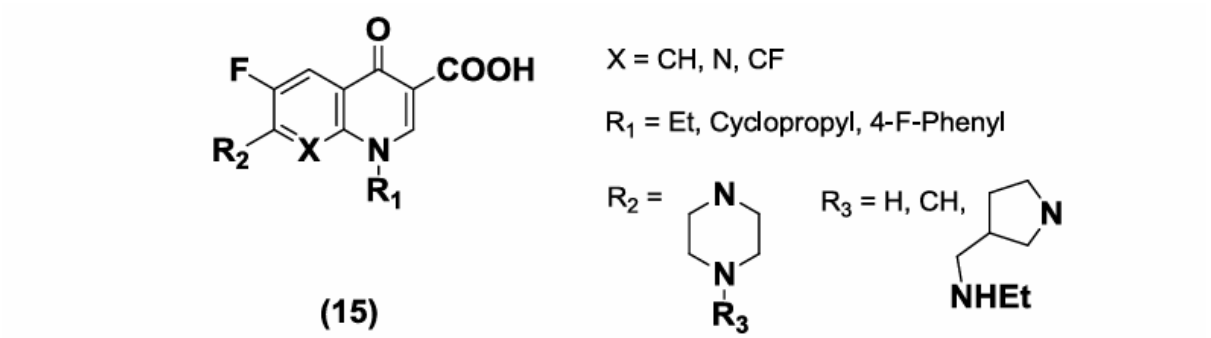
(13)

Ma et al. [21] have developed substituted quinolines (14) with benzyloxy, phenoxy and phenylthiol groups and these derivatives have exhibited fair amount of antibacterial effect.



(14)

Sanchez et al. [22] prepared some substituted carboxylic acids of quinoline moiety (15) and they are checked for their antibacterial potency, few compounds possessed anti-bacterial activity.



(15)

1.7 Importance of Sulphonamides and amides

Sulphonamides represent first line members basically used as drugs against various diseases. This functionality can be seen in clinically available 30 drugs, including antibacterial antihypertensive, antiprotozoal, anti-inflammatory, antifungal, nonpeptidic vasopressin receptor antagonists and translation initiation inhibitors. Certain important sulphonamide derivatives used as carbonic anhydrase inhibitors of commercial importance. They are also effective for the treatment of urinary, intestine, and ophthalmic infections, scalds, rheumatoid arthritis, ulcerative colitis, male erectile dysfunction as the phosphodiesterase-5 inhibitor sildenafil–better known under its commercial name Viagra and obesity. **(21)**

More recently, sulphonamides are used as an anticancer agent, as the antiviral HIV protease inhibitor amprenavir and in Alzheimer's disease. N1 group has the greatest effect that leads to lipophilicity which binds on protein, and the more sulphonamide-capable lipids are, the more protein they are involved. The amino group of aniline (N4) is actual significant for activity, because any changes of it other than the production of prodrugs lead to the loss of activity. Moreover, sulphonamides will become inactive when p-amino group is acylated, the benzene is substituted and the sulphonamide group, which is not directly attached to the benzene. Subsequent studies have shown that modified sulphonamides show high and moderate antibacterial activity. **(22)**

Aliphatic sulphonamides have strong antibacterial activity against Gram (-) bacteria relative to Gram (+) and antibacterial activity decreases by increasing the carbon chain length. On the other hand, amides are of great importance in synthetic organic chemistry because of the numerous natural products contains the amide linkage which constitutes the key functional group and potential drug compounds that contain amide bond. Amide linkage containing derivatives were allied with wide-ranging spectrum of biological activities including anticonvulsant, antituberculosis, analgesic, antitumor properties and insecticidal. This section discusses the some of the important quinoline derivatives with sulphonamides and amide functionalities. Smith and coworkers developed Quinoline based NK3 receptor antagonists and with CNS activity**. (23)**

1.8 Applications of Sulphonamides(24)

Sulphonamides are synthetic compounds containing the **$-SO_2NH_2$ functional group**. They are widely used in **pharmaceuticals and medicine**.

1. Antibacterial drugs

- Sulphonamides were among the first effective **synthetic antimicrobial agents**.
- They inhibit **folic acid synthesis in bacteria**, stopping bacterial growth.

Examples:

- Sulfamethoxazole
- Sulfadiazine
- Sulfisoxazole

2.Treatments(24)

They are used to treat:

- Urinary tract infections (UTIs)
- Respiratory infections
- Intestinal infections
- Wound infections

3.Antimalarial(25)

Some sulphonamide derivatives are used in malaria treatment.

Example: Sulfadoxine (often combined with Pyrimethamine).

4.Antidiabetic

Certain sulphonamide derivatives are used as oral hypoglycemic agents.

Example: Tolbutamide and Glibenclamide.

5.Diuretics

Some diuretic drugs contain the sulphonamide group.

Example: Furosemide.

6. Treatment of burns

- Silver sulfadiazine is widely used in burn infections.

2. Applications of Amides

Amides contain the **–CONH₂ functional group** and are important in **biology, pharmaceuticals, and industry**.

1.Pharmaceutical Drugs: Many drugs contain an amide group.

Examples:

- Paracetamol – analgesic and antipyretic
- Lidocaine – local anesthetic
- Penicillin – antibiotic

2. Formation of proteins

- Proteins are made of amino acids linked by **peptide bonds**, which are **amide bonds**.

3.Production of synthetic fibres(26)

- Amides are used to make polyamides such as: Nylon
  These fibers are used in textiles, ropes, and engineering plastics.
- **4.Solvents**
  Some amides act as industrial solvents, such as: Dimethylformamide (DMF)

5. Fertilizers

- Urea is an important nitrogen fertilizer.

6.Plastic and polymer industry

- Polyamides are used in: Engineering plastics
- Automobile parts
- Electrical component

CHAPTER 2

LITERATURE REVIEW

1. Ahemad et al., 2024 – Design and synthesis of sugar-fused 1,2-dihydroquinoline/chromene triazoles via copper-catalysed one-pot click and arylation; characterized by ^1H/^13C NMR & HRMS. The reaction integrates three important reactions in a single step: Azide–alkyne cycloaddition (click chemistry), Copper(I) catalysis promotes cycloaddition between azide and alkyne groups. Produces 1,2,3-triazole rings with high regioselectivity. Intramolecular arylation Formation of the dihydroquinoline ring system occurs through aryl C–N bond formation. Sugar conjugation, Sugar moieties enhance water solubility and biological compatibility.
2. Efficient synthesis of 2-imino-1,2-dihydroquinolines via copper-catalysed domino reaction – One-pot domino method to prepare biologically useful 1,2-DHQs; NMR/IR characterization described.
   A domino reaction involves multiple bond-forming steps occurring sequentially without isolation of intermediates. The mechanism includes: Activation of substrate by Cu catalyst,
   Nucleophilic attack on activated carbonyl or imineCyclization forming the dihydroquinoline core, Formation of imino functional group
3. Schneider & Devery, 2020 – Hydrazine-catalysed ring-closing carbonyl-olefin metathesis for 1,2-DHQ synthesis; includes spectral (NMR, crystallography) data. Carbonyl-olefin metathesis involves exchange of carbonyl and olefin fragments. Mechanistic steps: Hydrazine catalyst reacts with carbonyl group, Formation of hydrazinium intermediate, Intramolecular cyclization with olefin, Release of catalyst forming 1,2-dihydroquinoline ring.
4. Xu-Xu et al., 2020 – Conversion of quinolines to 1,2-dihydroquinolines with sodium cyanoborohydride; detailed spectral characterization. Quinolines are aromatic heterocycles. Partial reduction produces dihydroquinolines. Reaction mechanism: Hydride transfer from $NaBH_3CN$, Protonation of nitrogen atom, Reduction of the C=N bond, Formation of 1,2-dihydroquinoline
5. Kobayashi et al., 1999 – Magnesium amide-induced sequential condensation to 1,2-DHQ-3-carboxylic acids; spectral characterization. Magnesium amide acts as: Strong base Nucleophilic activator Mechanism: Deprotonation of starting amide, Nucleophilic attack on aldehyde/ketone, Cyclization, Formation of carboxylated dihydroquinoline.
6. Banu et al., 2018 – Synthesis of piperazinyl-1,2-DHQ carboxylates; antimicrobial evaluation and molecular docking. Piperazine rings are widely used in medicinal chemistry because they: Improve drug solubility, enhance biological activity, Synthetic strategy: Formation of 1,2-DHQ core, Substitution with piperazine derivatives, Esterification to form carboxylates, Biological Evaluation, Antimicrobial activity testing Molecular docking studies.
7. Takii et al., 2025 – Synthesis of ethynyl substituted 1,2-DHQ N-oxyl radicals; crystal structure and magnetic characterization. Radical compounds contain unpaired electrons and show interesting magnetic properties. Steps involved: Introduction of ethynyl group, Oxidation of nitrogen to form N-

oxyl radical, Characterization-ray crystallography, Electron spin resonance, Magnetic susceptibility measurements.

8. Tabassum et al., 2020 – One-pot three-component synthesis of 7-hydroxy-4-phenyl-1,2-DHQs; FTIR, ^1H/^13C NMR & MS characterization. The mechanism includes: Knoevenagel condensation, Michael addition, Cyclization to form dihydroquinoline
9. Alzweiri et al., 2022 – Synthesis of 2-oxo-1,2-DHQ-3-carboxamides as AChE inhibitors; medicinal chemistry focus. Acetylcholinesterase inhibitors are important in treating Alzheimer's disease. Structural modification involved: Introducing carboxamide groups, Increasing interaction with enzyme active sites. Techniques: Organic synthesis, Docking studies. Enzyme inhibition assays.
10. Huddar et al., 2020 – Discovery of 4-hydroxy-2-oxo-1,2-DHQs as potential antibacterial agents. his research focused on antibacterial heterocycles. Theory: Hydroxy and oxo functional groups increase: Hydrogen bonding, Enzyme binding. Activity: Compounds showed activity against: Gram-positive bacteria, Gram-negative bacteria
11. Shahin et al., 2018 – 2-oxo-1,2-DHQ-4-carboxamide derivatives for oesophageal SCC; synthetic & spectral approaches. Several studies (Shahin 2018, Agwupuye 2022, Hayani 2021, Islamoglu (2024) emphasize: Structure-Activity Relationship (SAR)Substituent effects on biological activity. Computational Chemistry, Density Functional Theory (DFT), Molecular docking, ADMET prediction. Spectroscopic Characterization; NMR, IR, Mass spectroscopy, X-ray crystallography
12. Agwupuye et al., 2022 – DFT & molecular modelling with synthesis of methyl 2,8-dichloro-1,2-DHQs; spectroscopic characterization. Recent reviews discuss modern synthetic strategies:
13. Skraup Reaction: Traditional method for quinoline synthesis using: Aniline, Glycerol, Oxidizing agent, Catalytic Innovations, Modern catalysts include: Iron catalysts, Cobalt catalysts, Gold catalysts
14. Hayani et al., 2021 – Alkyl 1,2-DHQ-4-carboxylates: synthesis, crystal structure, spectroscopic analysis, docking.
15. Islamoğlu, 2024 – In silico ADME/toxicity & docking on 1,2-DHQ derivatives; discussed structural features relevant to drug design.
16. Tabassum et al., 2020 (Heliyon) – Comprehensive spectral characterization of 1,2-DHQs synthesized via three-component reaction.
17. Qiu et al., 2025 (Review) – Recent advances in Skraup-type 1,2-DHQ synthesis: catalysts, mechanisms, substrate scope.
18. Z. Wang et al., 2012 – Iron-catalysed intramolecular amination to 1,2-DHQs with spectral data.
19. C. C. Bories et al., 2023 – Hydrido-cobalt-catalyzed DE aromatization to 1,2-DHQs; efficient under mild conditions.
20. P. Kothandaraman et al., 2009 – AuCl3/AgSbF6-catalyzed intramolecular allylic amination & characterization.
21. Rani et al., 2024 – Paper on synthesis of 1,2-DHQ sulfonamides; antibacterial testing and ^1H/^13C NMR data.

22. Mishra et al., 2021 (Review) – Quinoline derivatives overview including 1,2-DHQs and biological relevance.
23. Annor-Gyamfi et al., 2021 – Bioactive 1,2-DHQs overview; discusses synthesis routes & pharmaceutical potential.
24. Manahelohe et al., 2024 – Review on methods for synthesizing quinoline and 1,2-DHQ derivatives based on Skraup reaction.
25. Mohasin, 2024 (Review) – Synthesis and pharma applications of quinoline/1,2-DHQs with literature summary.
26. Islamoğlu et al., 2024 (in silico) – Theoretical studies supporting design/synthesis with docking & ADMET insight.

CHAPTER 3

AIM AND OBJECTIVES

1. Synthesis and Characterization of 1,2-dihydroquinoline Sulphonamides.
2. Synthesis and Characterization of Benzylated 1,2- dihydroquinoline derivatives.
3. Synthesis and Characterization of 1,2-dihydroquinoline benzamide derivatives.

CHAPTER 4

4. Synthesis and Characterization of 1,2-dihydroquinoline Sulphonamides (26-32)

4.1.1Introduction

Quinoline is the most common heterocyclic compound in medicinal chemistry. Quinoline chemistry has been increasing interest as most of these substances are useful as chemotherapeutic agents for malaria and microbes. Quinoline was first isolated by Ferdinand Rung in 1834 from the coal tar bases (very high viscosity brown or black liquid) . Gerhardt later in 1842 obtained quinoline by alkaline pyrolysis of cinchonine, alkaloid analogue of quinoline. It was found that heterocyclic compounds containing nitrogen and oxygen are one of the most commonly synthesized and evaluated compounds as they possess pharmacological activities including antimicrobial activity. Quinolines are an important class of natural flavonoids. These are biological agents, including antibiotic, anthelmintic, anti-inflammatory, anti-fungal, anti-tumour and antimutagenic. In addition, some quinoline derivatives have inhibited many enzymes such as xanthine oxidase, protein tyrosine kinase in cell systems. Therefore, the synthesis of quinolines is of great interest.

Quinolines are a group of synthetic wide spectrum antibacterial drugs. Nalidixic acid was a first generation quinolines introduced in 1962 for the cure of urinary tract infections in humans. George lesher and co-workers discovered Nalidixic acid in a distillate during an attempt at synthesis of famous antimalarial drug chloroquine. Quinoline derivatives exhibited their antibacterial effect by preventing bacterial DNA replication in bacterial cell, however most of the quinolones in clinical use belongs to the fluoroquinolones, which have fluorine atom attached to benzene ring. Therefore, we decided to synthesize quinoline derivatives and evaluate them for their activities for instance Antibacterial, Anthelmintic, Anti-inflammatory and Cytotoxic activity. In literature, reviews on importance of alkylation reactions, formulations and dosage are well documented.

This gave an impetus to the development of newer pharmacologically active quinoline derivatives. Hence, we synthesized the novel quinoline derivatives as shown in the reaction scheme 2.1 and to screen them for their activities. Sanchez JP et al. [22] prepared a new series of amino sulphonamide and benzene sulphonamide containing substituted piperazine quinoline carboxylic acids with (1, 2) at C-3 position and screened against various bacterial strains, using cup plate method. Compounds revealed promising antibacterial activity against tested bacterial strains.

4.2 Present work (33-37)

The present synthetic strategy is aimed towards the synthesis of 1,2 dihydroquinoline sulphonamides derivatives [4a-h]. The synthetic route for the preparation is based on the transformation of 3-hydroxy Acetanilide into acetylated aminophenol followed by cyclized product. The synthesis and characterization of 1,2-dihydroquinoline sulphonamides [4a-h] follows the below mentioned sequence of reactions:

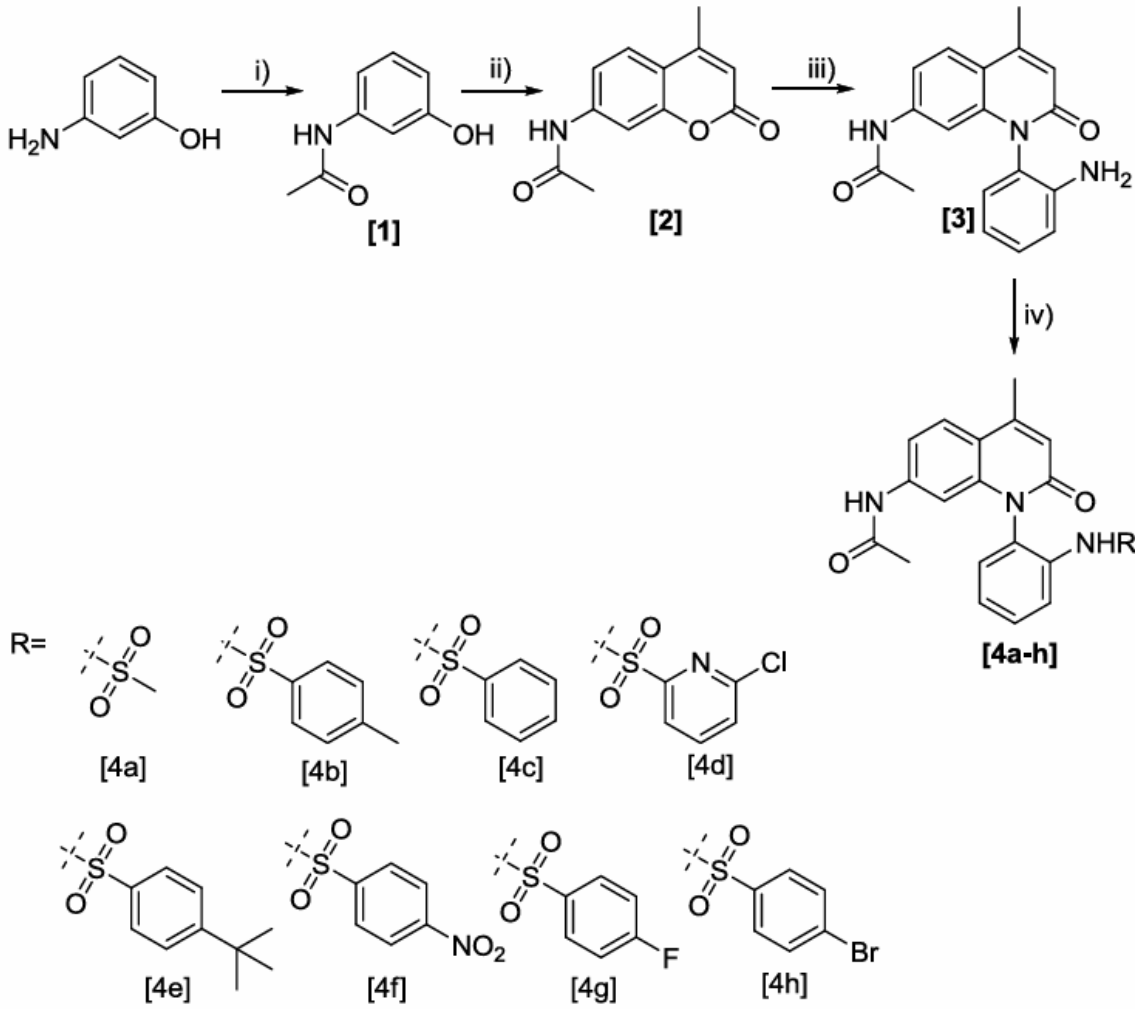
Step-1: Synthesis of 3-hydroxy Acetanilide [1] was carried out by the reaction of 3 aminophenol in presence of acetic acid with acetic anhydride.

Step-2: 3-hydroxy Acetanilide [1] underwent Pechmann condensation reaction with ethyl acetoacetate to afford product acetylated aminophenol [2].

Step-3: Reaction of O-phenylenediamine with intermediate acetamide rearrangement takes place leading to ring opening and subsequent elimination of water afforded condensed product [3].

Step-4: Compound [3] on reaction with substituted Sulfonamides in presence of base underwent coupling reaction to obtain sulphonamides containing dihydroquinoline derivatives [4a-h]. The sequence of reaction for the synthesis of 1,2-dihydroquinoline sulphonamides [4a-h] has been presented in scheme-2.1.

Scheme-2.1: Synthetic reaction scheme for the preparation of 1,2 Dihydroquinoline Sulphonamides [4a-h]



4.3 Reagents and conditions: i) (CH3CO)2O, CH3COOH, 8h; ii) CH3COCH2COOEt, 70% H2SO4, 0oC, 9-10h; iii) O-phenylenediamine, NaOAc, rt, 8h; iv) Substituted Sulfonyl chlorides, Et3N, CH2Cl2.

4.4 Materials and methods (38-45)

4.5 Introduction A brief description of organic solvents, reagents and the analytical procedure followed for the characterization of the synthesized compounds are given below.

4.6 Organic solvents and Reagents The organic solvents were purchased from SD Fine, Spectrochem, Sigma Aldrich and standard commercial sources are used without further purification.

4.7 Reaction conditions Room temperature reactions mentioned ranges between 20-30°C (throughout the year). For low temperatures reactions, ice-bath with sodium chloride (-5°C) was used. Magnetically stirred oil bath (or) a hotplate was used for high temperature reactions.

4.8 Analytical techniques (46-51)

Melting point For solid compounds melting point range was determined in open capillary tubes using a digital melting point apparatus

Thin layer Chromatography (TLC) Reaction was monitored by TLC using silica plates. The following mobile phases were used for elution- Hexane: Ethyl acetate (or) dichloromethane: methanol in different ratios. TLC plates were visualized with ultraviolet light or iodine vapours or by staining with 2% aqueous potassium permanganate solution.

Column chromatography Silica gel (60-120 mesh) or neutral alumina was used for purification of synthesized compounds.

Instrumentation Compounds were characterized by available spectroscopic techniques and LCMS.

FT-IR The spectra were recorded using JASCO FTIR-4100 spectrophotometer as KBr disc in the range of 4000-400 cm-1. FT-IR data are reported as follows: Frequency (functional group).

4.9 Experimental (52-59)

Step-1: Synthesis of 3-hydroxy Acetanilide [1] 3-aminophenol (25g, 0.11 mol) taken in round bottom flask containing acetic anhydride (80 mL) and it was stirred for 8 h at 60oC under Nitrogen atmosphere. After reaction completion, excess acetic anhydride was removed off under reduced pressure; the residue was obtained which was dissolved in dichloromethane. The dichloromethane layer was washed with brine solution, dried over anhydrous Na2SO4 and concentrated to achieve compound [1]. LCMS: 152 (M+1), MP: 152 C. Yield: 82%.

Step-2: Synthesis of intermediate acetamide [2] 3-hydroxy Acetanilide [1] (25g, 0.11 mol) was taken in ethyl acetoacetate (0.1mol) with 70% aq.H2SO4 (50 mL), and it was stirred for 9-10 h at 0·C. After reaction completion, the reaction mixture was poured into ice cold water, solid separates out. The solid was filtered and washed with water. The crude product was recrystallized to obtain pure compound [2].

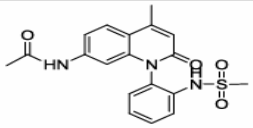
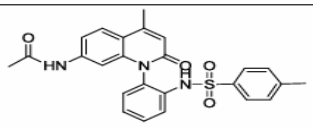
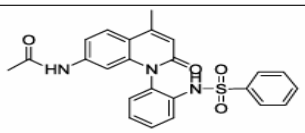
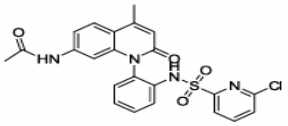
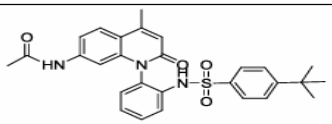
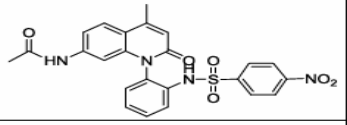
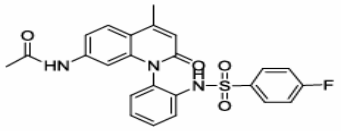
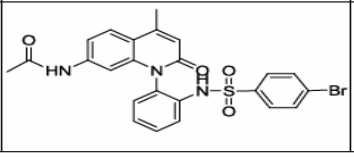
Step-3: Synthesis of N-[1-(2-aminophenyl)-4-methyl-2-oxo-1,2-dihydroquinolin 7-yl] acetamide [3] Compound [2] (2.17g, 0.01 mole), o-phenylenediamine (0.01 mole, 1.08g) and sodium acetate (5 g) were taken in a round bottom flask containing glacial acetic acid (15 mL) and the resulting mixture was refluxed for 8 h. After completion reaction, the reaction mixture was brought down to room temperature. The separated solid was filtered and recrystallized from methanol: water (1:2) to give title compound [3]. LCMS: 237.8 (M+1), MP: 285 ·C. Yield: 70%.

Step-4: Synthesis of 1,2-dihydroquinoline Sulphonamides [4a-h] Equimolar quantities of compound [3] (0.5 g, 0.001 mol), different substituted sulphonyl chlorides (0.001 mol) and triethylamine (0.57 g, 0.003 moles) were stirred in dry methylene chloride (10 mL) under N2 atmosphere at room temperature for 12 h. The reaction was monitored by TLC. After reaction completion, the mixture was washed with water and brine solution. Methylene chloride layer was dried over anhydrous Na2SO4 and evaporated under vacuum. The residue was purified by column chromatography using petroleum ether: ethyl acetate as eluent (7:3) to get Sulphonamide dihydroquinoline nucleus [4a-h] in good yield (scheme 2.1).

4.10 Results and discussion (52-58)

In this work, pharmacologically important novel dihydroquinoline derivatives were synthesized by the acetylation reaction of 3- Aminophenol, cyclisation of acylated aminophenol acetamide followed by substitution of o-phenylenediamine to get intermediate [3]. Compound [3] was reacted with various substituted sulphonyl chlorides in order to get the dihydroquinoline derivatives with sulphonamide moiety [4a-h]. All the derivatives were obtained in good yield as tabulated in Table 2.1. The structures of the newly synthesized compounds were established by spectroscopic methods for instance FT-IR.

Table 2.1: Physical characterization data of 1,2-dihydroquinoline sulfonamides [4a-h]

Compd.	Structure	Mol. Formula (Mol. Wt)	Yield (%)	Melting point (°C)
4a		$C_{19}H_9N_3O_4S$ (385.44)	82	189-190
4b		$C_{25}H_{23}N_3O_4S$ (461.53)	78	212-214
4c		$C_{24}H_{21}N_3O_4S$ (447.51)	72	200-201
4d		$C_{23}H_{19}ClN_4O_4S$ (482.94)	72	181-182
4e		$C_{28}H_{29}N_3O_4S$ (503.19)	84	194-195
4f		$C_{24}H_{20}N_4O_6S$ (492.11)	74	185-186
4g		$C_{24}H_{20}FN_3O_4S$ (465.50)	77	188-189
4h		$C_{24}H_{20}BrN_3O_4S$ (524.40)	84	175-176

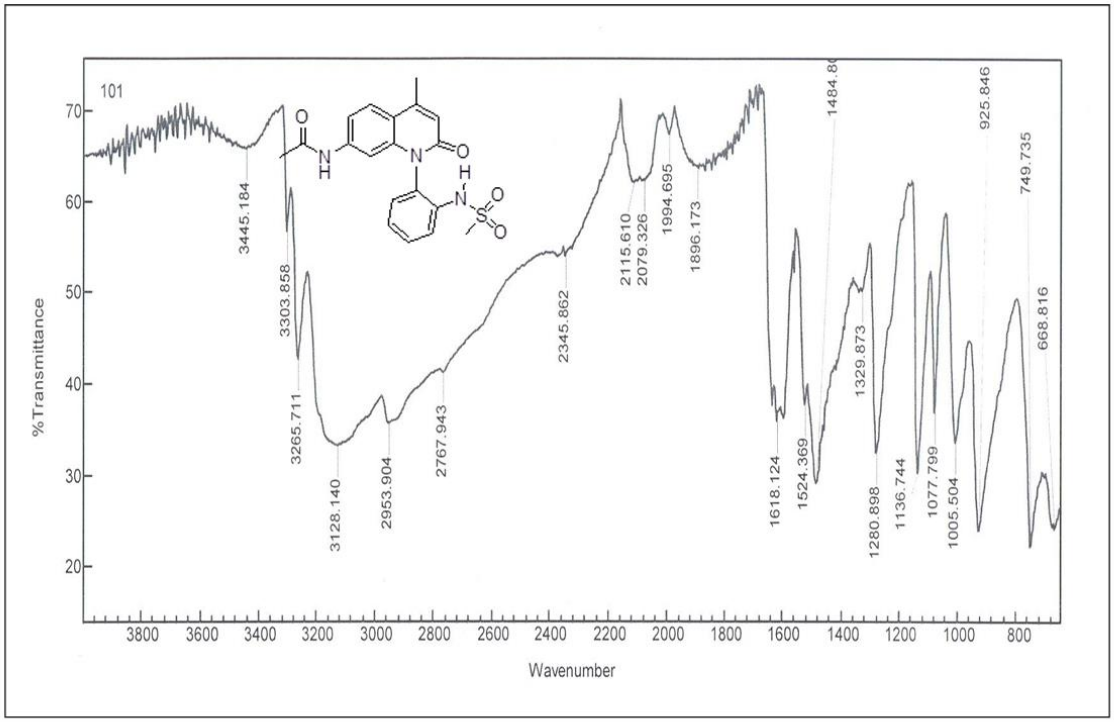


Figure 2.1: IR spectrum of compound **[4a]**

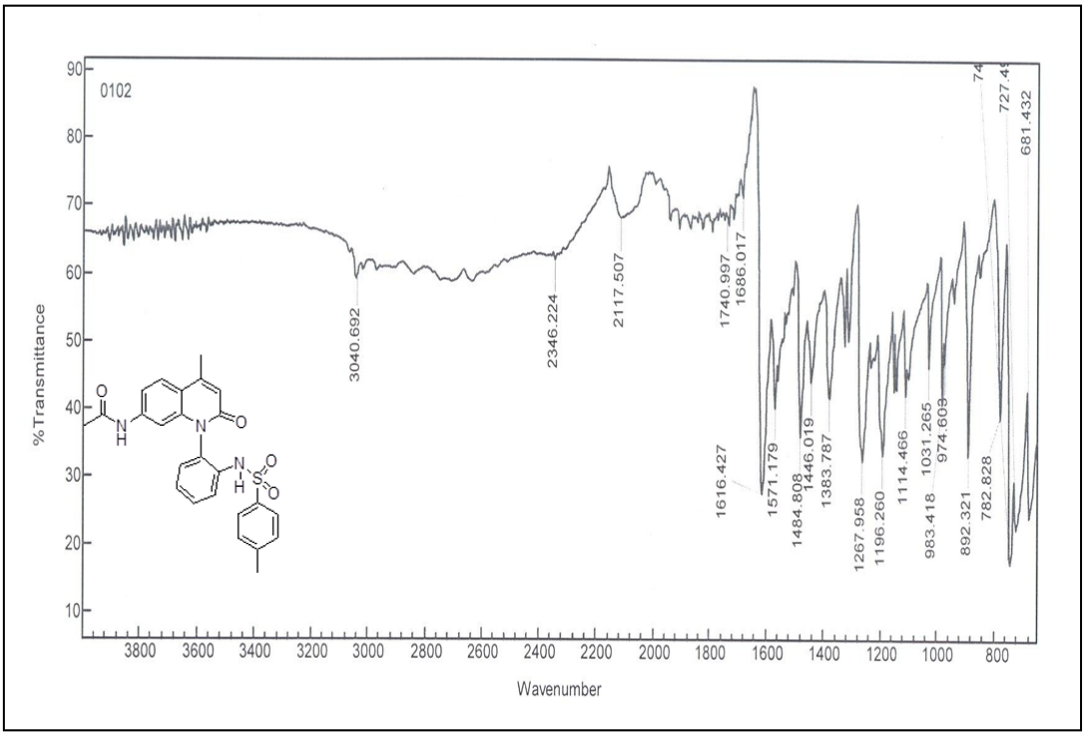


Figure 2.6: IR spectrum of compound **[4b]**

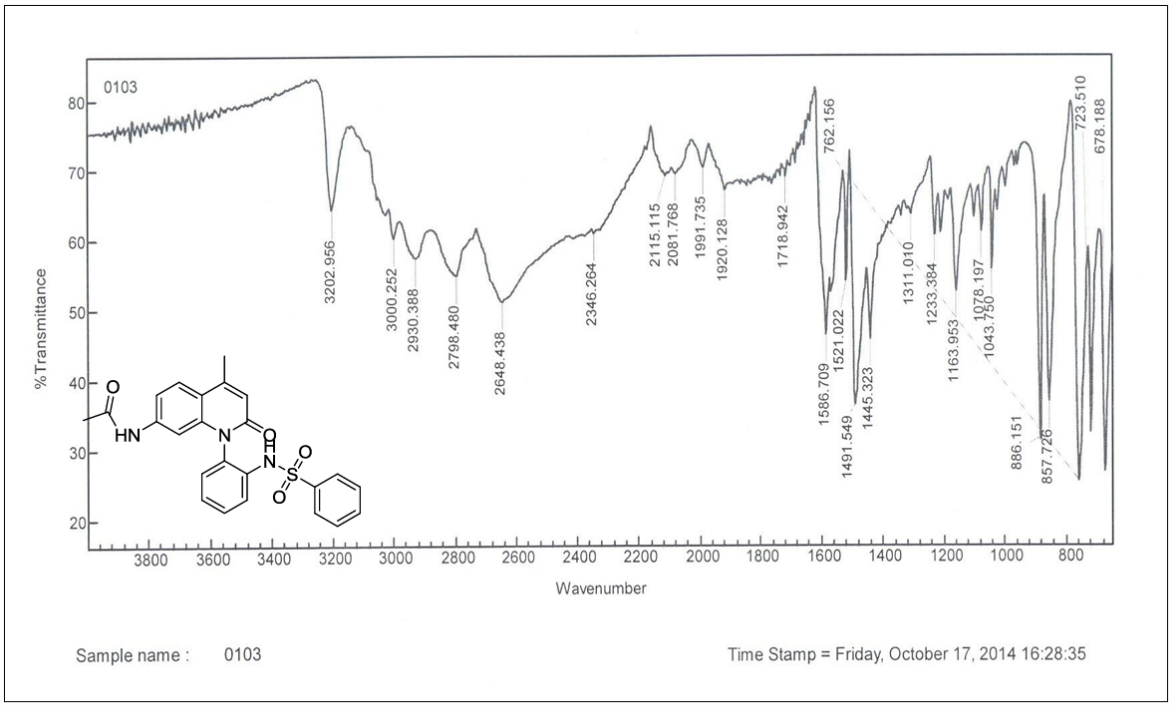


Figure 2.11: IR spectrum of compound **[4c]**

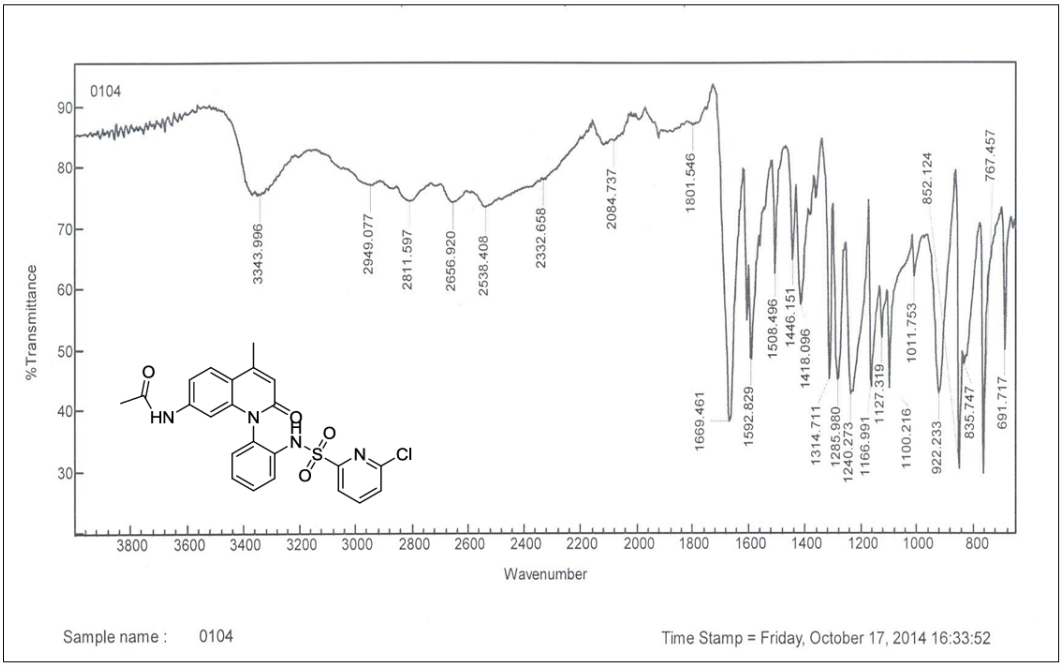


Figure 2.16: IR spectrum of compound **[4d]**

4.11 Conclusion

The research work was focused on the efficient synthesis of sulphonamides containing 1,2-dihydroquinoline nucleus. The reactions performed are ecofriendly as they are carried out at moderate temperature 60-90 OC by using solvents Tetrahydrofuran and Methylene dichloride to get final compounds with good yield, short time interval and purity. Newly synthesized compounds were well characterised by IR.

5. Synthesis and Characterization of 1,2-dihydroquinoline Sulphonamides(59-62)

5.1 Present work

The present synthetic strategy is aimed towards the synthesis of 1,2 dihydroquinoline sulphonamides derivatives [4a-h]. The synthetic route for the preparation is based on the transformation of 3-hydroxy Acetanilide into acetylated aminophenol followed by cyclized product. The synthesis and characterization of 1,2-dihydroquinoline sulphonamides [4a-h] follows the below mentioned sequence of reactions:

Step-1: Synthesis of 3-hydroxy Acetanilide [1] was carried out by the reaction of 3 aminophenol in presence of acetic acid with acetic anhydride.

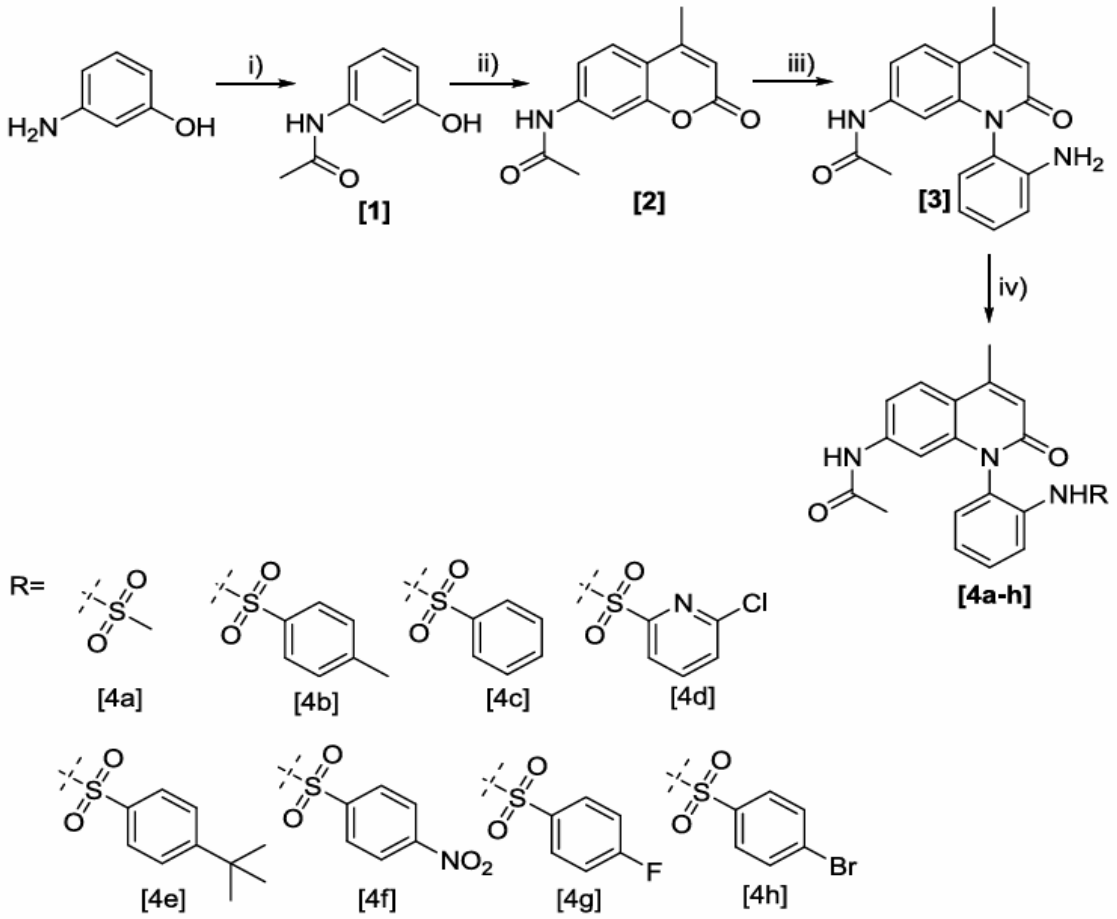
Step-2: 3-hydroxy Acetanilide [1] underwent Pechmann condensation reaction with ethyl acetoacetate to afford product acetylated aminophenol [2].

Step-3: Reaction of O-phenylenediamine with intermediate acetamide rearrangement takes place leading to ring opening and subsequent elimination of water afforded condensed product [3].

Step-4: Compound [3] on reaction with substituted Sulfonamides in presence of base underwent coupling reaction to obtain sulphonamides containing dihydroquinoline derivatives [4a-h].

The sequence of reaction for the synthesis of 1,2-dihydroquinoline sulphonamides [4a-h] has been presented in scheme-2.1.

Scheme-2.1: Synthetic reaction scheme for the preparation of 1,2-Dihydroquinoline Sulphonamides [4a-h]



Reagents and conditions: i) $(CH_3CO)_2O$, CH_3COOH, 8h; **ii)** CH_3COCH_2COOEt, 70% H_2SO_4, 0^oC, 9-10h; **iii)** O-phenylenediamine, NaOAc, rt, 8h; **iv)** Substituted Sulfonyl chlorides, Et_3N, CH_2Cl_2.

5.2. Materials and methods (63-67)

Introduction A brief description of organic solvents, reagents and the analytical procedure followed for the characterization of the synthesized compounds are given below.

5.3 Organic solvents and Reagents

The organic solvents were purchased from SD Fine, Spectrochem, Sigma Aldrich and standard commercial sources are used without further purification.

5.4 Reaction conditions

Room temperature reactions mentioned ranges between 20-30°C (throughout the year). For low temperatures reactions, ice-bath with sodium chloride (-5°C) was used. Magnetically stirred oil bath (or) a hotplate was used for high temperature reactions.

5.5 Analytical techniques (68-73)

Melting point For solid compounds melting point range was determined in open capillary tubes using a digital melting point apparatus.

Thin layer Chromatography (TLC) Reaction was monitored by TLC using silica plates. The following mobile phases were used for elution- Hexane: Ethyl acetate (or) dichloromethane: methanol in different ratios. TLC plates were visualized with ultraviolet light or iodine vapours or by staining with 2% aqueous potassium permanganate solution.

FT-IR

The spectra were recorded using JASCO FTIR-4100 spectrophotometer as KBr disc in the range of 4000-400 cm-1. FT-IR data are reported as follows: Frequency (functional group).

5.6 Experimental(74-88)

Step-1: Synthesis of 3-hydroxy Acetanilide [1]

3-aminophenol (25g, 0.11 mol) taken in round bottom flask containing acetic anhydride (80 mL) and it was stirred for 8 h at 60oC under Nitrogen atmosphere. After reaction completion, excess acetic anhydride was removed off under reduced pressure; the residue was obtained which was dissolved in dichloromethane. The dichloromethane layer was washed with brine solution, dried over anhydrous Na2SO4 and concentrated to achieve compound [1]. LCMS: 152 (M+1), MP: 152 ·C. Yield: 82%.

Step-2: Synthesis of intermediate acetamide [2]

3-hydroxy Acetanilide [1] (25g, 0.11 mol) was taken in ethyl acetoacetate (0.1mol) with 70% aq.H2SO4 (50 mL), and it was stirred for 9-10 h at 0 ·C. After reaction completion, the reaction mixture was poured into ice cold water, solid separates out. The solid was filtered and washed with water. The crude product was recrystallized to obtain pure compound [2].

Step-3: Synthesis of N-[1-(2-aminophenyl)-4-methyl-2-oxo-1,2-dihydroquinolin 7-yl] acetamide [3]

Compound [2] (2.17g, 0.01 mole), o-phenylenediamine (0.01 mole, 1.08g) and sodium acetate (5 g) were taken in a round bottom flask containing glacial acetic acid (15 mL) and the resulting mixture was refluxed for 8 h. After completion reaction, the reaction mixture was brought down to room temperature. The separated solid was filtered and recrystallized from methanol: water (1:2) to give title compound [3]. LCMS: 237.8 (M+1), MP: 285 ·C. Yield: 70%.

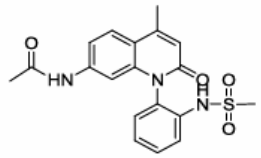
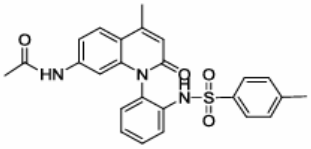
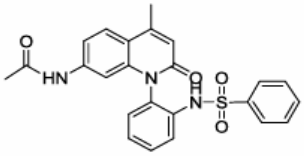
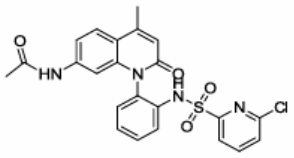
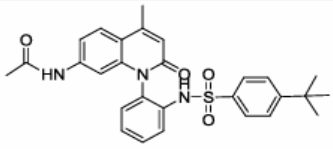
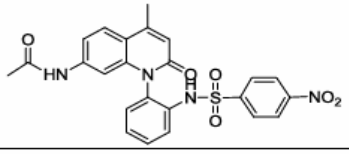
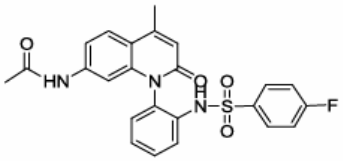
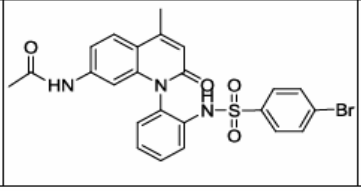
Step-4: Synthesis of 1,2-dihydroquinoline Sulphonamides [4a-h]

Equimolar quantities of compound [3] (0.5 g, 0.001 mol), different substituted sulphonyl chlorides (0.001 mol) and triethylamine (0.57 g, 0.003 moles) were stirred in dry methylene chloride (10 mL) under N2 atmosphere at room temperature for 12 h. The reaction was monitored by TLC. After reaction completion, the mixture was washed with water and brine solution. Methylene chloride layer was dried over anhydrous Na2SO4 and evaporated under vacuum. The residue was purified by column chromatography using petroleum ether: ethyl acetate as eluent (7:3) to get Sulphonamide dihydroquinoline nucleus [4a-h] in good yield (scheme 2.1).

5.7 Results and discussion

In this work, pharmacologically important novel dihydroquinoline derivatives were synthesized by the acetylation reaction of 3- Aminophenol, cyclisation of acylated aminophenol acetamide followed by substitution of o-phenylenediamine to get intermediate [3]. Compound [3] was reacted with various substituted sulphonyl chlorides in order to get the dihydroquinoline derivatives with sulphonamide moiety [4a-h]. All the derivatives were obtained in good yield as tabulated in Table 2.1. The structures of the newly synthesized compounds were established by spectroscopic methods for instance FT-IR.

Table 2.1: Physical characterization data of 1,2-dihydroquinoline sulfonamides [4a-h]

Compd.	Structure	Mol. Formula (Mol. Wt)	Yield (%)	Melting point (°C)
4a		$C_{19}H_9N_3O_4S$ (385.44)	82	189-190
4b		$C_{25}H_{23}N_3O_4S$ (461.53)	78	212-214
4c		$C_{24}H_{21}N_3O_4S$ (447.51)	72	200-201
4d		$C_{23}H_{19}ClN_4O_4S$ (482.94)	72	181-182
4e		$C_{28}H_{29}N_3O_4S$ (503.19)	84	194-195
4f		$C_{24}H_{20}N_4O_6S$ (492.11)	74	185-186
4g		$C_{24}H_{20}FN_3O_4S$ (465.50)	77	188-189
4h		$C_{24}H_{20}BrN_3O_4S$ (524.40)	84	175-176

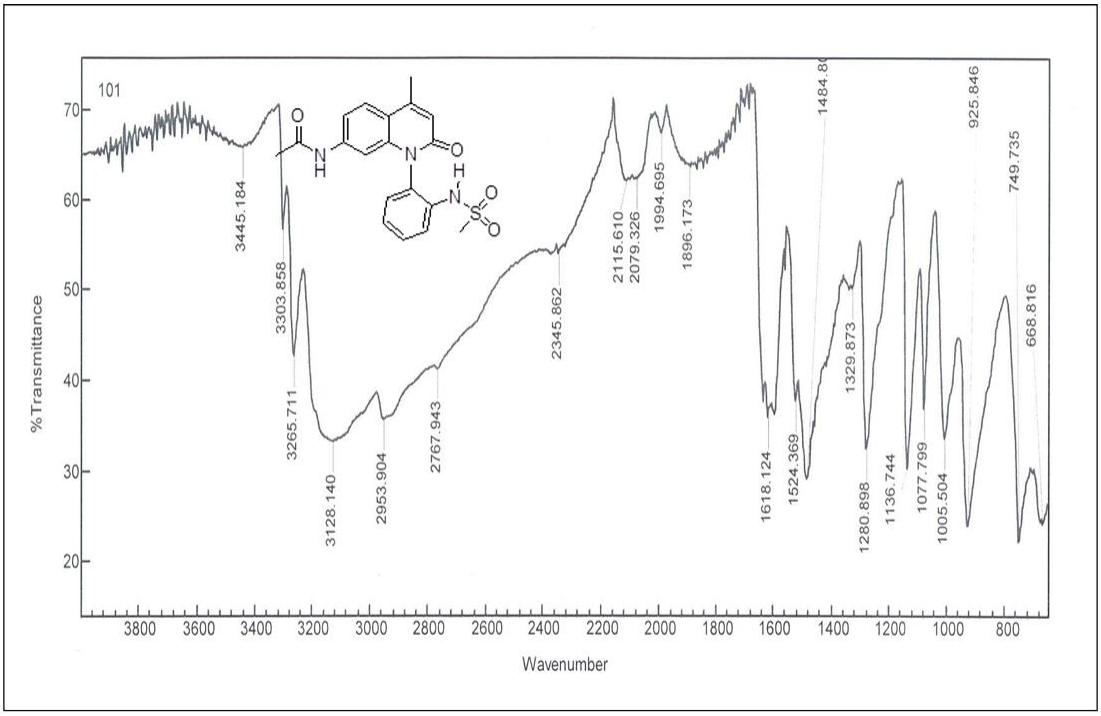


Figure 2.1: IR spectrum of compound **[4a]**

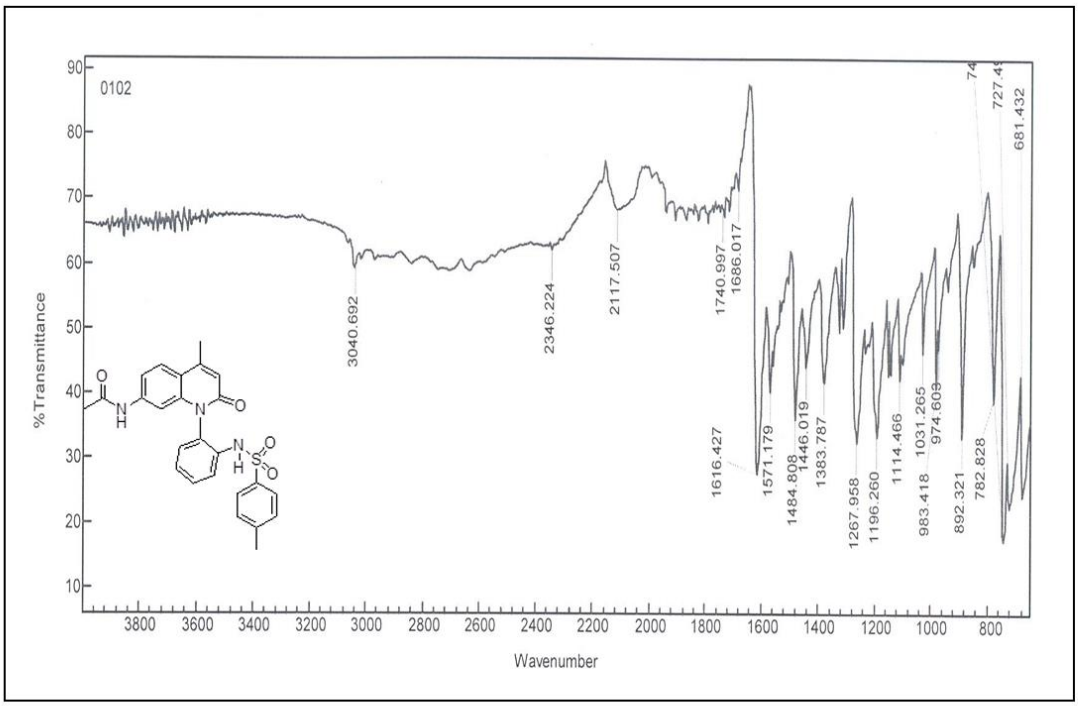


Figure 2.6: IR spectrum of compound **[4b]**

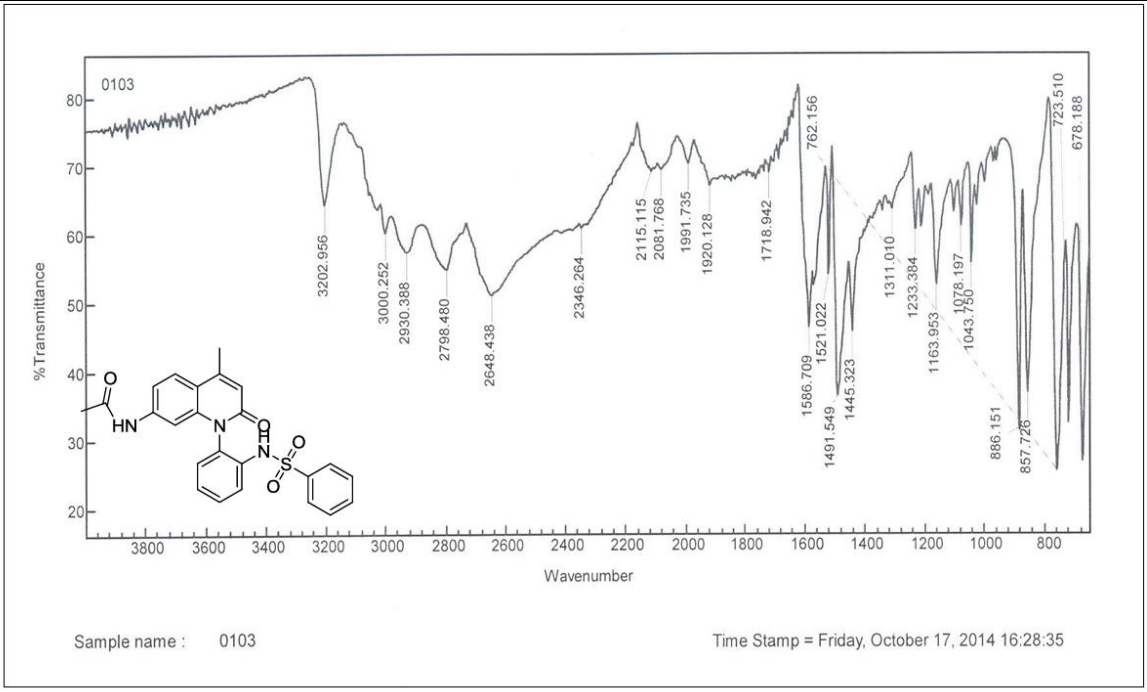


Figure 2.11: IR spectrum of compound **[4c]**

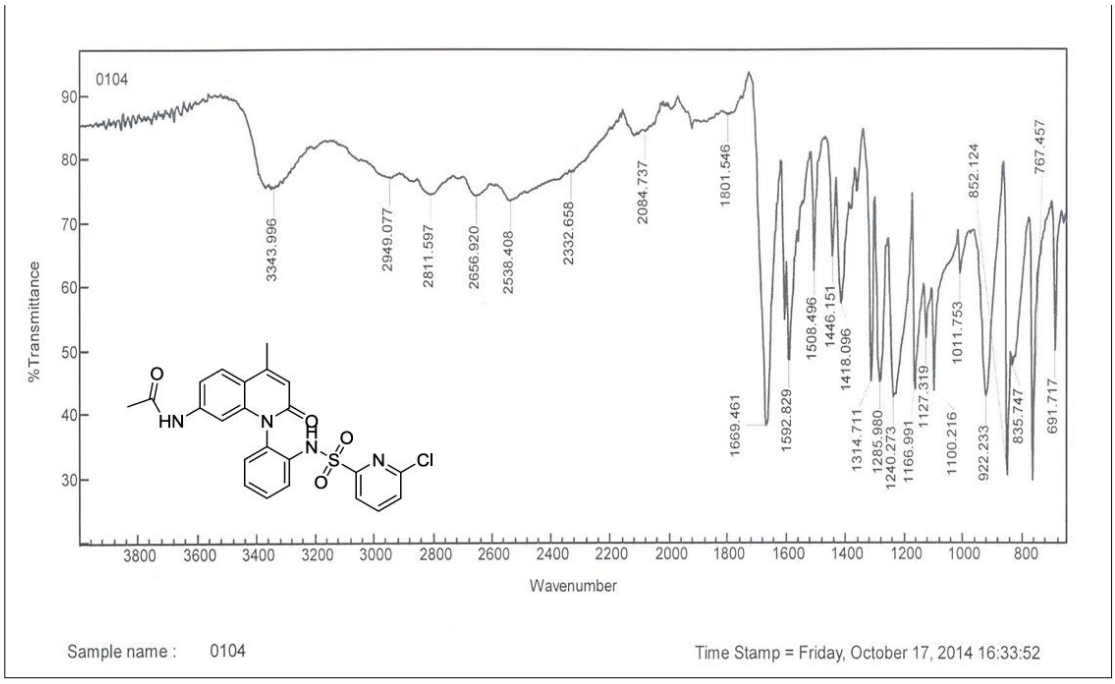


Figure 2.16: IR spectrum of compound **[4d]**

5.8 Conclusion

The research work was focused on the efficient synthesis of sulfonamides containing 1,2-dihydroquinoline nucleus. The reactions performed are ecofriendly as they are carried out at moderate temperature 60-90 OC by using solvents Tetrahydrofuran and Methylene dichloride to get final compounds with good yield, short time interval and purity. Newly synthesized compounds were well characterized by IR.

6. Synthesis and Characterization of Benzylated 1,2- dihydroquinoline derivatives (89-96)

6.1 Present work

The present synthetic strategy is aimed towards the synthesis of benzylated dihydroquinoline derivatives [5a-h]. The synthetic route for the preparation is based on the transformation 3-hydroxy Acetanilide into intermediate (2) followed by intermediate (3). The synthesis and spectral characterization of benzylated 1,2-dihydroquinoline derivatives [5a-h] follows the below mentioned sequence of reactions:

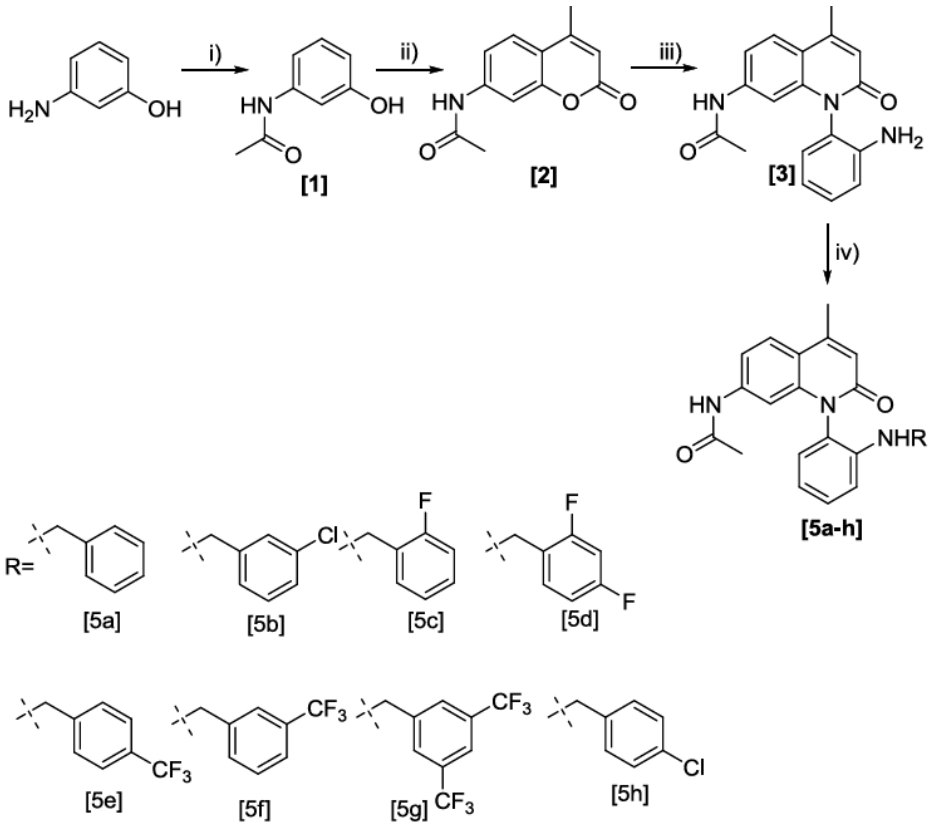
Step-1: Synthesis of 3-hydroxy Acetanilide [1] was carried out by the reaction of 3 aminophenol with acetic anhydride in presence of acetic acid.

Step-2:3-hydroxy Acetanilide [1] underwent Pechmann condensation reaction with ethyl acetoacetate to afford product N-(4-methyl-2-oxo-2H-chromen-7-yl) acetamide [2].

Step-3: Reaction of O-phenylenediamine with N- (4-methyl-2-oxo-2H-chromen-7-yl) acetamide [2], rearrangement takes place leading to ring opening and subsequent elimination of water afforded N-[1-(2-aminophenyl)-4-methyl-2 oxo-1,2-dihydroquinolin-7-yl] acetamide [3].

Step-4: Compound [3] on reaction with substituted Benzyl bromides (4a-h) in presence of base underwent coupling reaction to obtain benzylated 1, 2 dihydroquinoline derivatives [5a-h]. The sequence of reaction for the synthesis of Benzylated Dihydroquinoline nucleus [5a-h] has been presented in scheme-3.1.

Scheme-3.1: Synthetic route for the preparation of benzylated dihydroquinoline derivatives [5a-h]



Reagents and conditions: i) $(CH_3CO)_2O$, CH_3COOH, 10h; **ii)** CH_3COCH_2COOEt, 70% H_2SO_4, 0°C, 9-10h; **iii)** O-phenylenediamine, NaOAc, rt; **iv)** Substituted benzyl bromides, Et_3N, CH_2Cl_2.

6.2 Materials and methods(97-106)

The organic solvents and chemicals were procured from SD Fine, Spectrochem, Sigma Aldrich, Merck and standard commercial sources are used without further purification

Room temperature reactions mentioned ranges between 15-35°C (throughout the year). For low temperatures reactions on ice-bath with sodium chloride (0°C) was used. Magnetically stirred oil bath (or) hotplate was used for high temperature reactions.

Solid compounds melting point range were determined in open capillary tubes using a hot stage apparatus.

Progress of the reactions was monitored by TLC using Merck silica gel 60 F254 precoated on aluminium backed plates. TLC plates were visualized with ultraviolet light or iodine vapours or by staining with 2% aqueous potassium permanganate solution.

Silica gel (60-120 mesh) or neutral alumina was used for purification of synthesized compounds.

The spectra were recorded using JASCO FTIR-4100 spectrophotometer as KBr disc.

6.3 Experimental(107-116)

Step-1: Synthesis of 3-hydroxy Acetanilide [1]

3-aminophenol (0.11 mol, 25g) was dissolved in acetic anhydride (80 mL) and the reaction mixture was stirred at 60oC for 8 h at room temperature under nitrogen atmosphere. After completion of the reaction, the excess acetic anhydride was removed under reduced pressure; the residue was dissolved in methylene dichloride. The organic layer was washed with brine solution, dried over anhydrous Na2SO4 and concentrated to obtain compound (1). LCMS: 152 (M+1), MP: 152 ·C. Yield: 82%.

Step-2: Synthesis of N-(4-methyl-2-oxo-2H-chromen-7-yl) acetamide (2)

A mixture of 3- hydroxy acetanilide (metacetamol) (0.1 mol, 15.1g) and ethyl acetoacetate (0.1 mol) with 70% sulphuric acid (50 mL) was heated carefully for 5 h. The resulting solution was cooled and poured over crushed ice (250 g). The crude product was filtered off and washed repeatedly with water, dried and recrystallized from hot water to result in title compound (3). LCMS: 205 (M+1), MP: 243 ·C. Yield: 62%.

Step-3: Synthesis of N-[1-(2-aminophenyl)-4-methyl-2-oxo-1,2-dihydroquinolin 7-yl] acetamide (3)

A mixture of N-(4-methyl-2-oxo-2H-chromen-7-yl) acetamide (0.01 mol, 2.17g), o phenylenediamine (0.01 mol, 1.08g) and sodium acetate (5 g) in glacial acetic acid (15 mL) was refluxed for 8 h and cooled. The separated solid was filtered and recrystallized from methanol: water (1:2) to give title compound (3). LCMS: 237.8 (M+1), MP: 285· C. Yield: 70%.

Step-4: Synthesis of benzylated dihydroquinoline derivatives (5a-h) Equimolar quantities of compound (3)

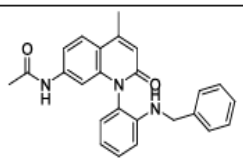
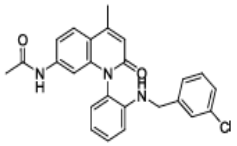
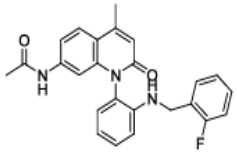
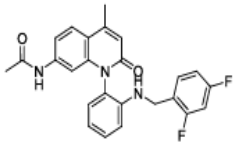
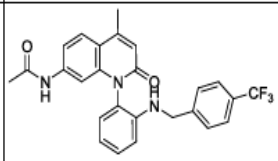
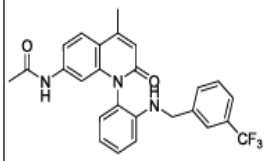
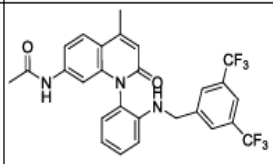
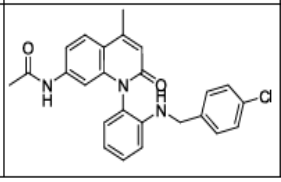
(0.5 g, 0.001 mol) and different substituted benzyl bromides (0.001 mol), K2CO3 (0.003 moles, 0.57 g), were stirred in dry ACN (10 mL) under nitrogen at room temperature for 10 h. The reaction was monitored by TLC and the reaction mixture was filtered. The acetonitrile phase was dried using anhydrous Na2SO4 and it was

evaporated. The residue was purified by column chromatography using petroleum ether: ethyl acetate as eluent (8:2) to get benzylated dihydroquinoline nucleus (5a-h) in good yield (scheme 3.1).

6.4 Results and discussion (117-121)

In the present work, novel benzylated dihydroquinoline derivatives were synthesized by acetylation of 3-amino phenol, cyclisation of N-(3-hydroxyphenyl) acetamide followed by substitution of o-phenylene diamine to get N-[1-(2-aminophenyl)-4 methyl-2-oxo-1,2-dihydroquinolin-7-yl] acetamide (3). Compound (3) was treated with various benzyl bromides in order to get the benzylated 1,2-dihydroquinoline derivatives (5a-h). All the derivatives were obtained in good yield. Physical data of all the compounds are tabulated in Table 3.1. The structures of the newly synthesized compounds were characterized by spectroscopic techniques like FT-IR.

Table 3.1: Physical characterization data of benzylated 1,2-dihydroquinoline derivatives [5a-h]

Entry	Structure	Mol. Formula (Mol. Wt.)	Yield (%)	Melting point (°C)
5a		$C_{25}H_{23}N_3O_2$ (397.47)	72	192-193
5b		$C_{25}H_{22}ClN_3O_2$ (431.91)	72	199-200
5c		$C_{25}H_{22}FN_3O_2$ (415.46)	75	212-214
5d		$C_{25}H_{21}F_2N_3O_2$ (433.45)	80	204-206
5e		$C_{26}H_{22}F_3N_3O_2$ (465.47)	65	202-203
5f		$C_{26}H_{22}F_3N_3O_2$ (465.47)	70	202-204
5g		$C_{27}H_{21}F_6N_3O_2$ (533.46)	89	194-196
5h		$C_{25}H_{22}ClN_3O_2$ (431.91)	90	201-203

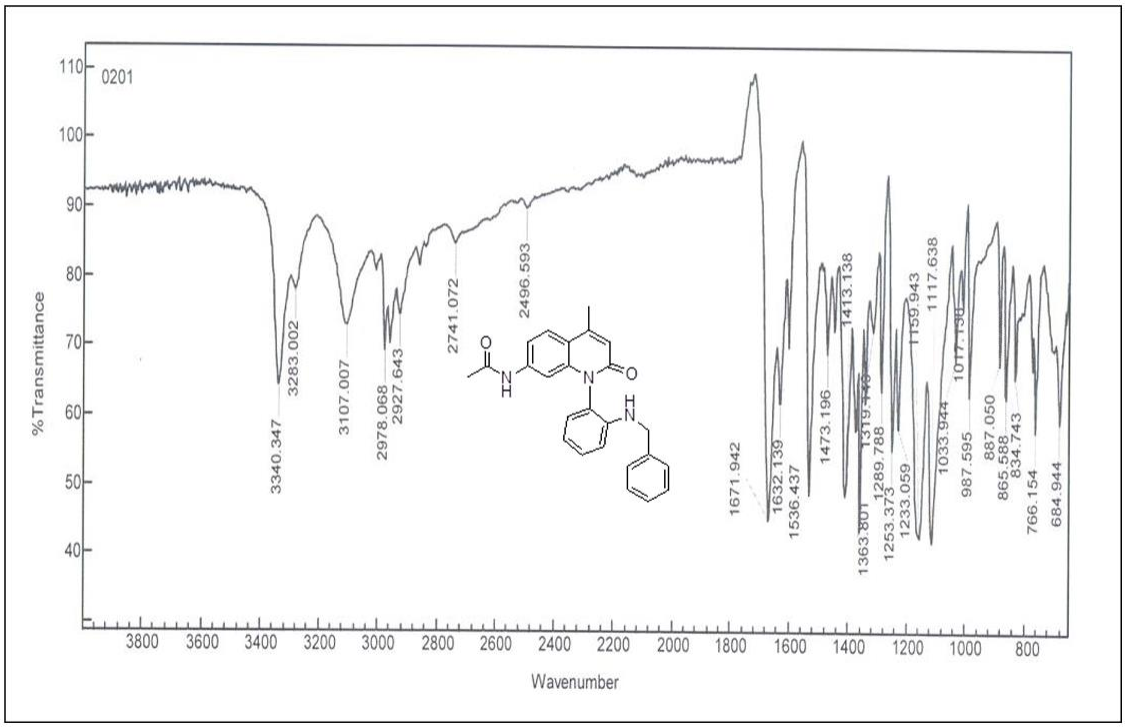


Figure 3.1: IR spectrum of compound **[5a]**

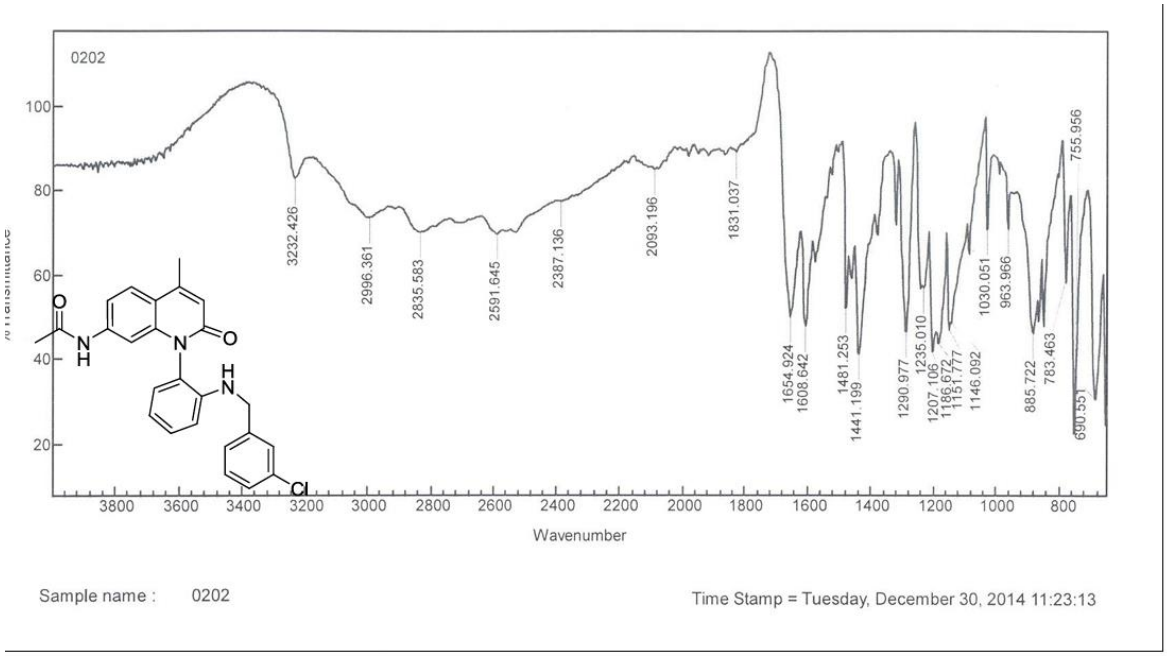


Figure 3.6: IR spectrum of compound **[5b]**

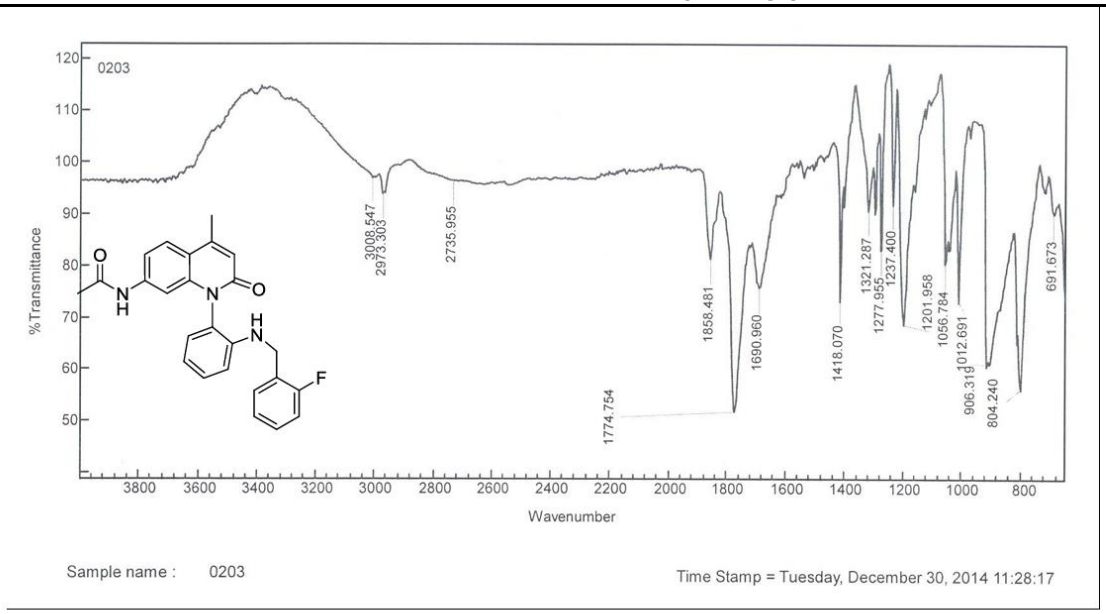


Figure 3.11: IR spectrum of compound **[5c]**

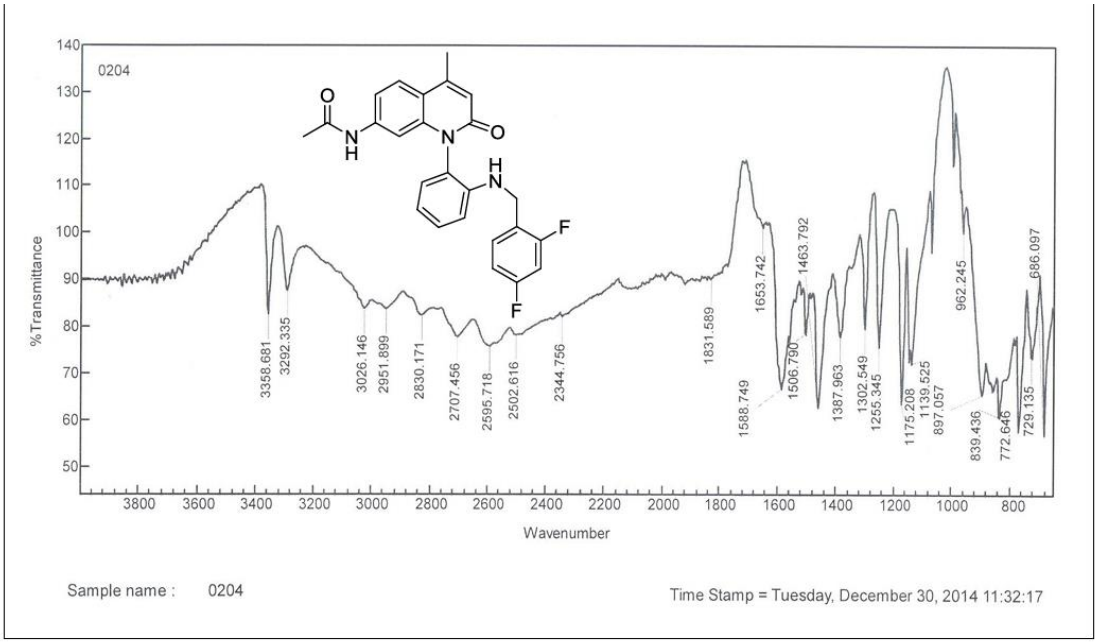


Figure 3.16: IR spectrum of compound **[5d]**

6.5 Conclusion

The research work was concentrated on the efficient synthesis of benzylation reaction on 1,2-dihydroquinoline nucleus. The reactions performed are ecofriendly as they are carried out at moderate temperature 60-90 OC by using solvents Tetrahydrofuran and Methylene dichloride to get final compounds with good yield, short time interval and purity. Newly synthesized compounds were well characterized by IR

7. Synthesis and Characterization of 1,2-dihydroquinoline benzamide derivatives(122-145)

7.1 Present work

The present synthetic strategy is aimed towards the synthesis of benzamide containing1,2-dihydroquinoline derivatives [6a-h].

The synthetic route for the preparation is based on the transformation of 3-hydroxy Acetanilide into intermediate (2) followed by intermediate (3).

The synthesis and characterization of 1,2-dihydroquinoline benzamide derivatives [6a-h] follows the below mentioned sequence of reactions:

Step-1: Synthesis of 3-hydroxy Acetanilide [1] was carried out by the reaction of 3 aminophenol with acetic anhydride in presence of acetic acid.

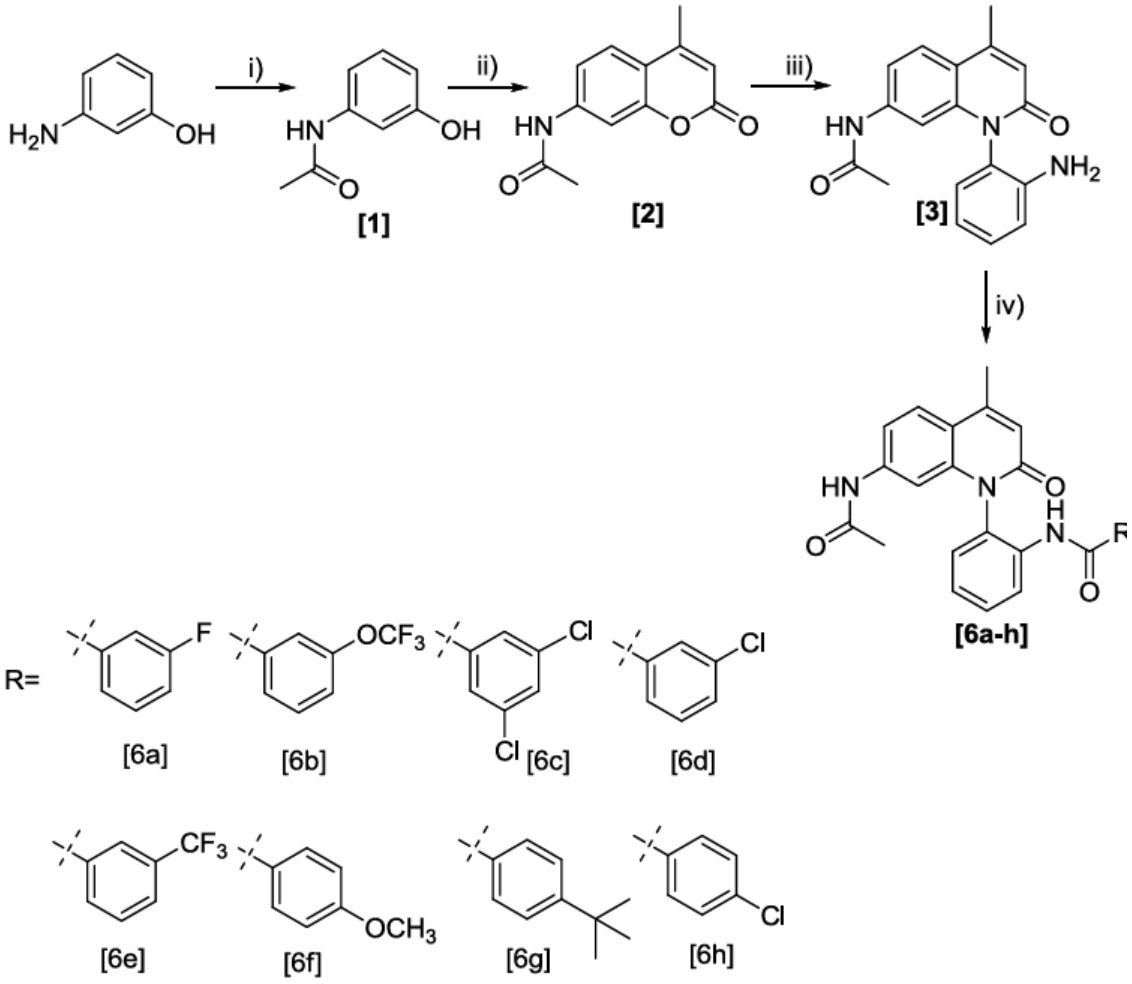
Step-2: 3-hydroxy Acetanilide [1] underwent Pechmann condensation reaction with ethyl acetoacetate to give product N-(4-methyl-2-oxo-2H-chromen-7 yl) acetamide [2].

Step-3: Reaction of o-phenylenediamine with N (4-methyl-2-oxo-2H-chromen-7-yl) acetamide resulted in rearrangement leading to ring opening and subsequent elimination of water to yield N-[1-(2-aminophenyl)-4-methyl-2-oxo-1,2 dihydroquinolin-7-yl] acetamide [4].

Step-4: Compound [4] on reaction with substituted Benzoyl chlorides in presence of base underwent coupling reaction to obtain benzamide containing 1,2 dihydroquinoline derivatives [6a-h]. The sequence of reaction for the synthesis of benzamide containing 1,2 dihydroquinoline derivatives [6a-h] has been presented in scheme-4.1.

The sequence of reaction for the synthesis of benzamide containing 1,2 dihydroquinoline derivatives [6a-h] has been presented in scheme-4.1.

Scheme-4.1: Synthetic route for the preparation of 1,2-dihydroquinoline benzamide derivatives [6a-h]



Reagents and conditions: i) (CH3CO)2O, CH3COOH, 10h; ii) CH3COCH2COOEt, 70% H2SO4, 0oC, 9-10h; iii) O-phenylenediamine, NaOAc, rt; iv) substituted benzoyl chlorides, Et3N, CH2Cl2.

7.2 Materials and methods (146-156)

The organic solvents and chemicals were purchased from SD Fine, Spectrochem, Sigma Aldrich, Merck and standard commercial sources are used without further purification.

Room temperature reactions mentioned ranges between 15-35°C (throughout the year). For low temperature reactions an ice-bath with sodium chloride (0°C) was used. Magnetically stirred oil bath (or) hotplate was used for high temperature reactions.

Melting point of solid compounds range was determined in open capillary tubes using a hot stage apparatus.

Progress of the reactions was monitored by TLC using Merck silica gel 60 F254 precoated on aluminium backed plates. TLC plates were visualized with ultraviolet light or iodine vapors or by staining with 2% aqueous potassium permanganate solution.

Silica gel (60-120 mesh) or neutral alumina was used for purification of synthesized compounds.

The spectra were recorded using JASCO FTIR-4100 spectrophotometer as KBr disc.

7.3 Experimental (157-166)

Step-1: Synthesis of 3-hydroxy Acetanilide [1]

3-aminophenol (0.11 mol, 25g) was dissolved in acetic anhydride (80 mL) and the reaction mixture was stirred at 60oC for 8 h at room temperature under nitrogen atmosphere. After completion of the reaction, the excess acetic anhydride was removed under reduced pressure; the residue was dissolved in methylene dichloride (MDC). The organic layer was washed with brine solution, dried over anhydrous Na2SO4 and concentrated to obtain compound (1). LCMS: 152 (M+1), MP: 152·C. Yield: 82%.

Step-2: Synthesis of N-(4-methyl-2-oxo-2H-chromen-7-yl) acetamide [2]

A mixture of 3- hydroxy acetanilide (metacetamol) (0.1 mol, 15.1g) and ethyl acetoacetate (0.1 mol) with 70% sulphuric acid (50 mL) was heated carefully for 5 h. The resulting solution was cooled and poured over crushed ice (250 g). The crude product was filtered off and washed repeatedly with water, dried and recrystallized from hot water to result in title compound (3). LCMS: 205 (M+1), MP: 243·C. Yield: 62%.

Step-3: Synthesis of N-[1-(2-aminophenyl)-4-methyl-2-oxo-1,2-dihydroquinolin 7-yl] acetamide [3]

A mixture of N-(4-methyl-2-oxo-2H-chromen-7-yl) acetamide (0.01 mol, 2.17g), o phenylenediamine (0.01 mol, 1.08g) and sodium acetate (5 g) in glacial acetic acid (15 mL) was refluxed for 8 h and cooled. The separated solid was filtered and recrystallized from methanol: water (1:2) to give title compound (3). LCMS: 237.8 (M+1), MP: 285 ·C. Yield: 70%.

Step-4: Synthesis of 1,2-dihydroquinoline benzamides [6a-h]

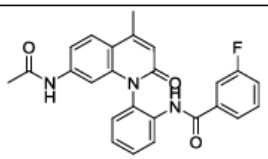
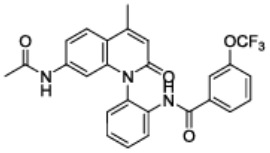
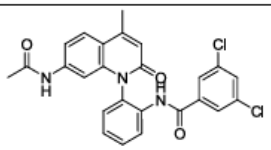
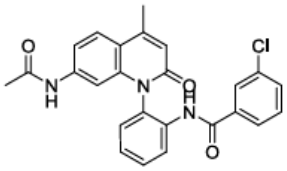
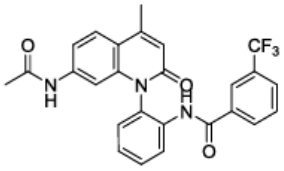
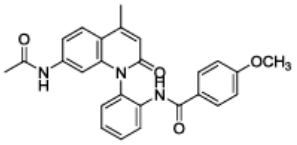
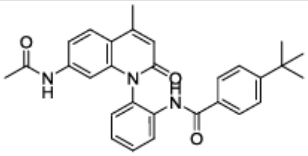
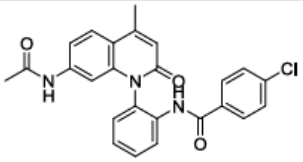
Equimolar quantities of compound [4] (0.5 g, 0.001 mol) and different substituted benzoyl chlorides (0.001 mol) such as 3-fluoro, 3-methoxy and 3,5-dichloro benzoyl chlorides, K2CO3 (0.003 moles, 0.57 g), were stirred in dry ACN (10 mL) under nitrogen at room temperature for 10 h. The reaction was monitored by TLC and the reaction mixture was filtered. The organic ACN phase was dried using anhydrous Na2SO4 and evaporated. The residue was purified by column chromatography using petroleum ether: ethyl acetate as eluent (8:2) to get benzamide dihydroquinoline nucleus (6a-h) in good yield (scheme 4.1).

7.4 Results and discussion

In the present work, novel benzamide dihydroquinoline derivatives were synthesized by acetylation of 3-amino phenol, cyclisation of N-(3-hydroxyphenyl) acetamide followed by substitution of o-phenylenediamine to get N-[1-(2 aminophenyl)-4-methyl-2-oxo-1,2-dihydroquinolin-7-yl] acetamide [3]. Compound [3] was treated with various substituted aromatic benzoyl chlorides in order to get the dihydroquinoline derivatives with benzamide moiety [6a-h].

All the derivatives were obtained in good yield. The physical data of all the compounds are presented in Table 4.1. The structures of the newly synthesized compounds were characterized by spectroscopic techniques like FT-IR.

Table 4.1: Physical characterization data of 1,2-dihydroquinoline Benzamides [6a-h]

Entry	Structure	Mol. Formula (Mol. Wt)	Yield (%)	Melting point (°C)
6a		$C_{25}H_{20}N_3O_3F$(429.44)	72	221-223
6b		$C_{26}H_{20}N_3O_4F_3$(495.44)	72	241-242
6c		$C_{25}H_{19}N_3O_3Cl_2$ (480.34)	75	251-253
6d		$C_{25}H_{20}N_3O_3Cl$ (445.90)	80	218-219
6e		$C_{26}H_{20}F_3N_3O_3$(479.45)	70	216-218
6f		$C_{26}H_{23}N_3O_4$(441.48)	85	251-253
6g		$C_{29}H_{29}N_3O_3$(467.56)	91	222-223
6h		$C_{25}H_{20}ClN_3O_3$(445.90)	85	231-232

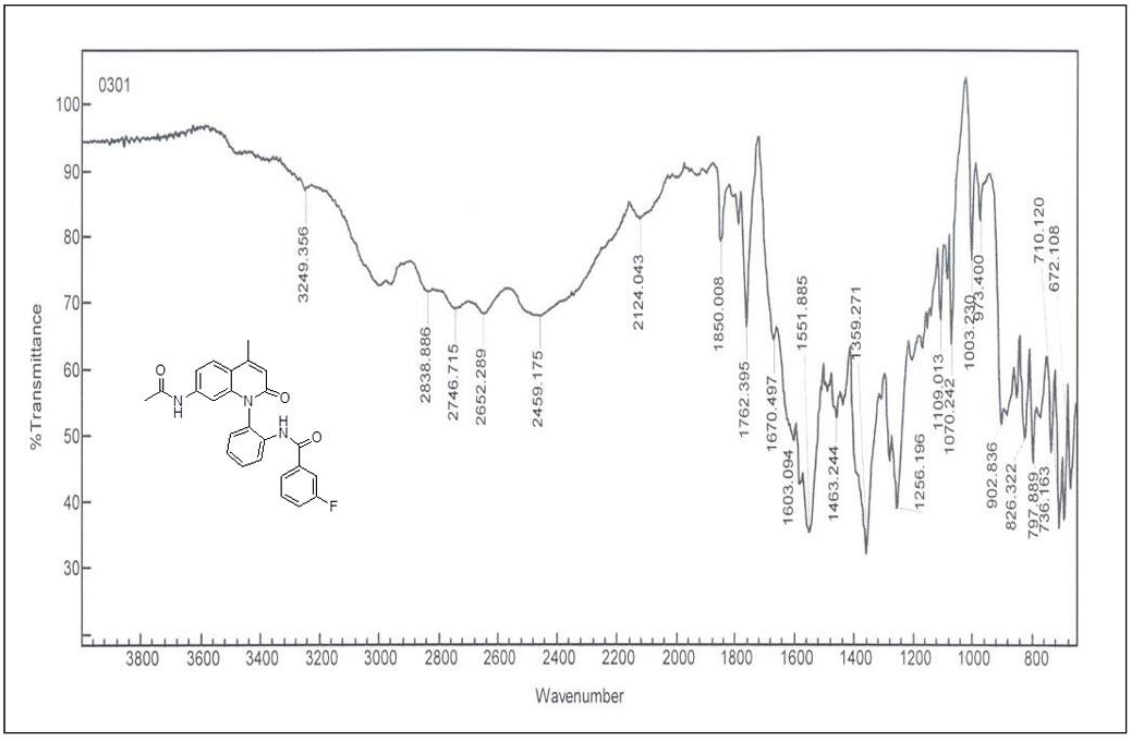


Figure 4.1: IR spectrum of compound**[6a]**

.

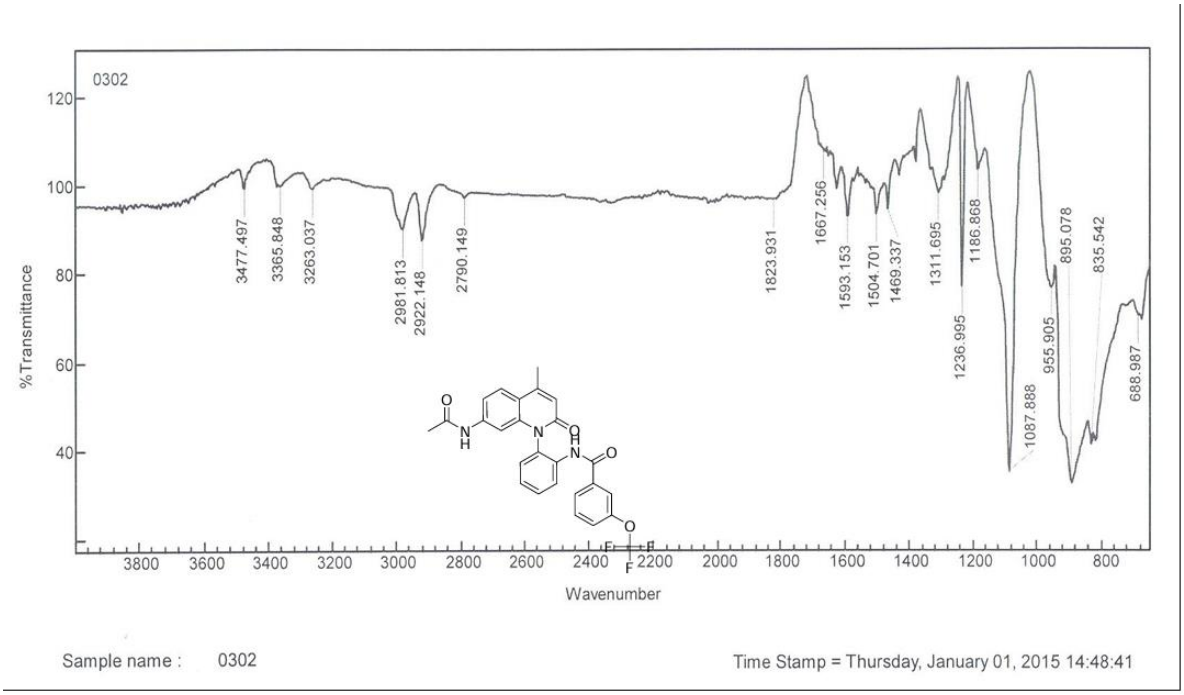


Figure 4.6: IR spectrum of compound**[6b]**

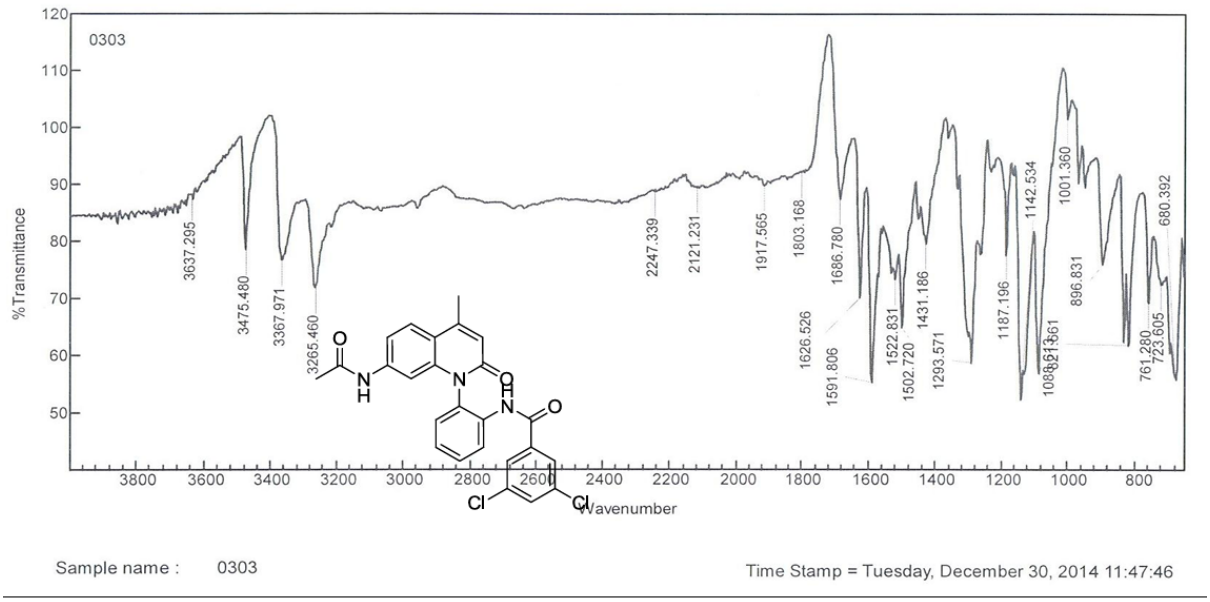


Figure 4.11: IR spectrum of compound **[6c]**

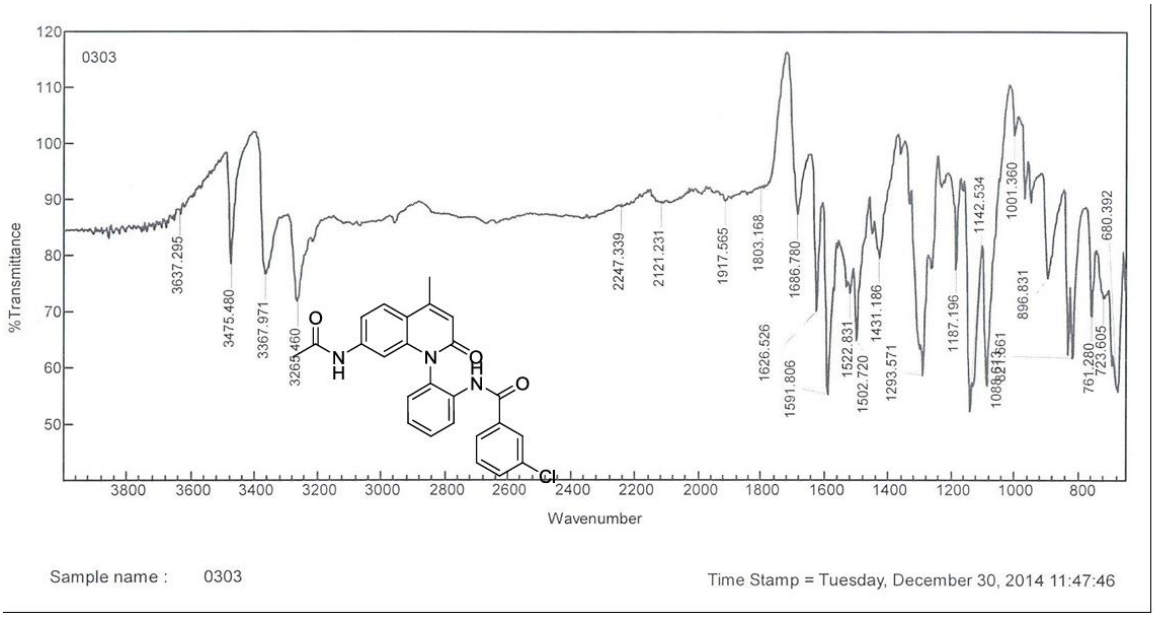


Figure 4.16: IR spectrum of compound **[6d]**

7.5 Conclusion

The research work was focused on the efficient synthesis of benzamides containing 1,2-dihydroquinoline nucleus. The reactions performed are ecofriendly as they are carried out at moderate temperature 60-90 OC by using solvents Tetrahydrofuran and Methylene dichloride to get final compounds with good yield, short time interval and purity. Newly synthesized compounds were well characterized by IR.

CHAPTER 5

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