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HUMNABAD DIST: BIDAR

DEPARTMENT OF CHEMISTRY

MINOR RESEARCH PROJECT ON

"GREEN APPROACH:IN SYNTHETIC ORGANIC CHEMISTRY"

(MRP(S)/13-14/KAGUO17/UGC-SWRO)

(Work is ongoing)

Project report 1.

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Green Approach – In synthetic organic chemistry

Introduction :

It has long been known that molecules undergo excitation with electromagnetic radiation, this effect in utilized in household microwave oven to heat up food. However chemists have only been using microwave a reaction methodology for a few years. Some of the fist example gave amazing results which led to a food of interest in microwave accelerated synthesis. The water molecule and organic solvent like ether, alcohol, dioxane, hexane, benzene molecules with or without dipole it absorbs microwave radiation. Microwave radiations is converted into heat with high efficiency, so that superheating becomes possible at ambient pressure. Enormous accelerations in reaction time can be achieved, if super heating is performed in closed vessel under high pressure a reaction that taken several hours under conventional condition and can be completed over the course of minutes. Due to the ability of some compound viz solids or liquid to transform electromagnetic energy in to heat. This technique has been widly employed in chemistry as an energy sourse. Microwave assisted organic reactions produce high yields and lower quantities is easier and in some cases selectivity is modified. Indeed new reactions and conditions that can't be achieved by conventional heating can be performed using microwaves absorption and transmission of microwave every is completely different and the energy is transformed from the surface to the bulk by convention and conduction. The important characteristic of microwave heating is energetic coupling, at the molecular level is rapid, volumetric, selectivity depend upon the properties of the material. The prime principles of Green chemistry reports by Anastas and Warner are

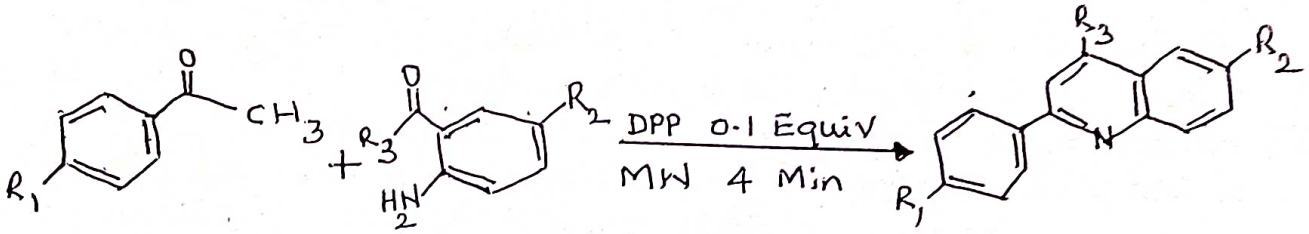
1. To prevent waste
2. Maximum atom (material) economy
3. Design less hazardous chemical synthesis
4. Design safer chemicals and products
5. Use safer solvents and reaction condition
6. Increase energy efficiency
7. Use renewable feed stocks
8. Avoid chemical derivaties
9. Use catalyst, not stochio metric reagent
10. Design chemical and products to degreed after use
11. Analyze in real time to prevent pollution
12. Minimize the potential for acciduts.

Solvent Free Reactions

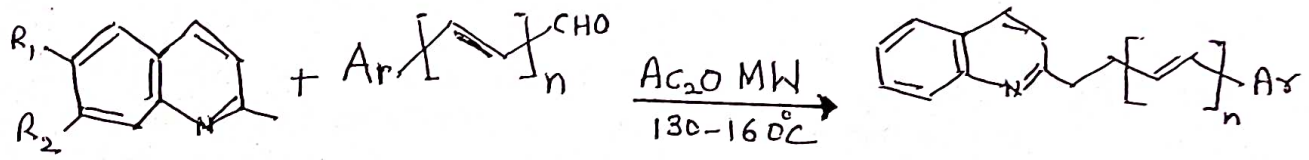
Microwave radiation is a safe source of heating, unctrolled reaction conditions involving volatile reactants and / or solvents at high pressure may results in undersirable results. This problem has been made more sustainable processes through the use of open vessel solvent – free microwave condition.

In 1993 Louly reported that potassium acetate can be alkylted in the absence of solvent in a domestic oven using equivalent amount of salt and alkylating agent in the presence of aliquat 336 (10% mol)

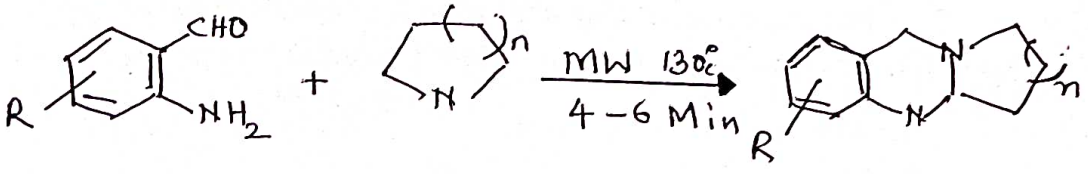
Quinolines are know not only for their important biological activities but also for the formation of conjugated molecules and polymers that combine enahanced electronic or nonlinear optical properties and good mechanical properties. Kwon decribed the preparation of 12 – quinoline derivative by Friendlander coupling condensation between acetophone and 2-aminoacetophenone in the presence of diphenyl phosphate (0.1 – 0.5 equiv) for 4 min, under microwave conditan in the absace of solvent (85%)



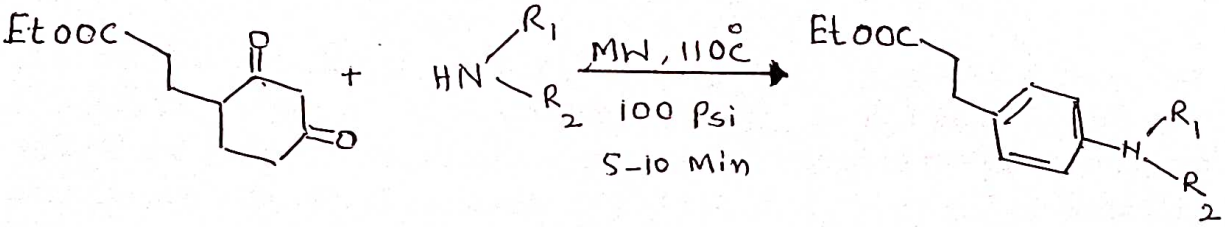
Styrylquinolines are also valuable derivatives as imaging agents for β-amyloid plaques on human brain sections in alzhemer patients. Menendez reported a microwave ansisted solvent – free synthesis



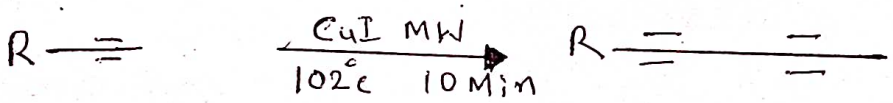
In 2008 Varma described the preparation A ring fused aminals through MW assisted α - aminaton of nitrogen heterocyclies in a high yielding process that was solvent and catalyst free



β - Enaminones and β – Enaminoester derirative are versatile synthetic intermediate for a wide range of bioactive heterocycles, pharmaceuticals and naturally occurring alkaloids. For this reason several catalytic and non catalytic methods have been applied for the synthesis of these compounds. Das described the microwave assisted synthesis of novel classes of β – Enaminoesters within 5-10 min by reaction between 3-(2,4- dioxoxylohexyl) propanoate and different amines under solvent and catalyst free condition. The reaction did not require work up and clean product formation was achieves under milder reaction conditions, thus making this process in an environmentally benign method.



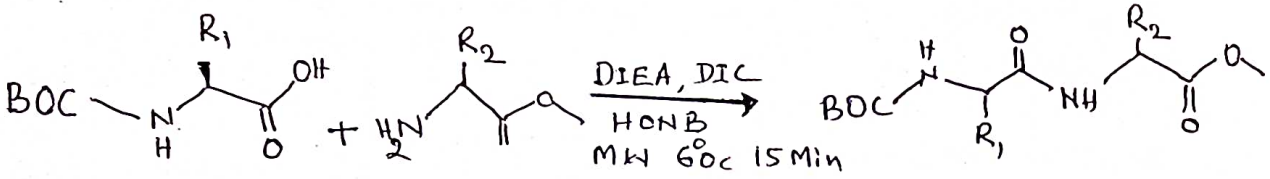
Brags recently described synthesis of 1,3 – diynes from terminal acetylenes catalysed by CuI and tetramethylanediame in the presence of air as oxidant at 102^0C for 10 min under solvent – free condition. A wide range of green chemistry expertise synthetic areas including homogeneous and heterogeneous catalyst, asymmetric synthesis of heterocyclic compounds were synthesized.



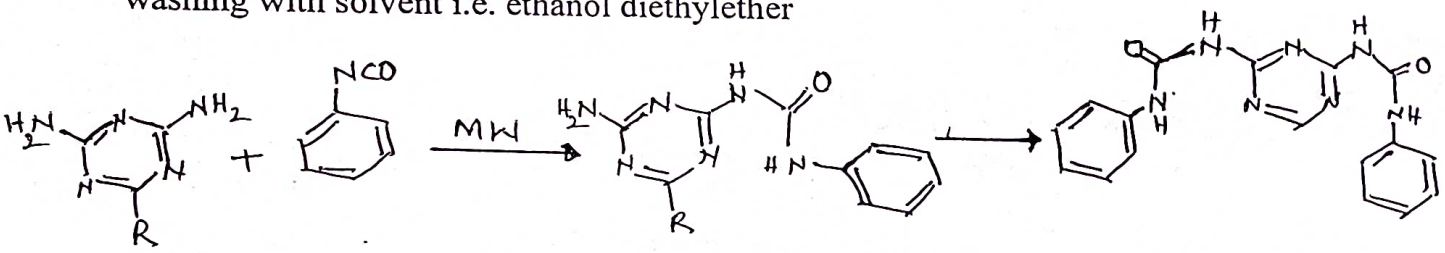
Keeping in view the following microwave assisted reactions are carried out in this laboratory.

1. **Synthesis and characterization of coumarine derivatives which are significant molecular structural skeleton in natural products.**
   A microwave assisted method for synthesis of heterocylic compounds is well know. Alpha – naphthdhline derivatives are known for their importance biological activities and formation of conjugated molecules which enhanced electronic or non linear optical properties with good mechanical properties. Naphthol derivatives by Friedlander coupling condensation between substituted aromatic aldehydes and dicyanomethane and 1 – nephthol (0.1 mol) in the presence of diphenylphosphate (0.1 equiv) with 10 min under microwave irradiation in the absence of solvent. This procedure afforded product yields of up to 82-85% scheme – 1

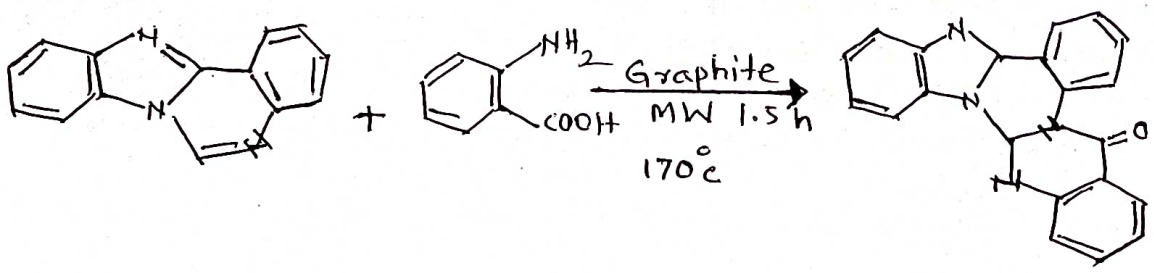
Recently Jain reported an efficient and facile solvent peptide synthesis assisted by microwave irradiation using N, N disopropyl carbodimide (DIC) as the coupling reagent and N-hydroxy–5 nor bornene–en–2,3–dicrbodimide (HONB) as an auxiliary nucleophile in 15-min-at 60^{0}C in high yield with high purity without recimizatian



Hoz reported an efficient and sustainable microwave – assisted solvent free approach for the preparation of wide range of 1, 3, 5 trazinyl mono-and bisureas under these condition non-reactive amino groups attached to the trazine ring are able to react with phenyl isocyanate to yied selectively mono and bisureas. The products were obtained with simple purification procedure which simply involved washing with solvent i.e. ethanol diethylether

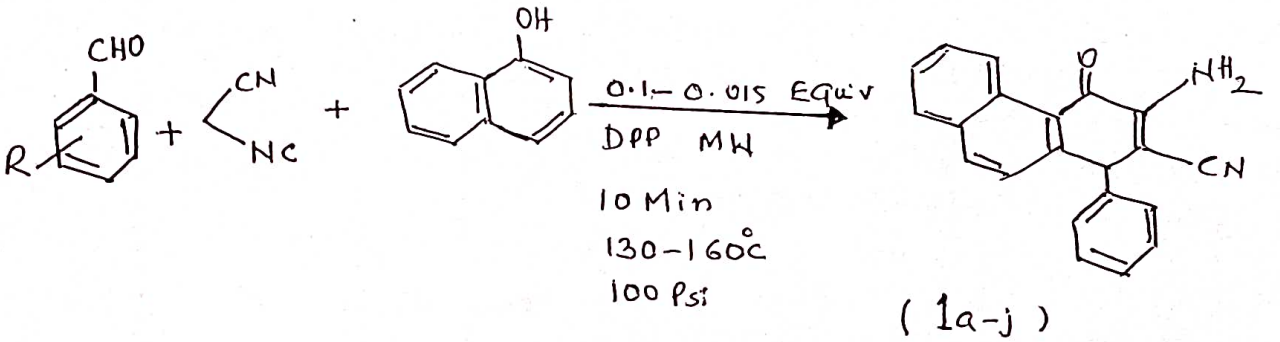


Basson reported that a quinazolin – 4 – one ring can be fused into a benzimidazo (1, 2 – c) quinazoline by modified Niementowski reaction. Thermal heating of the two reagents at 120^0 C or in refluxing butanol for 48h gave only50% of the target compound. The reaction time was reduced to 6h in microwave assisted process. However irradiation of the quinazolin acid absorbed on graphite let to the desired product in 1.5 h with 95% yield. Further more the fact that byproducts were not detected allowed the easy purification of the product.



Experimental procedure and characterization :

A mixture of 1 – naphthol (0.1 mol), substituded aldehyde (0.1 mol) and diphanylphosphats were finely powder in a closed vessel in the atmosphere of dicyanomethane were subjected to microwave irradiation for 10 min and the colour of the sample slowly changed to coloured one, cooled and dried. The sample were extracted with ether (3 x 5 ml) and than washed with brine (6 ml) and dried (Na_2SO_4). The solvent was evaporated and residue was purified on silica gel column using hexane an eluent to furnise 1 – naphthol coumarine (1 a – j) derivatives (Table – 1)



a – 2Cl
b – 2Br
c – $2CH_3$
d – $2OCH_3$
e – NO_2
f – 4Cl
g – 4Br
h – $4CH_3$
i – $4OCH_3$
j – $4NO_2$

Scheme–1

Spectral Characterization

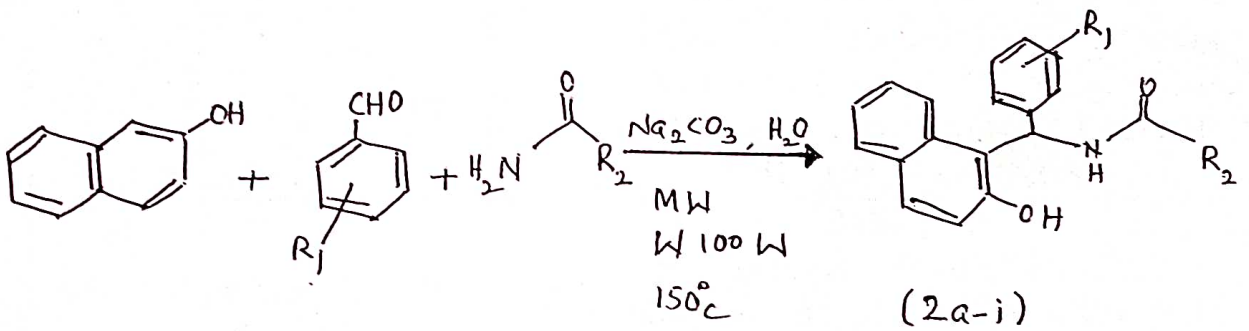
IR spectra were recorded on Jasco – FTIR 410 spectophotometer and NMR spectra were recorded on JNM λ - 300 spectometer. The chemical shift (δ ppm) and coupling constants (Hz) are reported in the standard fashion with reference to either internal tetramethylsilane (for ^1H) or the central line (77.0 ppm) of $CDCl_3$ (for C^{13}) in NMR Spectra, the nature of the carbons (C, CH, CH_2 or CH_3) was determined by recording the DEPT – 135 spectra and is given in parenthesis.

Table – 1

Compd.	Substituent	m.p.c^0	Yield%	IR and NMR spectra
1a	4 – Cl	106	82	3569 cm^{-1}, 3559 cm^{-1} (NH_2, = N, 1530 cm^{-1}- CN), -O- 106 0cm^{-1} 7.20 – 6.95 (4H, Ar – H)
1b	4 – Br	183	85	3560 cm^{-1}, 3560 cm^{-1} (NH_2, = N, 1540 cm^{-1}- CN), -O- 106 0cm^{-1} 7.20 – 6.95 (4H, Ar – H)
1c	4 – CH_3	162	88	3550 cm^{-1}, 3565 cm^{-1} (NH_2, = N, 1530 cm^{-1}- CN), -O- 106 0cm^{-1} 7.20 – 6.95 (4H, Ar – H)
1d	4 – OCH_3	152	90	3540 cm^{-1}, 3560 cm^{-1} (NH_2, = N, 1520 cm^{-1}- CN), -O- 106 0cm^{-1} 7.20 – 6.95 (4H, Ar – H)
1e	4 – NO_2	180	92	3570 cm^{-1}, 3560 cm^{-1} (NH_2, = N, 1535 cm^{-1}- CN), -O- 106 0cm^{-1} 7.20 – 6.95 (4H, Ar – H)
1f	2 – Cl	148	90	3565 cm^{-1}, 3558 cm^{-1} (NH_2, = N, 1537 cm^{-1}- CN), -O- 106 0cm^{-1} 7.20 – 6.95 (4H, Ar – H)
1g	2 – Br	191	92	3561 cm^{-1}, 3555 cm^{-1} (NH_2, = N, 1531 cm^{-1}- CN), -O- 106 0cm^{-1} 7.20 – 6.95 (4H, Ar – H)
1h	2 – CH_3	153	91	3556 cm^{-1}, 3552 cm^{-1} (NH_2, = N, 1531 cm^{-1}- CN), -O- 106 0cm^{-1} 7.20 – 6.95 (4H, Ar – H)
1i	2 – OCH_3	128	82	3554 cm^{-1}, 3567 cm^{-1} (NH_2, = N, 1545 cm^{-1}- CN), -O- 106 0cm^{-1} 7.20 – 6.95 (4H, Ar – H)
1j	2 – NO_2	156	85	3567 cm^{-1}, 3557 cm^{-1} (NH_2, = N, 1537 cm^{-1}- CN), -O- 106 0cm^{-1} 7.20 – 6.95 (4H, Ar – H)

2. Synthesis of 2 – naphthol derivative of substituted phenyl amides (2a-j)

2 - naphthol derivatives of substituted phenyl amides were prepared and the reactions studied under microwave irradiation in water include palladium catalysed coupling reactions, heterocyclic synthesis, multicomponent reactions. Nucleophilic substitution, cyclo additions, takes place. Such type of mechanism takes place by microwave irradiation of the fine mixture of 2 – naphthol (0.1 mol) aromatic substituted aldehydes (0.1 mol) and alkylamide (0.11 mol) the presence of sodium carbonate, water, MW, 100 W at 150^0 C for 8 min. The products was decanted from excess of water and quenched with ammonium chloride (5 ml) and extracted with ether (5 x 3 ml). The ether extract was washed with brine (5 ml) and dried over sodium suphate. Evaporation of the solvent and purification of the residue over a silica gel column using methylene chloride / hexane (1:5) as eluent furnished the pure naphthol derivatives. (table – 2)



R_1 = 4–CH_3
4–OCH_3
4-Cl

R_2 = CH_3
C_2H_5
C_3H_7 (Isopropyl)

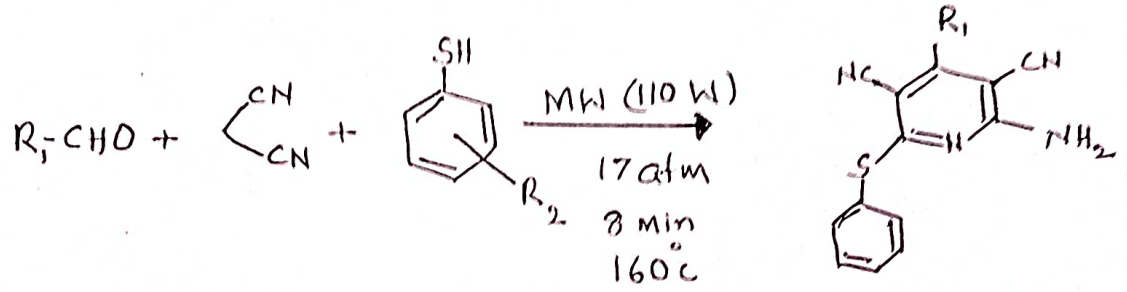
Scheme–2

Table – 1

Compd.	Substituent		m.p.c^0	Yield%	IR and NMR spectra
	R1	R2			
2a	4-CH_3	4-CH_3	158	88	Vmex/cm^{-1} 3569,3559,1514, 3330 cm^{-1} (NH) 913 ^{1}H NMR 300 MH$_z$ $CDCl_3$, δ 7.20 – 6.95 (4H, m, Ar – 4) 4.42 (1H, s, CH-OH) 3H, s, Ar – CH_3 – 2.40 – 2.20
2b	4-CH_3	4-C_2H_5	138	82	Vmex/cm^{-1} 3565,3559,1517, 3330 cm^{-1} (NH) 913 ^{1}H NMR 300 MH$_z$ $CDCl_3$, δ 7.40 – 6.95 (4H, m, Ar – 4) 4.42 (1H, s, CH-OH) 3H, s, Ar – CH_3 – 2.40 – 2.20
2c	4-CH_3	4-C_3H_7	160	86	Vmex/cm^{-1} 3569,3559,1514, 3330 cm^{-1} (NH) 913 ^{1}H NMR 300 MH$_z$ $CDCl_3$, δ 7.20 – 6.95 (4H, m, Ar – 4) 4.42 (1H, s, CH-OH) 3H, s, Ar – CH_3 – 2.40 – 2.20
2d	4-OCH_3	4-CH_3	142	90	Vmex/cm^{-1} 3559,3559,1524, 3330 cm^{-1} (NH) 913 ^{1}H NMR 300 MH$_z$ $CDCl_3$, δ 7.40 – 6.95 (4H, m, Ar – 4) 4.42 (1H, s, CH-OH) 3H, s, Ar – CH_3 – 2.40 – 2.20
2e	4-OCH_3	4-C_2H_5	180	90	Vmex/cm^{-1} 3569,3559,1514, 3330 cm^{-1} (NH) 913 ^{1}H NMR 300 MH$_z$ $CDCl_3$, δ 7.50 – 6.95 (4H, m, Ar – 4) 4.42 (1H, s, CH-OH) 3H, s, Ar – CH_3 – 2.40 – 2.20
2f	4-OCH_3	4-C_3H_7	129	82	Vmex/cm^{-1} 3557,3559,1520, 3330 cm^{-1} (NH) 913 ^{1}H NMR 300 MH$_z$ $CDCl_3$, δ 7.30 – 6.95 (4H, m, Ar – 4) 4.42 (1H, s, CH-OH) 3H, s, Ar – CH_3 – 2.40 – 2.20
2g	4-Cl	4-CH_3	147	88	Vmex/cm^{-1} 3569,3559,1514, 3330 cm^{-1} (NH) 913 ^{1}H NMR 300 MH$_z$ $CDCl_3$, δ 720 – 6.95 (4H, m, Ar – 4) 4.42 (1H, s, CH-OH) 3H, s, Ar – CH_3 – 2.40 – 2.20
2h	4-Cl	4-C_2H_5	154	90	Vmex/cm^{-1} 3560,3559,1517, 3330 cm^{-1} (NH) 913 ^{1}H NMR 300 MH$_z$ $CDCl_3$, δ 7.20 – 6.95 (4H, m, Ar – 4) 4.42 (1H, s, CH-OH) 3H, s, Ar – CH_3 – 2.40 – 2.20
2i	4-Cl	4-C_3H_7	132	85	Vmex/cm^{-1} 3556,3552,1514, 3330 cm^{-1} (NH) 913 ^{1}H NMR 300 MH$_z$ $CDCl_3$, δ 7.40 – 6.95 (4H, m, Ar – 4) 4.42 (1H, s, CH-OH) 3H, s, Ar – CH_3 – 2.40 – 2.20

3. **Synthesis of substituted pyridine derivative by microwave irradiation solvent free reaction. (3a–h)**

To sonochemically activated lithium (20 mg 3.2 mol) in dry THF (1 ml) in a petty dish was add slowly a mixture of 2 – naphthol (fine powdered) 0.1 mol, substituted aldehydes (0.1 mol, equiv) ant alkyl substituted amide (0.1 mol) and magnetically stirred. Microwave assisted synthesis of phridine derivative is excellent yields. The catalyst could be recovered by simple filtration and reused. This method is applicable to a wide range of substituted pyridines which are significant in natural products.



$R_1 = CH_3$
$= C_2H_5$

$R_2 = 4\text{-Cl}$
$= 4\text{-Br}$
$= 4\text{-}CH_3$
$= 4\text{-}OCH_3$

Scheme–3

The reaction mixture subjected to microwave irradiation (110 w) at 160^0 c for 8 min. Evaporation of the solvent on hot water bath and purification of residue over a silica gel column using CH_2Cl_2 / hexave (1 : 9) as eluent furnished the pure product (3a – h)

Table – 3

Compd.	Substituent		m.p.c^0	Yield%	IR and NMR spectra
	R1	R2			
3a	CH_3	4-Cl	182	85	3320 cm^{-1} (NH_2), 780 C-S-C 1640 cm^{-1} (CN) ^1H NMR (300 MH_z $CDCl_3$: δ 5.8-5.6 ^1H, m, 4-H), 5.0 – 4.95 (2H, m, H – 5) 3.64 (3 H, s, OCH_3), 5.14 (CH_3, OCH_3)
3b	CH_3	4-Br	142	86	3325 cm^{-1} (NH_2), 785 C-S-C 1640 cm^{-1} (CN) ^1H NMR (300 MH_z $CDCl_3$: δ 5.8-5.6 ^1H, m, 4-H), 5.0 – 4.95 (2H, m, H – 5) 3.64 (3 H, s, OCH_3), 5.14 (CH_3, OCH_3)
3c	CH_3	4-CH_3	130	82	3330 cm^{-1} (NH_2), 770 C-S-C 1640 cm^{-1} (CN) ^1H NMR (300 MH_z $CDCl_3$: δ 5.8-5.6 ^1H, m, 4-H), 5.0 – 4.95 (2H, m, H – 5) 3.64 (3 H, s, OCH_3), 5.14 (CH_3, OCH_3)
3d	CH_3	4-OCH_3	182	90	3320 cm^{-1} (NH_2), 780 C-S-C 1640 cm^{-1} (CN) ^1H NMR (300 MH_z $CDCl_3$: δ 5.8-5.6 ^1H, m, 4-H), 5.0 – 4.95 (2H, m, H – 5) 3.64 (3 H, s, OCH_3), 5.14 (CH_3, OCH_3)
3e	C_2H_5	4-Cl	180	82	3320 cm^{-1} (NH_2), 765 C-S-C 1640 cm^{-1} (CN) ^1H NMR (300 MH_z $CDCl_3$: δ 5.8-5.6 ^1H, m, 4-H), 5.0 – 4.95 (2H, m, H – 5) 3.64 (3 H, s, OCH_3), 5.14 (CH_3, OCH_3)
3f	C_2H_5	4-Br	182	86	3324 cm^{-1} (NH_2), 774 C-S-C 1640 cm^{-1} (CN) ^1H NMR (300 MH_z $CDCl_3$: δ 5.8-5.6 ^1H, m, 4-H), 5.0 – 4.95 (2H, m, H – 5) 3.64 (3 H, s, OCH_3), 5.14 (CH_3, OCH_3)
3g	C_2H_5	4-CH_3	138	90	3315 cm^{-1} (NH_2), 782 C-S-C 1640 cm^{-1} (CN) ^1H NMR (300 MH_z $CDCl_3$: δ 5.8-5.6 ^1H, m, 4-H), 5.0 – 4.95 (2H, m, H – 5) 3.64 (3 H, s, OCH_3), 5.14 (CH_3, OCH_3)
3h	C_2H_5	4-OCH_3	142	88	3325 cm^{-1} (NH_2), 774 C-S-C 1640 cm^{-1} (CN) ^1H NMR (300 MH_z $CDCl_3$: δ 5.8-5.6 ^1H, m, 4-H), 5.0 – 4.95 (2H, m, H – 5) 3.64 (3 H, s, OCH_3), 5.14 (CH_3, OCH_3)

The Phoromcological and Microbial activities studies is in progress.

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Reg No: 1969/92-93

ಶ್ರೀ ವೀರಭದ್ರೇಶ್ವರ ಶಿಕ್ಷಣ ದತ್ತಿಯ

Ph: 08483-270303

ಶ್ರೀ ಬ. ಚ. ಸ್ವಾಮೀಜಿ ಕಲಾ, ಶ್ರೀ ವೀರಭದ್ರೇಶ್ವರ ವಾಣಿಜ್ಯ ಹಾಗೂ ವಿಜ್ಞಾನ
ಮಹಾವಿದ್ಯಾಲಯ ಮತ್ತು ಶ್ರೀ ವೀರಭದ್ರೇಶ್ವರ ಪಿ. ಜಿ. ಕಾಲೇಜ, ಹುಮನಾಬಾದ.

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ಪ್ರಾಂಶುಪಾಲರು

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ದಿನಾಂಕ: 26/03/17

Date:

To
Dr. N.Gopukumar
Deputy Secretary
South Western Regional Office
University Grant Commission
P.K.Block, Palace Road
Gandhinagar, Bengalouru.

Subject :- Submission of project report-1 of the MRP Topic Name Green Approaches in synthetic organic chemistry.

Ref No. MRP (S) 0430/13-14/KAGUO17/ UGC-SWRO

-00-

Sir/Madam,

I am here by submitting the progress report of my MRP Topic said above kindly accept my project report -1 and help the needful. I hope you do consider my request with courtesy.

Thanking you,

Principal Investigator
Prof: C.N.Biradar
Dept of Chemestry
SBCS Arts S.V. Com & Sci College
Humnabad

Principal
PRINCIPAL
S.B.C. Arts, S.V. Commerce
& Science College, Humnabad

UGC, SWRO
28 MAR 2017
RECEIVED
BANGALORE.

Annexure - III

UNIVERSITY GRANTS COMMISSION
BAHADUR SHAH ZAFAR MARG
NEW DELHI – 110 002

STATEMENT OF EXPENDITURE IN RESPECT OF MINOR RESEARCH PROJECT

1. Name of Principal Investigator Prof C.N. Biradar
2. Deptt. of PI Department of Chemistry
   Name of College SBCS Art's, SV Com & Science College, Humnabad
3. UGC approval Letter No. and Date MRP(S)13-14/KAGV017/UGC-SWRO
4. Title of the Research Project Green Approaches on Synthetic Organic Chemistry
5. Effective date of starting the project 01-09-2014
6. a. Period of Expenditure: From 01-09-2014 to 31-03-2017
   b. Details of Expenditure _____

S.No.	Item	Amount Approved (Rs.)	Expenditure Incurred (Rs.)
i.	Books & Journals	10,000=00	10,000=00
ii.	Equipment	30,000=00	30,000=00
iii.	Contingency including special needs	12,500=00	12,500=00
iv.	Field Work/Travel (Give details in the proforma).	7,500=00	7,500=00
v.	Hiring Services		
vi.	Chemicals & Glassware	50,000=00	50,000=00

7. if as a result of check or audit objection some irregularly is noticed at later date, action will be taken to refund, adjust or regularize the objected amounts.

8. It is certified that the grant of Rs. 1,10,000 (Rupees One Lakh Ten Thousand only) received from the University Grants Commission under the scheme of support for Minor Research Project entitled Green Approaches in Synthetic organic chemistry vide UGC letter No. F. MRP(S)/13-14/KAGU017/UGC-SWRO dated 15-2-14 has been fully utilized for the purpose for which it was sanctioned and in accordance with the terms and conditions laid down by the University Grants Commission.

SIGNATURE OF PRINCIPAL INVESTIGATOR

PRINCIPAL

PRINCIPAL
S.B.C. Arts, S.V. Commerce
& Science College, Humnabad

(Seal)

Annexure - IV

UNIVERSITY GRANTS COMMISSION
BAHADUR SHAH ZAFAR MARG
NEW DELHI – 110 002

STATEMENT OF EXPENDITURE INCURRED ON FIELD WORK

Name of the Principal Investigator:

Name of the Place visited	Duration of the Visit		Mode of Journey	Expenditure Incurred (Rs.)
1) Goel pharmacy college, Bidar 2) Central University, Hyderabad	From Sept-14 April-15	To March-15 March-19	Bus Car	7,500/-

Certified that the above expenditure is in accordance with the UGC norms for Major Research Projects.

SIGNATURE OF PRINCIPAL INVESTIGATOR

PRINCIPAL
PRINCIPAL
S.B.C. Arts, S.V. Commerce
& Science College, Humnabad
(Seal)

Annexure - V

UNIVERSITY GRANTS COMMISSION
BAHADUR SHAH ZAFAR MARG
NEW DELHI – 110 002

Utilization certificate

Certified that the grant of Rs. 1,10,000/-
(Rupees One Lakh Ten thousand rupees only
_____ only) received from the University Grants Commission under the scheme of support for Minor Research Project entitled Green Approaches in Synthetic Organic Chemistry
vide UGC letter No. F.MRP(S)/13-14/KAGU017/UGC-SWRO dated 15-2-14 has been fully utilized for the purpose for which it was sanctioned and in accordance with the terms and conditions laid down by the University Grants Commission.

For Saroj & Associates
Chartered Accountants

SIGNATURE OF THE PRINCIPAL INVESTIGATOR

PRINCIPAL
PRINCIPAL
S.B.C. Arts, S.V. Commerce & Science College, Humnabad
(Seal)

ROMA DEVI
Partner
M.No. 235425 Fr. No.009139S
STATUTORY AUDITOR
(Seal)

SAROJ & ASSOCIATES CHARTERED ACCOUNTANTS BIDAR

Annexure -VI

UNIVERSITY GRANTS COMMISSION
BAHADUR SHAH ZAFAR MARG
NEW DELHI – 110 002.

Annual/Final Report of the work done on the Minor Research Project.
(Report to be submitted within 6 weeks after completion of each year)

1. Project report No. 1st/Final Report 1
2. UGC Reference No.F. MRP(S)-0430/13-14/KAGU017/UGC-SWRO
3. Period of report: from 01-09-2014 to 31-03-2017
4. Title of research project Green Approaches in Synthetic Organic Chemistry
5. (a) Name of the Principal Investigator Prof. C.N Biradar
   (b) Deptt. Dept. of Chemistry
   (c) College where work has progressed SBCS, S.V Com & Science College, Hunnabu
6. Effective date of starting of the project 01-09-2014
7. Grant approved and expenditure incurred during the period of the report:
   a. Total amount approved Rs. 1,10,000/-
   b. Total expenditure Rs. 1,10,000/-
   c. Report of the work done: (Please attach a separate sheet)
   i. Brief objective of the project Enclosed
   ii. Work done so far and results achieved and publications, if any, resulting from the work (Give details of the papers and names of the journals in which it has been published or accepted for publication –
   iii. Has the progress been according to original plan of work and towards achieving the objective. if not, state reasons

iv. please enclose a summary of the findings of the study. One bound copy of the final report of work done may also be sent to the concerned Regional Office of the UGC.

v. Any other information

SIGNATURE OF THE PRINCIPAL INVESTIGATOR

PRINCIPAL

PRINCIPAL
S.B.C. Arts, B.V. Commerce
& Science College, Hummabad

(Seal)