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# SYNTHESIS AND CHARACTERIZATION OF SUBSTITUTED HETEROCYCLES FROM 1-NAPHTHOL

R. Raghu nadhan, D. Sai pavan, K. Bhanu, CH. Veeranjaneyulu,
K. Madhavi* and A. Lakshmana Rao. Department of pharmaceutical chemistry,
V.V. Institute of Pharmaceutical sciences,
**Corresponding author: madhavikamma19@gmail.com**

RESEARCH ARTICLE

**Abstract:**

1-Naphthol or α- Naphthol is aromatic phenol, It is an isomer of 2-naphthol, 1-Naphthol is a precursor to a variety of insecticides and pharmaceuticals including Nadolol, Propranalol and various azo dyes. 5 and 6 membered heterocyclic rings are synthesized from α- naphthaols to get better pharmacological activities like anticancer, antifungal, antiviral, anti-inflammatory, anti depressants, anthelmintic. The synthesized heterocyclic rings are Isoxazoles, pyrazoles, pyrimidine derivatives.

KEYWORDS: Heterocyclic rings, isoxazoles, pyrazoles, pyrimidine, α- Naphthol.

## INTRODUCTION:

Heterocyclic aromatic organic compounds are important pharmacophore and a privileged structure in medicinal chemistry. Heterocycles are present in a wide variety of drugs, vitamins, biomolecules, many natural products and biologically active compounds, including antitumor, antibiotic, anti-inflammatory, antidepressant, antimalarial, anti-HIV, antimicrobial, antibacterial, antifungal, antiviral, antidiabetic, herbicidal, fungicidal, and insecticidal agents. Based on above fact we designed to isoxazoles, pyrazoles and pyrimidine derivatives by using acetylated α- naphthols with aromatic aldehydes to give acrylates(chalcones), which on cyclization with substituted hydroxylamine and urea in alkaline medium give corresponding isoxazoles, pyrazoles and pyrimidine derivatives.

## METHODOLOGY:

**Step-1 Procedure for synthesis of 1- Naphthyl acetate:**

To a solution of 1-naphthol (0.01mole) in chloroform (dry, 100ml) and acetic anhydride (0.02mole) were added drop wise at 0-5$^{O}$c with constant stirring. The reaction mixture was stirred for 2 hours by magnetic stirrer. The excess solvent was distilled off and the separated mass was poured into ice water and recrystallized from methanol.

**Step-2: Synthesis of O-(naphthalene – 1-yl)-3-aryl acrylates derivatives**

To a mixture of 1- Naphthyl acetate (0.01mole) in methanol (50ml) and appropriate aromatic aldehydes (0.01mole) were added in the presence of 2% NaOH solution (5ml). The reaction mixture was stirred for 10 hrs at room temperature and then refluxed for 6hrs. The excess solvent was distilled off and poured into ice water. The resulting solid was filtered, washed with water and recrystallized from ethanol.

**STEP-3: Synthesis of O-(naphthalene-1-yl)-5-phenyl-4, 5-dihydroisoxazole derivatives ($S_1$&$S_5$)**

To a mixture of O-(Napthalene-1-yl) -3- aryl acrylates derivative (0.01mole), absolute ethanol (50ml), hydroxyl amine hydrochloride (0.01mole) and solid NaOH (0.4g) were added. The reaction mixture was refluxed for 5 hrs and poured in to ice water thus resultant was filtered, washed with water and recrystallized from acetone. The recrystallized product purity was checked by TLC by using solvent system ethanol, Dichloromethane (1:2) ratio.

**Synthesis of O-(naphthalene-1-yl)-5-phenyl-4, 5-dihydroPyrazole derivatives ($S_2$&$S_6$)**

To a mixture of O-(Napthalene-1-yl) -3- aryl acrylates derivative (0.01mole), absolute ethanol (50ml), Hydrazine hydrochloride (0.01mole) and solid NaOH (0.4g) were added. The reaction mixture was refluxed or 5 hrs and poured in to ice water thus resultant was filtered, washed with water and recrystallized from acetone. The recrystallized product purity was checked by TLC by using solvent system ethanol, Dichloromethane (1:2) ratio.

**Synthesis of O-(naphthalene-1-yl)-6-phenyl-5, 6-dihydropyrimidinone derivatives ($S_3$&$S_7$**

To a mixture of O-(Napthalene-1-yl) -3- aryl acrylates derivative (0.01mole), absolute ethanol (50ml), Urea (0.01mole) and solid NaOH (0.4g) were added. The reaction mixture was refluxed for 5 hrs and poured in to ice water thus resultant was filtered, washed with water and recrystallized from acetone. The recrystallized product purity was checked by TLC by using solvent system ethanol, Dichloromethane (1:2) ratio.

**Synthesis of O-(naphthalene-1-yl)-6-phenyl-5, 6-dihydr derivatives ($S_4$&$S_8$)**

To a mixture of O-(Napthalene-1-yl) -3- aryl acrylates derivative (0.01mole), absolute ethanol (50ml), guanidine nitrate (0.01mole) and solid NaOH (0.4g) were added. The reaction mixture was refluxed for 5 hrs and poured in to ice water thus resultant was filtered, washed with water and recrystallized from acetone. The recrystallized product purity was checked by TLC by using solvent system ethanol, Dichloromethane (1:2) ratio.

**RESULTS AND DISCUSSION:**

In the present work, substituted 1-naphthol derivatives were synthesized. 1-naphthol was treated with acetic anhydride in presence of chloroform at 0-5$^0$c to give 1-naphthyl acetate [step1], which was subjected for acetylation and subsequent, it was treated with different substituted aldehyde in presences of 2% NaOH [step-2]. This underwent cyclization with hydroxyl amine hydrochloride, hydrazine hydrochloride, guanidine nitrate and urea. To gave corresponding rings in presence of methanol. All the synthesized compounds (S1-S8) were characterized by TLC, Melting point, solubility, and spectral analysis (IR&NMR).

## CONCLUSION:

From the results one can establish that the synthesized substituted heterocyclic compounds can rich source of exploitation. Therefore, the search of theses synthesized compounds are efficient biological active compounds for medicinal agent, it may worthwhile to explore the possibility in this area by making or introducing different functional groups. This may result in better pharmacological agents with higher potency.

## ACKNOWLEDGEMENT

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**SCHEME OF WORK**

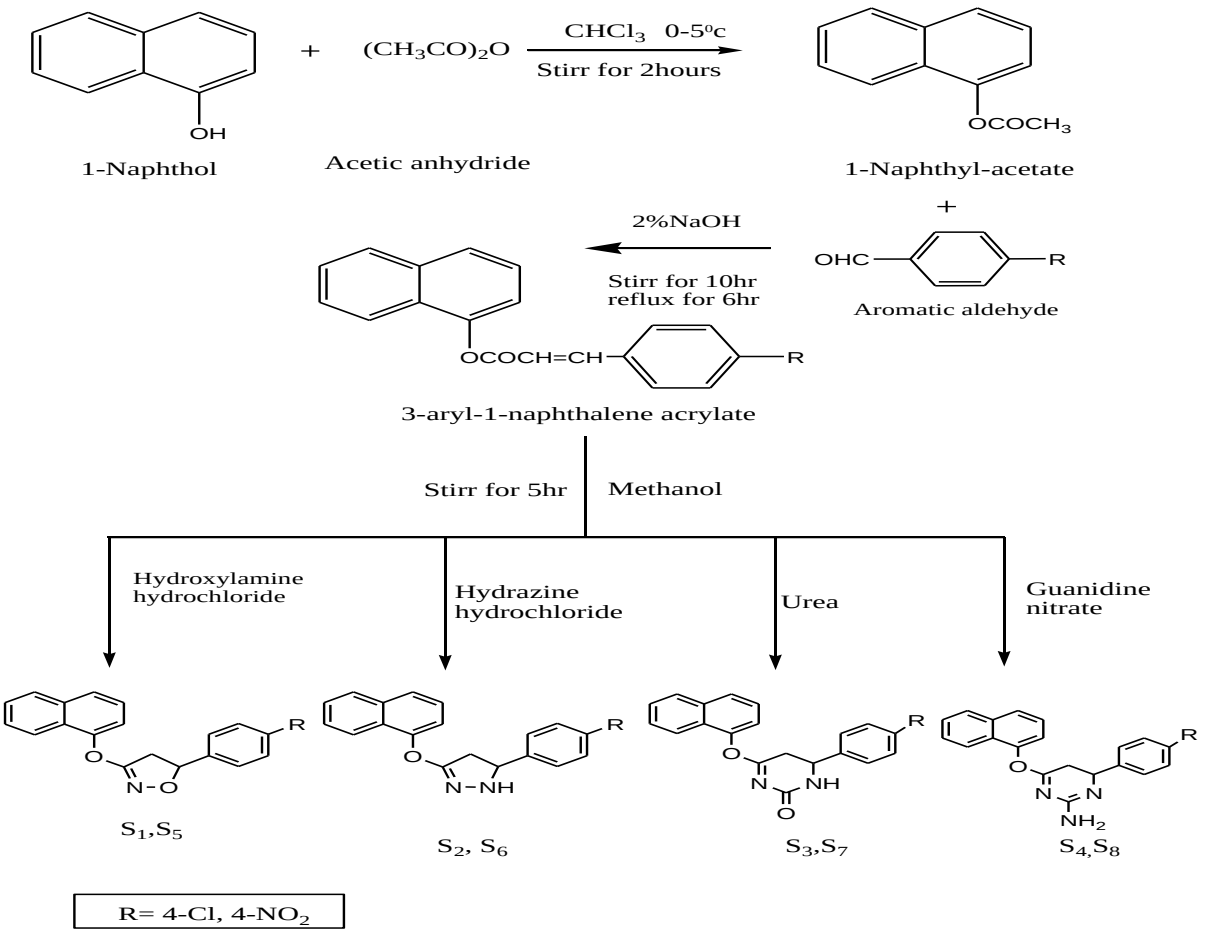
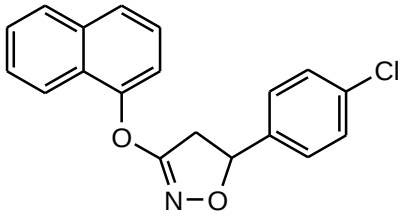



**Table No. 1: Physical Characterization data of synthesized compound ($S_1$-$S_8$)**

| S.no | Compound Code | Molecular Formula | Molecular Weight | Melting Point $^0$C | Appearance | % Yield |
|---|---|---|---|---|---|---|
| 1 | $S_1$ | $C_{19}O_2NClH_{12}$ | 321.5 | 205-210 | Reddish- brown | 65 |
| 2 | $S_2$ | $C_{19}N_2H_{13}ClO$ | 320.5 | 195-200 | Yellowish-brown | 50 |
| 3 | $S_3$ | $C_{20}O_2N_2ClH_{13}$ | 348.5 | 150-152 | Brown | 60 |
| 4 | $S_4$ | $C_{20}ON_3ClH_{14}$ | 347.5 | 195-196 | Orange | 57 |
| 5 | $S_5$ | $C_{19}N_2O_4H_{12}$ | 332 | 180-185 | Reddish-brown | 70 |
| 6 | $S_6$ | $C_{19}O_3N_3H_{13}$ | 331 | 185-190 | brown | 63 |
| 7 | $S_7$ | $C_{20}N_3O_4H_{13}$ | 359 | 140-145 | Orange | 45 |
| 8 | $S_8$ | $C_{20}N_4O_3H_{14}$ | 358 | 200-205 | Dark brown | 56 |

**SPECTRAL DATA:**

**COMPOUND $S_1$**

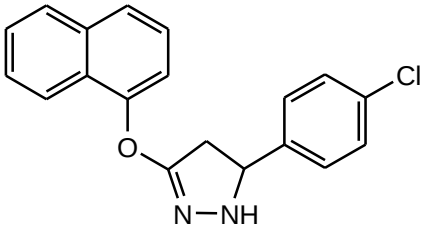



5-(4-chlorophenyl)3-naphthyloxy-4,5dihydro- isoxazole

**$^1$H NMR (δ ppm):** 2.5 (1H of isoxazole), 7.4-8.1(H of naphthalene), 3.17-3.37(2H of p-substituted Aromatic ring).

**IR (KBr) (cm$^{-1}$):** 3494cm$^{-1}$(isoxazole NH Stretching), 3555cm$^{-1}$(C-H Stretching in isoxazole), 3315cm$^{-1}$(C-H str in naphthalene) , 3094cm$^{-1}$(C-H str in aromatic ),
1618cm$^{-1}$(C=N Stretching), 1417cm$^{-1}$(C-N Stretching), 1214cm$^{-1}$(C-O str in oxazole), 1089cm$^{-1}$(C-O str in ether), 1505cm$^{-1}$(C=C stretching) 814cm$^{-1}$(C-H bending), 748cm$^{-1}$(C-Cl stretching).

**COMPOUND $S_2$**

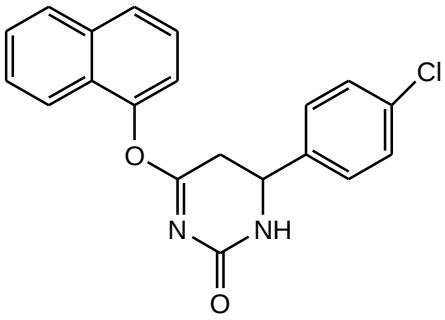



5-(4-chlorophenyl)3-naphthyloxy-4,5dihydro- pyrazole

**$^1$H NMR (δ ppm):** 2.7(1H of pyrazole), 7.4-8.1(H of Naphthalene), 3.17-3.37(2H of p-substituted Aromatic ring), 11.3(1Hof NH in ring).

**IR (KBr) (cm$^{-1}$) :** 3494cm$^{-1}$(NH Stretching in pyrazole), 3604cm$^{-1}$(C-H Stretching in pyrazole), 3139cm$^{-1}$(C-H str in naphthalene), 3094cm$^{-1}$(C-H str in aromatic ), 1618cm$^{-1}$(C=N Stretching), 1417cm$^{-1}$(C-N Stretching), 1115cm$^{-1}$( C-O str in ether),1605cm$^{-1}$(C=C stretching) 814cm$^{-1}$(C-H bending), 720cm$^{-1}$(C-Cl stretching).

**COMPOUND $S_3$**




6-(4-chlorophenyl)-4-naphthyloxy5,6dihydro-1H-pyrimidinyl-2-one

**$^1$H NMR (δ ppm):** 3.2(1H of pyrimidinone), 7.4-8.1(H of naphthalene), 3.17-3.37(2H of p-substituted Aromatic ring).11.3(1Hof NH in ring)

**IR (KBr) (cm-1) :** 3494cm$^{-1}$(NH Stretching in pyrimidinone), 3555cm$^{-1}$(C-H Stretching), 3315cm$^{-1}$(C-H str in naphthalene) , 3094cm$^{-1}$(C-H str in aromatic ), 1618cm$^{-1}$(C=N Stretching), 1417cm$^{-1}$(C-N Stretching), 1214cm$^{-1}$(C=O in ring), 1125cm$^{-1}$( C-O str in ether),1402cm$^{-1}$(C=C stretching), 703cm$^{-1}$ (C-H bending), 738cm$^{-1}$(C-Cl stretching).