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Research Article

Synthesis and Anti-Oxidant Activity of Phenol and Aldehyde Derivatives of Sulfonyl Chloride Quinoxaline

Goyal Rakesh ^{1*}, Sharma Mukesh ¹, Ahuja Dharmendra ², Jain Anurekha ²¹ Research Scholar, Faculty of Pharmaceutical Sciences Jayoti Vidyapeeth Women's University, Jaipur, Rajasthan, India² Professor, Faculty of Pharmaceutical Sciences Jayoti Vidyapeeth Women's University, Jaipur, Rajasthan, India

ABSTRACT

N, N'-diprotonation is very easier for pyrazine Synthesis of 2, 3-diphenylquinoxaline by phenylene-diamine in 16 ml of rectified spirit was added & combine solution was warm in water bath for 30 min. added water until slight colorless persist & allow to cool recrystallize the product in ethanol. Synthesis of 2, 3-diphenylquinoxaline 7-sulfonylchloride (R) using chlorosulfonic acid under ice-cold condition, then Synthesis of 2-hydroxyphenyl-2,3-diphenylquinoxaline-7-sulphonate (R1) through resorcinol with 3ml pyridine & sulphonyl chloride derivative, Synthesis of 2-formylphenyl-2,3-diphenylquinoxaline-7-sulphonate (R7) obtained by reaction of salicylaldehyde with pyridine & sulphonyl chloride derivative then Synthesis of 3-formylphenyl-2,3-diphenylquinoxaline-7-sulphonate (R9) obtained by heating on water bath mixture of 3-hydroxybenzaldehyde with pyridine & sulphonyl chloride, Synthesized quinoxaline derivatives were subjected to antioxidant activity. Hydrogen peroxide solution (40 mM) was prepared with standard phosphate buffer (pH 7.4). Different concentration of the compound stock solution and 4ml distilled water was added to 0.6 ml of hydrogen peroxide solution. Absorbance was determined at 230 nm after 10 min against a blank solution containing phosphate buffer without hydrogen peroxide. DPPH radical scavenging activity was measured using the method of Cotelleet *al.* with some modifications. 3 ml of reaction mixture containing 0.2 ml of DPPH (100 µM in methanol) 2.8 ml of test solution, at various concentrations (5, 10, 20, 40, 80, 160 320 µg/ml) of the extract fractions was incubated at 37°C for 30 min absorbance of the resulting solution was measured at 517 nm using Beckman model DU-40 spectrophotometer. Most of the derivatives have shown comparable antioxidant activity in relation to standard Ascorbic acid and DPPH

Keywords: DPPH, Quinoxaline, Antioxidant activity, Sulfonyl chloride quinoxaline.

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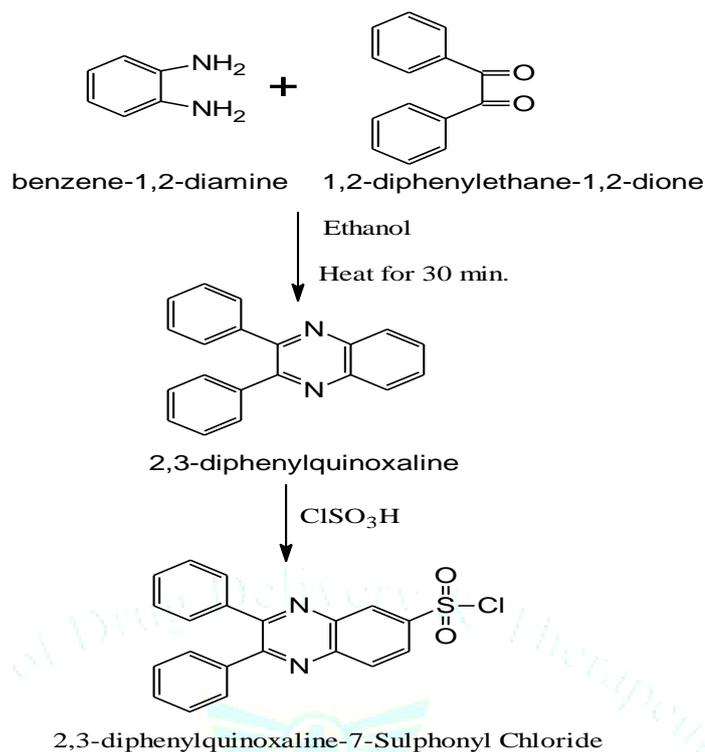
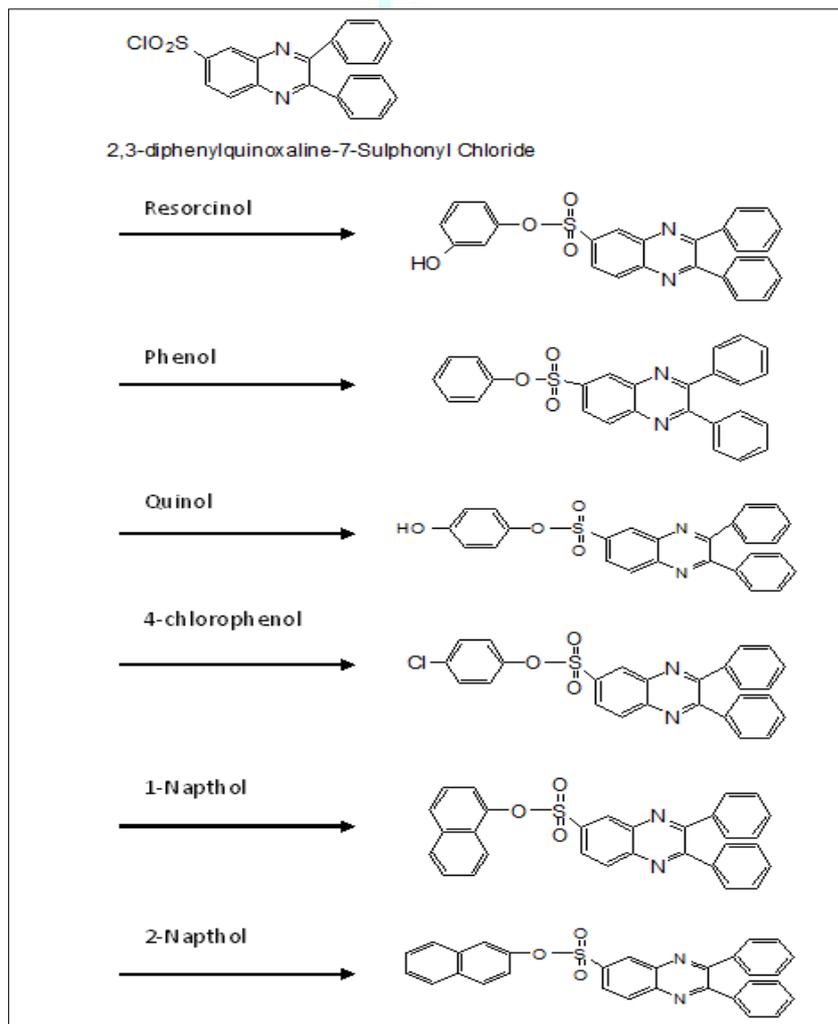
*Address for Correspondence:

Goyal Rakesh, Research Scholar, Faculty of Pharmaceutical Sciences Jayoti Vidyapeeth Women's University, Jaipur, Rajasthan, India

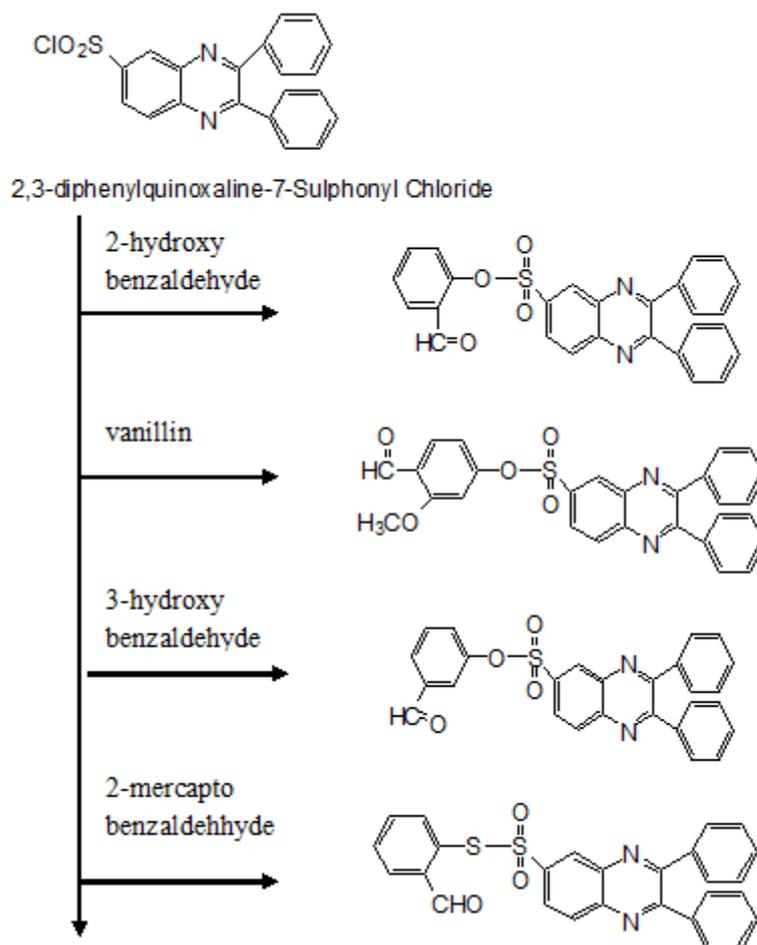
1. INTRODUCTION:

Pharmaceutical chemistry is the chemistry of substances used in medicine. It embraces the main branches of chemistry: radiochemistry, analytical, general, and physical and organic chemistry. Pharmaceutical chemistry is concerned more with physically and chemically oriented phases of drug action or availability such as pharmacokinetics, thermodynamics and the assay of drugs in drug system. Heterocyclic compounds are those cyclic compounds whose ring contain besides, carbon, one or more atoms of other elements. The non-carbon atoms such rings are referred to as hetero atoms. The most common hetero atoms are nitrogen, sulphur and oxygen. The heterocyclic compounds having lesser common atoms such phosphorus, tin, boron, silicon, bromine, etc. have been a subject of much investigation in recent years. The heterocyclic compounds having three to six carbons in the ring are numerous, but only those having five or six atoms in the ring are by far the most important. Quinoxalines are becoming the attractive target of extensive research due to its inherent diverse

properties. Various potential activities of the quinoxalines have been explored recently like, antimicrobial agents, cytotoxic agents, anti-tubercular, anxiolytic, anti-HIV, anti-inflammatory, antioxidant etc. In the recent year, 2, 3 Disubstituted quinoxalines reported to possess significant antimicrobial potential against bacteria, fungi, and mycobacterium (Ganapaty S. *et al* 2007). Designs of quinoxaline antibiotics have undertaken by several workers, but they possess limited application due to their toxic effect. According to conclusion derived in literature survey, it was worthwhile to introduced lipophilic moiety into the 2,3 diphenylquinoxaline system to make the structure as DNA targeted potent antimicrobial agent the sulfonate have created considerable attention as carrier and lipophilic core in the area of synthetic medicinal chemistry. Based on the observation and in connection with earlier studies (Ganapaty *et al*, 2007), the present work was undertaken to synthesize some new phenol & aldehyde derivatives of 2, 3 diphenylquinoxaline 7 sulphonyl chloride which are more potential as antibacterial than parent quinoxalines.

2. MATERIALS AND METHODS:**Synthetic Scheme 1:****2.1 Synthetic Scheme 2:**

2.2 Synthetic Scheme 3:



2.3 Experimental Procedure:

2.3.1 Synthesis of 2, 3-diphenylquinoxaline

To warm solution of 4.2 gram of benzyl in 16 ml of rectified spirit, the solution of 2.2ml of o-phelynediamine in 16 ml of rectified spirit was added & combine solution was warm in water wath for 30 min. added water until slight colourless persist & allow to cool. Filter & recrystallize the product in ethanol.

2.3.2 Synthesis of 2-hydroxyphenyl-2,3-diphenylquinoxaline-7-sulphonate(R1)

Mix 1.17gm of resorcinol with 3ml pyridine & 2.34 gm of sulphonyl chloride derivative &heat on water bath for 1 hr. pour into 25 ml of cold water & stir until the oil solidifies , filter wash with cold dilHCl to remove pyridine and cold dilNaOH to remove any phenol present &them with cold water , recrystallized from methanol or ethanol.

2.3.3 Synthesis of Phenyl-2,3-diphenylquinoxaline-7-sulphonate (R2)

Mix 1 gm of phenol with 2.5ml pyridine & 2 gm of sulphonyl chloride derivative & heat on water bath for 1 hr. pour into 25 ml of cold water & stir until the oil solidifies , filter wash with cold dilHCl to remove pyridine and cold dilNaOH to remove any phenol present &them with cold water , recrystallized from methanol or ethanol.

2.3.4 Synthesis of 4-hydroxyphenyl-2,3-diphenylquinoxaline-7-sulphonate(R3)

Mix 1.17 gm of quinol with 3ml pyridine & 2.34 gm of sulphonyl chloride derivative &heat on water bath for 55min pour into 25 ml of cold water & stir until the oil solidifies , filter wash with cold dilHCl to remove pyridine and cold dilNaOH to remove any phenol present & them with cold water , recrystallized from methanol or ethanol.

4.3.2.4 Synthesis of 4-Chlorophenyl-2,3-diphenylquinoxaline-7-sulphonate(R4)

Mix 1.36 gm of 4-chloro phenol with 3.4ml pyridine & 2.72 gm of sulphonyl chloride derivative &heat on water bath for 1 hr. pour into 25 ml of cold water & stir until the oil solidifies , filter wash with cold dilHCl to remove pyridine and cold dilNaOH to remove any phenol present &them with cold water , recrystallized from methanol or ethanol.

2.3.5 Synthesis of Naphthalene-1-yl-2,3-diphenylquinoxaline-7-sulphonate(R5)

Mix 1.54gm of 1-naphthol with 3.85ml pyridine & 3.08 gm of sulphonyl chloride derivative &heat on water bath for 2 hr. pour into 25 ml of cold water & stir until the oil solidifies , filter wash with cold dilHCl to remove pyridine and cold dilNaOH to remove any phenol present &them with cold water , recrystallized from methanol or ethanol.

2.3.6 Synthesis of Naphthalene-2-yl-2,3-diphenylquinoxaline-7-sulphonate (R6)

Mix 1.54 gm of 2-naphthol with 3.85ml pyridine & 3.08 gm of sulphonyl chloride derivative &heat on water bath for

2.15 hr. pour into 25 ml of cold water & stir until the oil solidifies, filter wash with cold dilHCl to remove pyridine and cold dilNaOH to remove any phenol present & them with cold water, recrystallized from methanol or ethanol.

2.3.7 Synthesis of 2-formylphenyl-2,3-diphenylquinoxaline-7-sulphonate(R7)

Mix 1.29 gm of salicylaldehyde with 3.22ml pyridine & 2.58 gm of sulphonyl chloride derivative & heat on water bath for 1.5 hr. pour into 25 ml of cold water & stir until the oil solidifies, filter wash with cold dilHCl to remove pyridine and cold dilNaOH to remove any phenol present & them with cold water, recrystallized from methanol or ethanol.

2.3.8 Synthesis of 4-formyl-3-methoxyphenyl-2,3-diphenylquinoxaline-7-sulphonate (R8)

Mix 1.61 gm of vanillin with 4.02 ml pyridine & 3.22 gm of sulphonyl chloride derivative & heat on water bath for 3 hr. pour into 25 ml of cold water & stir until the oil solidifies, filter wash with cold dilHCl to remove pyridine and cold dilNaOH to remove any phenol present & them with cold water, recrystallized from methanol or ethanol.

2.3.9 Synthesis of 3-formylphenyl-2,3-diphenylquinoxaline-7-sulphonate(R9)

Mix 1.29 gm of 3-hydroxybenzaldehyde with 3.22ml pyridine & 2.58 gm of sulphonyl chloride derivative & heat on water bath for 2.15 hr. pour into 25 ml of cold water & stir until the oil solidifies, filter wash with cold dilHCl to remove pyridine and cold dilNaOH to remove any phenol present & them with cold water, recrystallized from methanol or ethanol.

2.3.10 Synthesis of 5-2-formylphenyl-2,3-diphenylquinoxaline-7-sulphonate(R10)

Mix 1.46 gm of 2-mercapto benzaldehyde with 3.67ml pyridine & 2.92 gm of sulphonyl chloride derivative & heat on water bath for 2 hr. pour into 25 ml of cold water & stir until the oil solidifies, filter wash with cold dilHCl to remove pyridine and cold dilNaOH to remove any phenol present & them with cold water, recrystallized from methanol or ethanol.

3. PHARMACOLOGICAL ACTIVITY:

3.2 Antioxidant Screening

3.2.1 Hydrogen Peroxide Scavenging Assays

Hydrogen peroxide solution (40 mM) was prepared with standard phosphate buffer (pH 7.4). Different concentration of the compound stock solution and 4ml distilled water was added to 0.6 ml of hydrogen peroxide solution. Absorbance was determined at 230 nm after 10 min against a blank solution containing phosphate buffer without hydrogen peroxide. The percentage scavenging activity at different concentrations of the different derivatives compared with the standard, ascorbic acid.

$$\% \text{ Inhibition} = (A_c - A_t / A_c) \times 100$$

Where, A_c - Absorbance of control and A_t - Absorbance of test

3.2.21,1-Diphenyl-2, Picryl Hydrazyl Method (DPPH)

DPPH radical scavenging activity was measured using the method of Cotelleet *al.* with some modifications. 3 ml of reaction mixture containing 0.2 ml of DPPH (100 μ M in methanol) 2.8 ml of test solution, at various concentrations (5, 10, 20, 40, 80, 160 320 μ g/ml) of the extract fractions was incubated at 37°C for 30 min absorbance of the

resulting solution was measured at 517 nm using Beckman model DU-40 spectrophotometer. The percentage inhibition of DPPH radical was calculated by comparing the results of the test with those of the control (not treated with extract) using the following equation: (Navkar S. et al, 2010).

$$\% \text{ inhibition} = (1 - \text{absorbance of test} / \text{absorbance of control}) \times 100$$

4. RESULT AND DISCUSSION:

4.1 Antioxidant Screening

4.1.1 Hydrogen peroxide scavenging activity

Table 1: Hydrogen peroxide scavenging assay

Concentration	50 μ g/ml	100 μ g/ml	200 μ g/ml
R1	45.2	65.30	72.27
R3	36.8	56.93	85.27
R4	18.4	18.53	28.00
R7	34.5	49.80	87.28
R10	30.45	40.52	84.24
Ascorbic acid	49.4	71.32	89.96

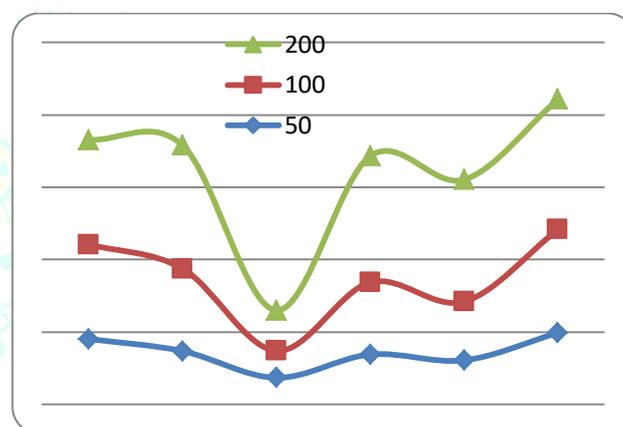


Figure 1: Hydrogen peroxide scavenging assay

4.1.2: 1, 1 diphenyl 2, picryl hydrazyl Method (DPPH)

Table 2: 1, 1 diphenyl 2, picryl hydrazyl Method (DPPH)

Concentration	100mcg/ml	200mcg/ml	400mcg/ml
R1	71.16	83.03	91.92
R3	71.04	83.48	89.26
R4	76.89	88.57	97.54
R7	85.71	86.21	88.00
R10	74.81	87.93	95.96

CONCLUSION:

The newly synthesized phenol and aldehydes derivatives were screened for antioxidant activity. The results of pharmacological screenings are satisfactory. Most of the derivatives have shown comparable antioxidant activity in relation to standard Ascorbic acid and DPPH at 100, 200 and 400mcg/ml were found 85.71,86.21 and 88.00 for R7 respectively.

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