



## Original Research Article

# Synthesis, and in vitro evaluation of benzene sulfonamide derivatives for antimicrobial and disinfectant properties: Part-I

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## ABSTRACT

The synthesis of benzene sulfonamide derivatives has been reported here for the antimicrobial and disinfectant properties. The synthesis was performed by known literature procedure. P-Toluene sulfonyl chloride was reacted with ethylene diamine to yield to the desired compounds. The synthesis of these agents is reported in part -I of the paper. In subsequent parts the antimicrobial activity and disinfectant properties shall be reported.

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## 1. Introduction

Benzene sulfonamide is a versatile moiety with several properties. Some of them include antimycobacterial,<sup>1</sup> antitubercular,<sup>2</sup> antibacterial<sup>3</sup> and antiviral,<sup>4</sup> etc properties. The synthesis of Benzene sulfonamide moieties is reported here from p-toluene sulfonyl chloride and ethylene diamine and to variate the reaction, with propylamine to yield compounds 1 and 2 respectively. The structure of these compounds have been reported in the Figure 1.

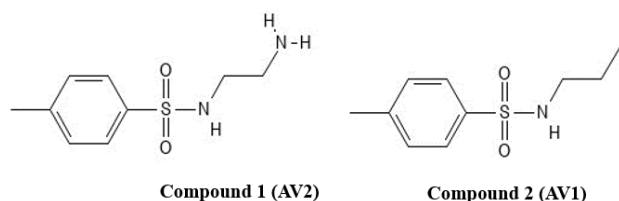


Figure 1:

## 2. Materials and Methods

TLC was performed on 524nm Merk TLC plates. All chemicals were of synthetic grade and 98% purisis grade. TLC was eluted with 3 different solvents to check the purity of the compounds and visualized in Iodine chamber and further in UV chamber. The <sup>1</sup>H-NMR was performed on Bruker 400 MHZ NMR before which FT-IR was performed on Perkin Elmer spectrophotometer. The synthetic scheme for the claimed compounds has been shown in Figure 2. The compounds were synthesized by sulfonamide formation reaction.<sup>5</sup>

## 2.1. Synthetic scheme

- 4- methyl-N-(ethanamine)-benzenesulfonamide (AV1): Equimolar quantities of p-toluene sulfonyl chloride and 1-propanamide were stirred at room temperature for 3 hrs vigorously in round bottom flask and magnetic bead on hot plate mantle with magnetic stirrer.
- FT-IR** ( $\lambda$ ,  $\text{cm}^{-1}$ ): 3454.9 (-NH<sub>2</sub> str.), 3108.7 (-N-H-H str), 3085.3 (-NH-H bending), 3001.7 (-SO<sub>2</sub> str), 2994.3, 2998.6 (-SO<sub>2</sub> bending), 1592.5 (CH<sub>2</sub>-NH<sub>2</sub>

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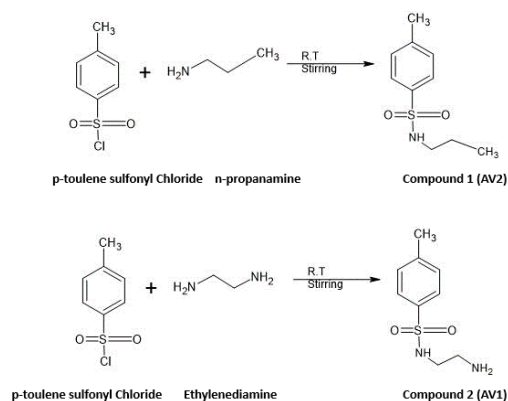


Figure 2:

str.), 1586.8 (CH<sub>2</sub>-NH<sub>2</sub> str), 1256.7, 1182.5, 1155.0, 1121.6, 1099.2, 1078.4, 1002.6, 934.0, 879.0, 798.0, 664.0, 553.0, 362.0, 283.0, 146.0 (-CH-Aromatic).

3. <sup>1</sup>H-NMR (δ shift in ppm): 2.32 (3H, s) (-CH<sub>3</sub>), 2.87 (2H, t, J = 7.0 Hz) (-NH<sub>2</sub>), 3.52 (2H, t, J = 7.0 Hz) (CH<sub>2</sub>), 7.31 (2H, ddd, J = 8.0, 1.8, 0.4 Hz) (-CH Ar), 7.70 (2H, ddd, J = 8.0, 1.5, 0.4 Hz) (-CH Ar).

4. **4-methyl-N-propylbenzenesulfonamide(AV2)** : Equimolar quantities of p-toluene sulfonyl chloride and 1-propanamide were stirred at room temperature for 3 hrs vigorously in round bottom flask and magnetic bead on hot plate mantle with magnetic stirrer.

5. **FT-IR (λ, cm<sup>-1</sup>):** 3047.4 (-NH Str), 3001.7(-SO<sub>2</sub>NH Str), 2994.3 (-SO<sub>2</sub>), 2998.6 (-CH Ar), 1592.5 (-NH-CH<sub>2</sub>), 1586.8 (-CH<sub>2</sub>), 1296.3, 1268.5, 1256.7, 1182.5, 1155.0, 1121.6, 1099.2, 1078.4, 1002.6, 934.0, 879.0, 798.0, 664.0, 553.0, 362.0, 283.0, 146 (1296-146,-CH Ar)

6. <sup>1</sup>H-NMR (δ shift in ppm): 0.96 (3H, t, J = 7.0 Hz) (-CH<sub>3</sub>), 1.62 (2H, tq, J = 7.5) (-NH<sub>2</sub>), 3.52 (2H t, J=7.0 Hz) (-CH<sub>2</sub>), 2.32 (3H, s) (-CH<sub>3</sub>), 3.28 (2H, t, J = 7.5 Hz) (-CH<sub>2</sub>), 7.31 (2H, ddd, J = 8.0, 1.8, 0.4 Hz) (-CH Ar), 7.69 (2H, ddd, J = 8.0, 1.5, 0.4 Hz) (-CH Ar).

### 3. Results and Discussion

#### 3.1. IR data

**4-methyl-N-(ethanamine)-benzenesulfonamide (AV1)**

**FT-IR (λ, cm<sup>-1</sup>):** 3454.9 (-NH<sub>2</sub> str.), 3108.7 (-N-H-H str), 3085.3 (-NH-H bending), 3001.7 (-SO<sub>2</sub> str), 2994.3, 2998.6 (-SO<sub>2</sub> bending), 1592.5 (CH<sub>2</sub>-NH<sub>2</sub> str.), 1586.8 (CH<sub>2</sub>-NH<sub>2</sub> str), 1256.7, 1182.5, 1155.0, 1121.6, 1099.2, 1078.4, 1002.6, 934.0, 879.0, 798.0, 664.0, 553.0, 362.0, 283.0, 146.0 (-CH-Aromatic)

**4-methyl-N-propylbenzenesulfonamide (AV2)**

**FT-IR (λ, cm<sup>-1</sup>):** 3047.4 (-NH Str), 3001.7(-SO<sub>2</sub>NH Str), 2994.3 (-SO<sub>2</sub>), 2998.6 (-CH Ar), 1592.5 (-NH-CH<sub>2</sub>), 1586.8 (-CH<sub>2</sub>), 1296.3, 1268.5, 1256.7, 1182.5, 1155.0,

1121.6, 1099.2, 1078.4, 1002.6, 934.0, 879.0, 798.0, 664.0, 553.0, 362.0, 283.0, 146 (1296-146, -CH Ar)

#### <sup>1</sup>H-NMR data

**4-methyl-N-(ethanamine)-benzenesulfonamide (AV1):** 2.32 (3H, s) (-CH<sub>3</sub>), 2.87 (2H, t, J = 7.0 Hz) (-NH<sub>2</sub>), 3.52 (2H, t, J = 7.0 Hz) (-CH<sub>2</sub>), 7.31 (2H, ddd, J = 8.0, 1.8, 0.4 Hz) (-CH Ar), 7.70 (2H, ddd, J = 8.0, 1.5, 0.4 Hz) (-CH Ar).

**4-methyl-N-propylbenzenesulfonamide (AV2):** 0.96 (3H, t, J = 7.0 Hz) (-CH<sub>3</sub>), 1.62 (2H, tq, J = 7.5) (-NH<sub>2</sub>), 3.52 (2H t, J=7.0 Hz) (-CH<sub>2</sub>), 2.32 (3H, s) (-CH<sub>3</sub>), 3.28 (2H, t, J = 7.5 Hz) (-CH<sub>2</sub>), 7.31 (2H, ddd, J = 8.0, 1.8, 0.4 Hz) (-CH Ar), 7.69 (2H, ddd, J = 8.0, 1.5, 0.4 Hz) (-CH Ar).

### 4. Conclusion

From the IR and <sup>1</sup>H-NMR data of the compounds, it was confirmed that the compounds were synthesized in Part-I of this paper. Further the evaluation of the compounds shall be done in Part-II of the paper.

### 5. Source of Funding

None.

### 6. Conflict of Interest

None.

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