



Synthesis, Characterization and Study of Antimicrobial Activity of 2,4,6-Tribromoaniline

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ABSTRACT

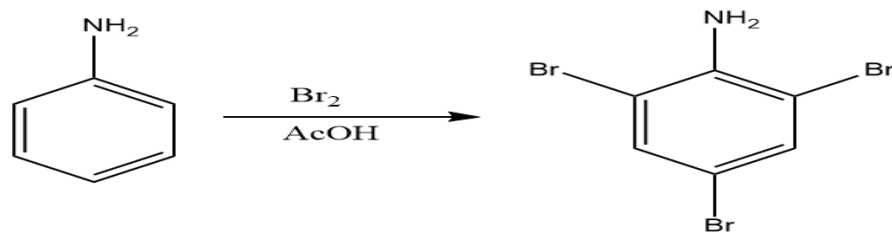
In this study the 2,4,6-Tribromoaniline is synthesized from aniline and bromine by halogenation (bromination) reaction. The presented study comprises synthesis, solubility testing, and antibacterial activity, which was also assessed using the cup-plate method. The products exhibited comparable Antimicrobial activity with Benzene and methanol at same concentration against the E. coli and S. aureus. The 2,4,6-Tribromoaniline is a chemical compound used in organic synthesis of pharmaceuticals, agrochemical and fire extinguishing agents.

Keywords: 2,4,6- Tribromoaniline, antimicrobial activity, aniline and bromine.

1.INTRODUCTION

A natural or synthetic material is referred to as an "antimicrobial agent" if it kills or prevents the growth of microorganisms like bacteria, fungi, and algae. Another definition of an antimicrobial agent is a medication used to stop the pathogenicity of germs.¹ Among other medical classes, antimicrobials stand out as pharmacotherapeutic agents. They are the only class of antibiotics that target bacteria more frequently than human tissues or endogenous products.² Drug discovery, epidemiology, and treatment outcome prediction are all possible uses for antimicrobial susceptibility testing.³ For antimicrobial activity against Escherichia coli and Staphylococcus aureus, it contains both gram positive and gram negative microorganisms (S. Aureus, E.coli).

An important class of organic compound synthesis involves electrophilic aromatic substitution reactions. The position and degree of replacement of the new entering groups are controlled by substitutes already present in the benzene nucleus. Generally speaking, these substituents can be categorised as deactivating (NO₂), moderately activating (NHCOCH₃), or substantially activating (NH₂). An excellent example of how to analyse the orientation of an entering electrophile on an aromatic nucleus that has been significantly activated is bromination of aniline. Aniline's amino group guides the electrophile to its two orthogonal and one para position.⁴ The 2,4,6-tribromoaniline is insoluble in water and soluble in organic solvent like benzene, methanol, chloroform, ether and ethanol.



2. MATERIALS

Synthesis Material: Aniline, Bromine solution, Glacial acetic acid, Ethanol

Solvents: Benzene, Methanol

Nutrient Agar media- agar, peptone, Beef extract, Yeast extract, sodium chloride, activated carbon.

Micro-organisms: Gram positive and Gram negative (E. coli and S. aureus)

3. METHODS

Synthesis of 2,4,6-Tribromoaniline from aniline :-

Dissolve 2.5 ml of aniline in 9.5 ml of glacial acetic acid in iodine flask.

Place solution of 42ml of bromine in 10ml of glacial acetic acid in a small dropping funnel supported over the flask. (Preparation should be carried out in a fume cupboard)

Add the bromine solution dropwise with shaking of the flask to the aniline solution.

Cool the flask in ice bath during the addition of bromine solution.

Filter the preparation and separate the product. By using the ethanol recrystallized the product and dry.⁵

Solubility Testing: In Water, Benzene, Methanol, Butanol, Chloroform, and Di-ethyl ether

Antimicrobial activity

Agar plate medium was made by mixing 1 litre of distilled water with 28 g of nutrient-rich agar powder, heating the liquid to dissolve all of the ingredients. The dissolved mixture is autoclaved at 121°C for 15 min, then allowed to cool without solidifying. The chosen bacterium was then put into nutrient agar medium, plated onto plates, and allowed to sit until hardened. The medium is then punctured with a sterile cork borer using the cup-plate method or agar well diffusion method to create holes approximately 9 mm in diameter. Phenyl benzoate antibacterial solution is applied directly into the perforations. The plates are incubated.^{6,7,8,9}

4. RESULT AND DISCUSSION

The synthesized product of 2,4,6-tribromoaniline was Characteristics by:

Chemical formula : $\text{C}_6\text{H}_2(\text{Br})_3\text{NH}_2$

Nature: Solid white powder.

Melting point: $120\text{-}122^\circ\text{C}$.

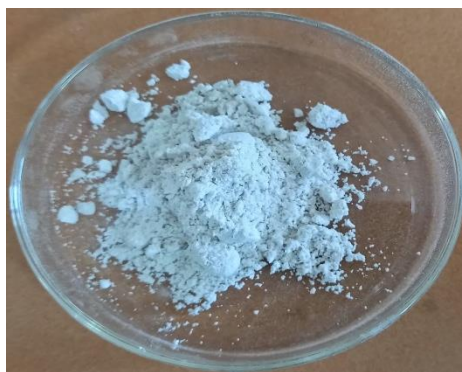


Fig. no 01: 2,4,6-Tribromoaniline

Solubility testing:-

Insoluble in water; Very soluble in methanol; soluble in benzene, ether, chloroform, alcohol, acetic acid.

Solvent :- Benzene and Methanol

2,4,6-Tribromoaniline soluble in a Benzene and Methanol as shown in fig. 02.



Fig. no. 02: Solvent

Study of Antimicrobial Activity:

The synthesized compound of 2,4,6-tribromoaniline was tested for antimicrobial activity against the Gram positive and Gram negative micro-organism. The antibacterial action using the cup-plate approach against human pathogens such as Escherichia coli and Staphylococcus aureus and the diameters of the zone of inhibition (cm) against the are as shown in Table no 01 and Fig. no 03.

Table no. 01: Antimicrobial activity of 2,4,6-tribromoaniline

Sr.no.	Name of solution	Concentration (mg/ml)	Zone of inhibition	
			E.coli	S. aureus
1	2,4,6-tribromoaniline in benzene	0.5	15.51 mm	18.21mm
2	2,4,6-tribromoaniline in methanol	0.5	11.63mm	14mm

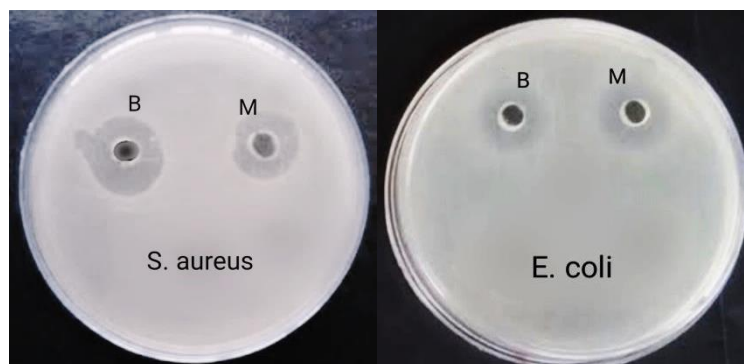


Fig. no 03: Antimicrobial activity of 2,4,6-tribromoaniline

CONCLUSION:

2,4,6-Tribromoaniline has been synthesised, studied, and is in accordance with several characteristics. Gram negative and positive bacteria are both affected by the 2,4,6-tribromoaniline compounds' antibacterial action when combined with benzene and methanol. The compounds' antibacterial action exhibits better results against the *S. aureus* bacterium than the *E. coli* bacteria. Compounds with the formula 2,4,6-tribromoaniline have the power to stop pathogenic microorganisms' ability to proliferate metabolically.

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