



SYNTHESIS AND ANTI MICROBIAL ACTIVITY OF 6-NITRO-2-CHLOROQUINOLINE-3-CARBALDEHYDE AZO DYE

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Abstract:

6-nitro-2-chloroquinoline-3-carbaldehyde azo dye were synthesized by reaction of NaNO₂ solution and one drop of alkaline β-naphthol and 6-nitro-2-chloroquinoline-3-carbaldehyde. The solubility of each newly synthesized and purified dye has been tested in various organic as well as inorganic solvent. The antimicrobial activity of this dye shows that they have power to resist the micro organism S-aureus

Introduction

Quinoline-aldehydes are important synthetic intermediates in the synthesis of heterocyclic compounds that are used in the manufacturing of dyes and pharmaceuticals. . These compounds have shown antimicrobial, antimalarial, anti-inflammatory, antitumor, and anti-parasitic activity. 2-chloroquinoline-3-carbaldehydes have high chemical reactivity due to the presence of both chloro and aldehyde group. Additionally, quinoline derivatives find use in the synthesis of fungicides, virucides, biocides, alkaloids, rubber chemicals and flavouring agents. They are also used as polymers, catalysts, corrosion inhibitors, preservatives, and as a solvent for resins and terpins. Furthermore, these compounds find applications in chemistry of transition metal catalyst for uniform polymerisation and luminescence chemistry.

II] EXPERIMENTAL

Material : All the chemicals used as a starting materials in the synthesis of this azo dye is of pure grade.

Synthesis of azo dye.

Part I] General procedure for the synthesis of 6-nitro-2-chloroquinoline-3-carbaldehyde:-

R. B. containing 9.62 ml (0.125m) DMF was placed in a salt ice bath and the temperature maintained up to 0° c. Then 31.56 ml (0.35m) POCl₃ was added drop by drop by dropping funnel while stirring continuously. Then P-NO₂ Acetanilide 9 gm (0.05m) was added in small portion. After addition was completed wait for 10-15 min. Refluxed for 6 hr at 75°c in oil bath. After complete reaction the mixture was poured in crushed ice and stirred for 30 min at 10°c. Separated product recrystallized from ethyl alcohol. Pale yellow colour was obtained. (Melting point = 145°c). Aldehyde

group test is done by Dinitrophenyl hydrazine test & Fehling solution test:-

PART II :

Azo Dye

A pinch of 6-nitro-2-chloroquinoline-3-carbaldehyde was taken in a R.B, 1 ml conc. HCl and one piece of tin metal or zinc dust was added. Boiled for 5 min. and filtered. Cooled under tap and NaNO₂ solution and one drop of alkaline β-Naphthol solution was added. Orange red dye obtained. The solubility of the compound 6-nitro-2-chloroquinoline-3-carbaldehyde azo dye has been tested in various solvents (Table No-1 and Figure-1).

iii] Result and Discussion

IR Spectra :

The infrared spectra of the compound 6-nitro-2-chloroquinoline-3-carbaldehyde azo dye in the region 4000-400 cm⁻¹ were scanned in solid state (KBr pallette) on Magma 550 series II Nicolet, USA FTIR spectrophotometer, At RC SAIF Panjab University, Chandigarh. The infrared spectra of the compound 6-nitro-2-chloroquinoline-3-carbaldehyde Azo dye :- (Figure-2)

The band at 3443.5 cm⁻¹ is due to free phenolic -OH group. The band at 2562.31 cm⁻¹ is due to Ar-CH str. The band at 1690.13 cm⁻¹ is due to -C=O str. The band at 1621.11 cm⁻¹ is due to -N=N- str. The band at 1598.12 cm⁻¹ is due to -C=N str. The band at 1505.16 cm⁻¹ is due to -C=C str. The band at 751.24 cm⁻¹ is due to C-Cl str. The ultraviolet visible spectra of the compound 6-nitro-2-chloroquinoline-3-carbaldehyde azo dye in region 200-800 nm is showing λ_{max} at 750 nm that is bathochromic shift of azo linkage in resonance with aromatic ring.

Bathochromic effect by virtue of which the absorption maximum is shifted towards longer wavelength due to the presence of an auxochrome or by the change of solvent. Such an absorption shifts towards longer wavelength is called Red shift or bathochromic shift.

NMR SPECTRA

Proton NMR spectra of the compound 6-nitro-2-chloroquinoline-3-carbaldehyde azo dye are presented in table. The NMR spectra of compound are taken in $CDCl_3$ solution.

The NMR of the compound 6-nitro-2-chloroquinoline-3-carbaldehyde azo dye :- (Figure-3 and Figure-4)

δ 16 – one proton singlet due to –CHO spectra. δ 8.6 – 8.7 – double doublet due to Ar – CH proton. δ 7.4 – 7.8 – multiplet due to Ar – CH proton. δ 7.25 – singlet due to Ar – CH proton. δ 3 – singlet due to Ar – CH proton. δ 1.9 – singlet (hump) due to phenolic OH

ANTIMICROBIAL ACTIVITY

After the 24 hrs incubation of medium with suspension of different proportion of the compound 6-nitro-2-chloroquinoline-3-carbaldehyde azo dye is observed that slight zone of inhibition around well by *S. aureus* bacterium culture. No zone of inhibition from the *E. coli* bacterium culture.

This activity performed as a application of the compound 6-nitro-2-chloroquinoline-3-carbaldehyde azo dye. This activity tells us that these dye is antimicrobial means they have power two resist the microorganism.

The following are the table for *S. aureus* and *E. coli* showing zone of inhibition Table-2.

Table-1

Solvent	Compound
Water	Insoluble
$CHCl_3$	Soluble
DMSO	Soluble
$CDCl_3$	Soluble

Table-2 For *S. aureus*

Content	Bacterial Culture	Zone of Inhibition
10 mg/ml	<i>S. aureus</i>	09 mm
20 mg/ml	<i>S. aureus</i>	11 mm
30 mg/ml	<i>S. aureus</i>	10 mm
40 mg/ml	<i>S. aureus</i>	07 mm
50 mg/ml	<i>S. aureus</i>	08 mm

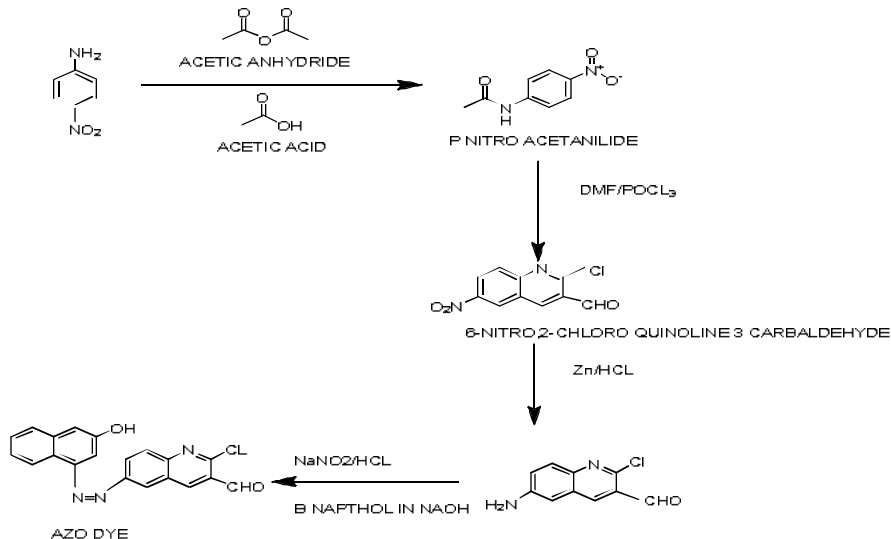


Figure-1

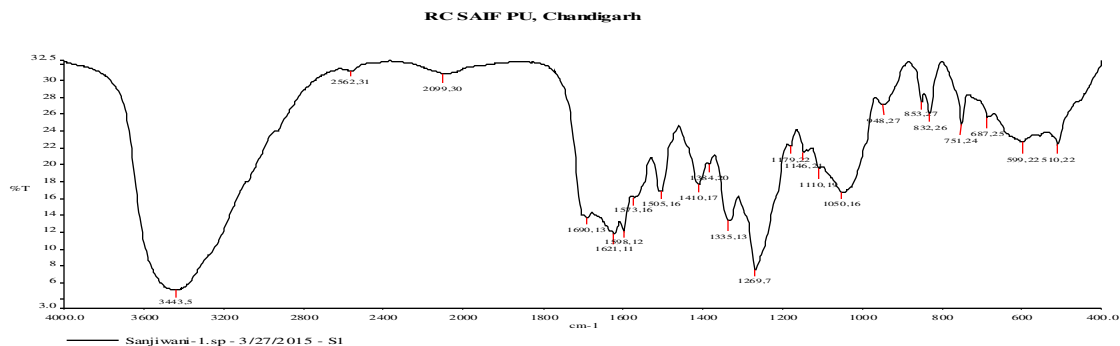


Figure-2

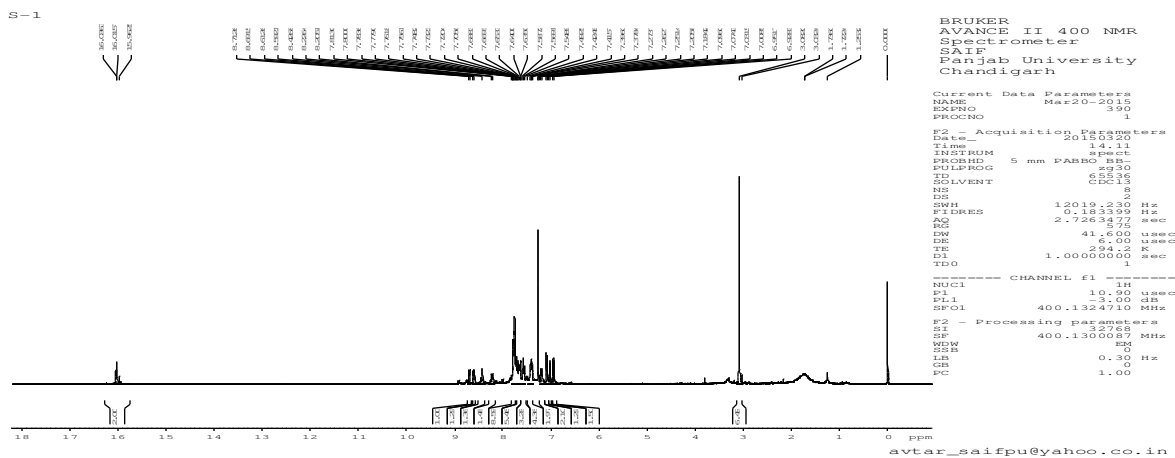


Figure-3

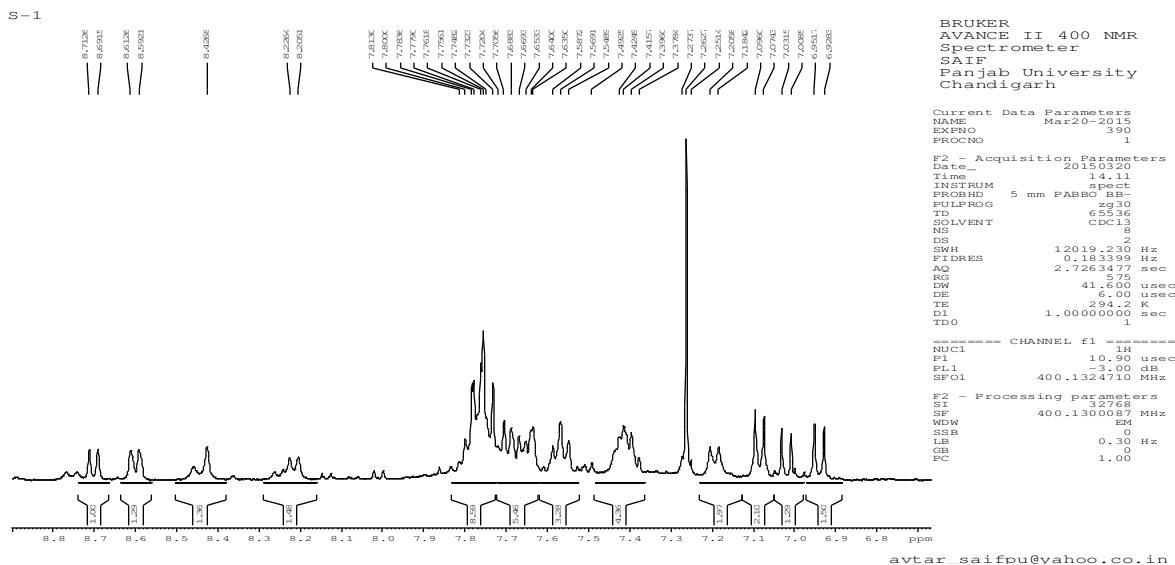


Figure-4

Conclusion:-

The final results indicated that 6-nitro-2-chloroquinoline-3-carbaldehyde azo dye is more efficacious antimicrobial agents. Hence there is enough scope for further study in developing such compounds as a good lead activity.

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