



Synthesis of 2-hydroxy-5-phenyazo Acetophenone

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DOI: 10.5281/zenodo.7132413

ABSTRACT

Azo chemicals are crucial to the textile dye, and fiber industries. In the current investigation, certain azo compounds were produced in high yields by diazotizing a few substituted aromatic amines with concentrated HCl and NaNO₂, then coupling those products with 2-hydroxyacetophenone. The FTIR method was used to characterize the produced azo compounds

Keyword - Azo compounds, 2-hydroxy acetophenone, Aromatic amines.

1. INTRODUCTION

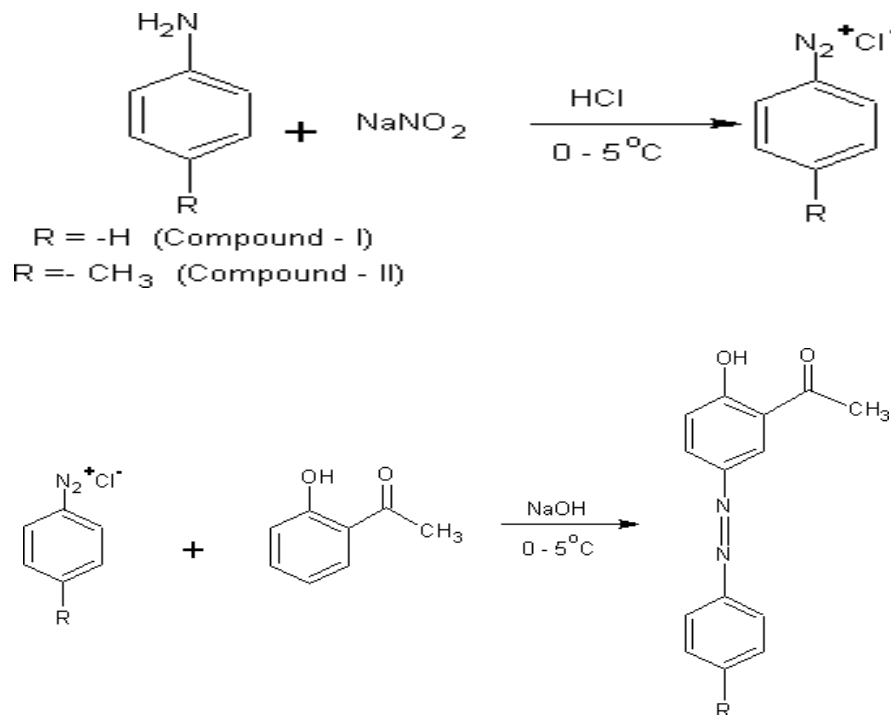
The azo dyes have variety of biological applications like antineoplastics, antidiabetics, antiseptics, anti-inflammatory and other useful chemotherapeutic agents.[1] Azo compounds are highly colored and have been used as dyes and pigments for a long time.[2] Azo dye compounds has great importance due to its environmental stability, electrical and optical properties.[3] The main advantage of azo dye is their cost effectiveness, which is due to the processes involved in manufacture.[4] The N=N group is called an azo or di-imide functional group and when found aromatic group in molecule this helps to stabilize the N=N group by making it a part of an extended delocalized system. This lead to making azo compounds colored and the molecules absorb the light in visible region.[5] Azo compounds are considered as class of organic colorants which consist of at least a conjugated chromophore azo (-N=N-) group in association with one or more aromatic or heterocyclic system.[6] The substituted azo compounds have the general structure R-N=N-R', where R and R' are alkyl, aryl or heterocyclic radicals. The azo dyes have been synthesized by the condensation of azo compounds with hydroxyl, aldehydes or ketones.[7] Some azo dye compounds shows biological activity against bacteria like digestive tract bacteria, Staphylococcus aureus etc.[8] The azo dyes compounds found to contain one or more azo groups(-N=N-) which are attached to carbon atom (SP² hybridized).[9] Synthesis of most azo compounds involves diazotization of a aromatic amine, followed by coupling amino and hydroxyl groups are commonly used for coupling reactions.[10]

In the present study, the azo dyes were synthesized by coupling 2-hydroxy acetophenone with benzene diazonium chloride and p-methyl diazonium chloride separately.

1.1 METHODS AND MATERIALS

Synthesis of 2-hydroxy-5-phenyazo acetophenone

The aryl diazonium chloride was prepared by dissolving pure aniline (0.93gm) with concentrated HCl (3ml) and water (3ml) and allow to cool at 5oC. in ice bath.NaNO₂ (0.69gm) was dissolved in water(10ml) at 5oC.The above two solutions were mixed with constant stirring. This mixture was added to the solution of 2-hydroxyacetophenone (1.36gm) which was dissolved in 10% NaOH solution at 5oC.The mixture were kept in ice bath with constant stirring for about 10min.The product precipitate was filtered and re-crystallized from glacial acetic acid, m.p.128oC.



2. RESULT AND DISCUSSION

The azo compounds I and II had distinct melting points. By using IR spectra and qualitative functional group analysis, the synthesised azo compounds were identified.

2.1 hydroxy-5-phenyazo acetophenone

IR (KBr) cm^{-1}

The dye shows the absorption peak due to azo group, $-\text{N}=\text{N}-$ stretching vibration at 1470cm^{-1} . Aromatic C-H stretching vibration bands appeared in the region of $2850-2940\text{cm}^{-1}$. aromatic C-H bending vibration bands appeared in the region of $845-730\text{cm}^{-1}$. $-\text{OH}$ stretching vibration bands appeared in the region of 3150cm^{-1} . $-\text{C}=\text{O}$ stretching vibration bands appeared in the region of 1620cm^{-1} . The decreased value of $-\text{C}=\text{O}$ stretching vibration may be attributed to the conjugation of the double bond.

There are functional groups such $-\text{OH}$, $-\text{N}=\text{N}-$, and $-\text{C}=\text{O}$, according to the qualitative functional group analysis..

3. CONCLUSIONS

It was decided to create azo dyes using the coupling agent 2-hydroxyacetophenone. The $\text{N}=\text{N}$ group is present in the produced compounds, making them suitable for use as dyes.

4. REFERENCES

- [1]. Pagariya S.K., Pathade R.M. and Bodkhe P.S., Synthesis, Characterization and Antimicrobial screening of some Azo compounds derived from Ethyl vanillin, Res. J of Chem Sci, July 2015; 5(7): 20-28.
- [2]. Jarad A J. , Synthesis and Characterization of New Azo Dye Complexes with Selected Metal Ions, J of Al-Nahrain University, December, 2012; 15(4): 74-81.
- [3]. Kate S S, and Thakare N.S., Synthesis and spectral characterization of some azo amine dyes, J of global biosciences, 2016; 5(1): 3615-3617
- [4]. Shelke N S, Thakare N.S, Azo Compounds Synthesis and Antimicrobial Analysis, Int J of Sci and Res., Oct 2016; 5(10): 505-507
- [5]. Yasser O M, Hamad A S, Ali Mohhamad M D, Synthesis of azo dyes based on N-phenyl maleimide derivatives, J of Applicable Chem., 2013; 2(5): 1347-1354.



- [6]. Loganathan K, Ali K S, Purushothaman M, Silambarasan S and Nasser A J A, Synthesis and characterization of azo derivatives of diacetylresorcinol, *J of Chem and Pharm Res.*, 2015; 7(4): 1452-1455.
- [7]. Patel B K, Prajapati N K and Patel D G, Synthesis, characterization and spectral study of chelating azo dyes containing salicylic acid ligand, *Pelagia Research Library Der Chemica Sinica*, 2013; 4(6): 70-72. 8. Ewelina W T and Lukasz G, Azo dyes – biological activity and synthetic strategy, *CHEMIK*, 2012; 66(12): 1303-1307.
- [8]. Fayadh R H, Ali A A, and Al-Jabri F M, Synthesis and Identification Symmetrically Azo Dyes Derived from Sulfa Compounds and Spectrophotometric study of Nickel (II) Complexes with Prepared Dyes, *Int J of Eng and Technical Res.*, 2015; 3(3): 24-28.
- [9]. Olayinka O A Oluwabunmi E A, Alice O A, Abiola E O and Winifred U A, Synthesis and Spectroscopic Study of Naphtholic and Phenolic Azo Dyes, *Phy Rev & Res Int*, 2013; 3(1): 28-41.