

Monoazo Acid Dyes Based on 3-[(2-methyl-6-methoxy-4-quinoliny) amino] Phenol

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Abstract: The synthesis and study of dyeing properties of the monoazo acid dyes based on 3-[(2-methyl-6-methoxy-4-quinoliny) amino] phenol (II). The coupling component (II) was prepared by the condensation of 2-methyl-6-methoxy-4-chloroquinoline and 3-aminophenol. Fourteen Acid dyes (III a-n) were prepared by coupling (II) with various diazo components (R= a – n). These dyes were applied on silk, wool and nylon fabrics.

Keywords: Silk and Nylon fabrics, coupling Reaction

1. Introduction

The synthesis and application of azo acid dyes derived from 4-oxoquinazoline [1-2], mercaptoquinazoline [3] and quinoline [3] systems are reported to have excellent dyeing properties including low sublimation and high thermal stability [4]. Synthesis of acid dyes based on 4-hydroxy-1-methyl-2-oxoquinoline [5], 4-hydroxy-1-phenyl-2-oxoquinoline, 4-hydroxyquinoline-[1,2-b]-4-oxoquinazoline[6], N-[3-hydroxyphenyl]-8-quinolinesulfonamide [7], 3-[(2,6-dimethyl-4-quinoliny) amino] phenol systems have been very recently reported. A study of the fastness of dyed patterns showed that dyes were good on silk and wool and fair on nylon.

2. Literature Survey

The first technical method was introduced for the preparation of picric acid from coal tar (1843). Individual dyes also play a part in the manufacture of colour lakes, which are used as pigment, printing inks and for colouring plastics. Disazo and polyazo dyes containing sulfonic acid groups are also frequently used in the above applications.

3. Methodology/Approach

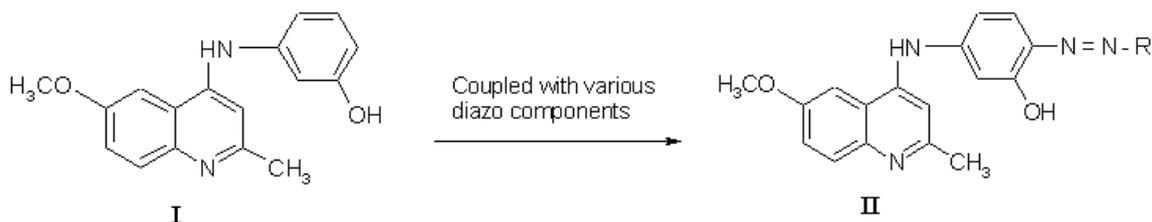
Preparation of 3-[(2-methyl-6-methoxy-4-quinoliny) amino] phenol (I)

A mixture of 2-methyl-6-methoxy-4-chloroquinoline (2.076g, 0.01 mole) and 3-aminophenol (1.09g, 0.01 mole) was refluxed in glacial acetic acid (40 ml) on a sand bath using an air condenser for four hours. The reaction mixture was cooled to room temperature and poured over ice and was neutralized with ammonia solution (20%). The product

was filtered, washed with water, dried and crystallized from aqueous alcohol, yield 68% m.p.>300°C

Preparation of 4-R-azo-3-[(2 methyl-6-methoxy-4-quinoliny) amino] phenol (ii) a-n

A clear solution of (II) (1.24 g, 0.005 mole) in acetone (30 ml) and sodium hydroxide (15 ml, 10%) was cooled below 5°C in an ice-bath. To this well stirred solution diazo solution was added drop wise over a period of 10-15 minutes, maintaining the pH between 7.5 and 8.0. The stirring was continued for two hours at 0 to 5°C. The reaction mixture was heated at 60°C, and sodium chloride was added until the coupled mass was precipitated. It was stirred for an hour, filtered and washed with a small amount of sodium chloride solution (5% w/v). The dye was dried at 80°C to 90°C, extracted with DMF. A yellow dye thus obtained was filtered, washed with acetone and dried to 60°C, yield 86 % m.p. >300°C. Found : [Found :N, 7.42 % ,C₂₇H₁₉O₁₁N₄S₃Na₃ ,required N,7.56 %]. The adsorption spectra of compounds were recorded on Hitachi spectro photometer (model V – 320) in DMF solution, infrared on FTIR model schimadza 820I PC using KBR pellets. All compounds are obtained in good yield. The structure of III a-n was confirmed by their elemental analysis and IR spectra. The IR spectra of these compounds showed characteristic bands at 3379, 3459 (O–H and N–H stretching), 2950, 2889 (C–H aromatic and aliphatic stretching), 2810 (C–H stretching), 1491 (C – C stretching), 1244 (C–O–C stretching), 1454 (N = N stretching), The dyeing and fastness properties of these dyes on silk, wool, and nylon have been evaluated. The percentage dye bath exhaustion was found to be 55-71%. All these dyes show shade variation from brown to yellow. Light fastness and wash fastness of the dyed patterns were found to be good to very good to excellent respectively.



For Compounds III a-n R=

- a. T-acid h. S-acid
- b. H-acid i. Peri acid
- c. Gamma acid j. K-acid
- d. 1,7-Cleaves acid k. C-acids
- e. J-acid l. Tobias acid
- f. 1-Amino-2-naphthol-4-sulphonic acid m. Chicago acid
- g. Bronner acid n. Laurent acid

4. Result and Discussion

The results reveal that the percentage dye-bath exhaustion of monoazo acid dyes are good. The percentage dye-bath exhaustion of monoazo dyes based on 3-[(2-methyl-6-methoxy-4-quinolinyl)amino]phenol is between 75-89% and their dyeing performance on silk, wool and nylon has been evaluated. The light fastness and wash fastness reveal that some of the dyes would prove to be useful dyes for dyeing polyester fabrics.

5. Future Scope

Azo dyes with relatively low molecular masses and one to three sulphonic acid groups serve as so called acid azo dyes for dyeing and printing wool, polyamide, silk and basic modified acrylics and for dyeing leather, paper and food. The main area of application is the dyeing of wool and polyamide.

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Author Profile



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