Practical application of reinforcement remazol dyes on cotton material using fixation abu ash and amyllum

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Abstract. Remazol is a synthetic dye from chemicals. Remazol can be used by dyeing, dripping or quenching. This dyestuff has water soluble properties, has brilliant colors with good fastness, low affinity. In the coloring process, color requires a fixation process. Fixation process, as a binder or reinforcement so that the color does not fade. Fixation is done with Na2CO3 or soda ash. soda ash or also known as Sodium carbonate, Na2CO3, is a sodium salt of carbonic acid which is easily soluble in air, white powder. soda ash can be used as a reinforcement for reactive type dye batik. By adding soda ash to a reactive dye solution or remazol, this automatic dye can become strong and not fade. After the soda ash fixation process is added starch which has the function to glue the fabric to the dye so that it is strong and does not easily wear off.

1. Introduction

Batik is a craft that has high artistic value and has been a part of Indonesian culture (especially Java) for a long time. In making the coloring agent is one of the important factors, clothes or fabrics are good to see or not, including batik cloth. The process of coloring batik is done using textile dyes. What is meant by dye or batik coloring agent is textile dyes that can be used in the process of coloring batik either by dyeing or plugging at room temperature so as not to damage the wax as a color barrier. The dyes used in textile crafts can be grouped into 2, namely natural dyes and synthetic dyes.

Natural dyes are dyes obtained from nature / plants both directly and indirectly. So that natural dyes do not fade and can stick well, the coloring process is preceded by mordanting, which is to include metal elements into the fiber (Alum / Al). Natural coloring materials that can be used for textiles can be taken in plants, parts of leaves, fruit, wood, wood or flowers.

The synthetic coloring agent is a dye that is made according to certain chemical reactions. Synthetic dyes in textiles are derivatives of aromatic hydrocarbons such as benzene, toluene, naphthalene and anthracene obtained from coal tar (coal, tar, dyestuff) which is a thick black liquid with a specific gravity of 1.03 - 1.30 and consisting of carbon dispersion in oil. The oil is composed of several types of compounds from the simplest forms such as benzene (C6H6) to complex forms such as chrisena (C18H12) and pisene (C22Hn).
Types of synthetic dyes include direct dyes, acid dyes, alkaline dyes, napthol dyes, sulfur dyes, pigment dyes, dispersion dyes, bejana dyes, soluble vessel dyes (indigosols), substances reactive color.

One that is used today is coloring dyes with reactive dyes. Reactive dyes are known as dyes that can react chemically with cellulose fibers in strong bonds (covalent bonds), so these dyes are part of the fiber. This bond is formed from the reaction between the reactive groups in the reactive dyes with the -OH, -SH, -NH2, and -NH groups present in the fiber. Therefore, the results of dyeing reactive dyes have excellent washing resistance.

Based on how to use Based on how they are used, reactive dyes are classified into two types, namely:

- **Use of cold ways**
  Reactive dyes that have high reactivity, for example reactive dyes with dichlorotriazine systems. The dyeing temperature is not more than 40OC because at higher temperatures the dye will be easily hydrolyzed.

- **Use of heat**
  Reactive dyes that have low reactivity, so you need to use high temperatures in the dipping process. Examples of these dyes are dyes with reactive groups monochlorotriazine. The dipping temperature is between 60 - 80OC. In coloring these reactive hot dyes using remazol dyes

Remazol is a type of dye batik procion which is classified as a reactive dye. Reactive dyes are dyes that have high reactivity and are dyed at low temperatures. Reactive dyes include dyes that dissolve in water and react with cellulose fibers, so that these reactive dyes are part of the fiber. Therefore the properties of color fastness and light resistance are very good. Generally the use of this dye is by using a dab and dye technique. In dyeing remazol dyes using fixation of Na2CO3 and starch as an alternative to waterglas. The purpose of the fixation process is to lock the natural dyes of the mordan group and function to strengthen the color and give the color effect (color direction) that varies according to the fixation substance used.

Na2CO3 itself is Sodium carbonate, also known as washing soda and soda ash, is a sodium salt of carbonic acid that is easily soluble in water. The function of soda ash for batik coloring is as a reinforcement of special dyes in reactive dyes both procion and remazol. by adding soda ash to the reactive dye solution both procion and remazol, the dye can automatically become strong and not fade. While starch is starch is a type of polysaccharide that is abundant in nature, namely most plants are found in tubers, leaves, stems, and seeds. starch is used as an ingredient used to concentrate liquid foods such as soup and so on. In industry, starch is used as an adhesive component, a mixture of paper and textiles, and in the cosmetics industry.

Reactive dyes include dyes that dissolve in water and react with cellulose fibers, one of the cellulose fibers used is cotton. Cotton fabric is a fabric that is obtained from fine fibers that cover cotton seeds. Cotton fabrics have beneficial properties, they are strong in the wet state, increase by 25%, can absorb water (hygroscopic), heat resistant to high irons, and withstand severe drugs.

The aim to be achieved in this research activity is to determine the resistance of Na2CO3 and starch fixation processes as a binder or reinforcement so that remazol dyes do not fade and last a long time against the coloring process of cotton cloth.

2. **Research Methods**

2.1. **Research material**

a. Remazol dye
b. Aquades
c. Na2CO3
2.2. Research tools
   a. Pan
   b. Stirrer
   c. Stove
   d. Waterbath
   e. Heater
   f. Thermometer
   g. Measuring Cup

3. Research Place

The research was conducted at the Laboratory of the Industrial Technology Faculty of the Indonesian Islamic University which is an integrated laboratory commonly used by FTI UII Chemical Engineering Students in carrying out practical or research activities and an integrated Laboratory of the Faculty of Mathematics and Natural Sciences, Islamic University of Indonesia

4. How to Research

4.1. The process of coloring cotton fabrics by dyeing method
The cloth is cut and the material is weighed as needed, then dilute the remazol dye with cold water and prepare a pan of water according to the dosage and heat it to 80c then mix. Wait until the temperature drops and then enter or dip the cloth into a pot of dyes and soak for 15 minutes. Then heat to 80c for 45 minutes, after fixation with soda ash.

4.2. The process of fixation with starch and soda ash
There is a fabric fixation process that is still soaked in the dyestuff in the soda soda powder mixed and stirred to be evenly distributed, then dry. After fixing soda ash and then fixing it with starch, the cloth which is as wet as the one in the starch that has been diluted with a ratio of 1: 1. Soak for 24 hours then wash the cloth and dry it.

4.3. The sampling process.
   a. Fabrics that have been colored are tested with 7.5 x 25 cm and 5 x 5 cm cut for white cloth to rub colored fabrics. Then tested with a crockmeter tool. The ends of the colored fabric are pinched and rubbed with a white cloth as much as 10 times rubbed and curled using a gray scale. This is for rubbing color fastness tests
   b. For the color aging test, the fabric is cut 5x5 cm in a pin on the ISR box in the UP-PC then exits the file name menu, column 1 and is named the sample code. Then the result is a graph.
   c. For color fastness tests, the fabric is stirred for 30 minutes in a soap solution at a temperature of 40-50 c with a ratio of 1:30 Vlot. Then rinse and dry. After that measured by Gray Schale.
Figur 1. Stages the process of coloring and fixing remazol dyes on cotton cloth

1. Cut the fabric and weigh the material needed
2. Dilute the remazol dye and make it into a paste with cold water
3. Dilute with hot water as needed at 80 °C until dissolved
4. Cooling water until 40 °C
5. Dip the cotton fabric for 15 minutes
6. Increase the temperature to 80 °C - 90 °C and continue dyeing for 45 minutes
7. Fixation by adding Na2CO3 powder and continued with drying
8. Soaking a cotton cloth using a 50g Amylum solution with 500ml water in a sealed plastic bag for 24 hours
9. Wash cotton cloth with water
10. Drying
11. Sample evaluation / test
5. Results And Discussion

In the research that has been done on the effect of binder compounds namely soda ash and starch on cotton cloth which has been given remasol dyes with the aim of obtaining a good composition on starch binder and soda ash for cotton fabrics that have been given remasol dyes using techniques dyeing.

Dyeing technique is giving color to textile material evenly with color is giving color to textile material evenly with the same color evenly with the same color in all textile materials.

To find out the color resistance of cotton cloth dipped in remazol dyes with starch fixation carried out by several tests, namely: testing color resistance to rubbing and drying, fading testing with soap washing and testing with a spectrophotometer.

5.1. Color Resistance Test for Rubbing

The color fastness test on rubbing was done to find out what the color fastness value of the fabric on the results of remazol staining on cotton cloth with fixation of soda ash and starch tested by using a crockmeter tool. In the rubbing test, there are two types of rubbing tests, namely dry rubbing test and wet rubbing test.

5.1.1. Dry Cloth Rub Test Value

From the data that has been carried out the dry and wet rubbing testing process, that for the results of dry rubbing on the fixator with a concentration of 75% it produces the value of gray scale 5 (very good). At the fixator with a concentration of 50% get the gray scale value which is 5 (very good). And for the fixator with a concentration of 25% it produces a gray scale 5 (very good), but at a concentration of 0% gets a value of 4 (good). This shows that the cloth given the binding agent or reinforcement in the coloring process is more resistant to dry rubbing when compared to fabrics that are only given dyes.

| Value          | Percentage |
|---------------|------------|
| 4 (good)      | 0%         |
| 5 (very good) | 25%        |
| 5 (very good) | 50%        |
| 5 (very good) | 75%        |

5.1.2. Test Value of Wet Fabric

Based on the data above, it can be seen that the testing of starch and soda ash fixation in the cotton fabric coloring process with concentrations of 0%, 25%, 50%, and 75% which produces an average gray fastness value for all 4 (good). This shows that the wet rub is shown to be less than the maximum value. This is
because in the wet state the pores open, so that when given pressure or rubbing, the dye comes out of the mouth of the fiber. This means that the process of coloring cloth that is given a fixator or not, can lock the color on the fabric.

**Table 2. Test Value of Wet Fabric**

| Value          | Percentage |
|----------------|------------|
| 5 (very good)  | 0%         |
| 5 (very good)  | 25%        |
| 5 (very good)  | 50%        |
| 5 (very good)  | 75%        |

![Diagram of Wet Cloth Scour Test Value](image)

**Figur 3. Diagram of Wet Cloth Scour Test Value**

5.2 Test Color Blending with the Method of Washing Soap

In testing the fading with the soap washing method using the Gray Scale value. Gray scale functions to show color differences before and after testing. Testing is done visually by looking at the color change value.

5.2.1. Test Washing Soap

From the data above, it can be seen that fixators of starch and soda ash with concentrations of 25%, 50%, 75% show the results of the value at gray scale, which is 4 (good). At the fixator with a concentration of 0%, it can be seen the result of gray scale is 2 (not good). This shows that the color reduction is due to the effect of gososkan produced by the solution or waste from the washing process. Thus the color fastness properties in the washing process are determined to be weak in the fibers that occur between fibers, dyes, and fixators. In other words, this fixator can lock the color on the fabric given remasol coloring.

**Table 3. Test Value of Washing Soap**

| Value          | Percentage |
|----------------|------------|
| 2 (not good)   | 0%         |
| 5 (very good)  | 25%        |
| 4 (good)       | 50%        |
| 4 (good)       | 75%        |
5.3 Testing Color Lead

For testing color aging using a UV-PC spectrophotometer, that is by illuminating fabric that has been given remasol coloring with fixation of starch and soda ash. Then it produces output in the form of different wavelengths each fabric that is acknowledged. The older the color will display a small number and vice versa if the brighter the color on the fabric will display a large number.

5.3.1. Color Test

From the data above, it can be seen that the fixator concentration which gives the oldest color is 25% remazol and fixator dyestuffs with a value of 67.08% and a ficastor concentration of 0% or without fixation is 77.08%, this is due to the color of the fixator concentration 0% fade easily during washing so the color fades to light.

| Table 4. Color Test |
|---------------------|
| Nilai (R%) | Percentage |
| 77.08 | 0% |
| 67.08 | 25% |
| 77.0 | 50% |
| 71.41 | 75% |

6. Conclusion

The effect of fixation on cotton fabric coloring using remazol shows that the higher the concentration of fixation substances, the better / better the color resistance of the fabric. In testing the color age, the older the
color, the smaller number will be displayed and vice versa if the lighter color on the fabric will display a large number.

7. Reference

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