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CHLORINE CONTENT ANALYSIS ON WHITE RICE AT THE PAGESANGAN MARKET, MATARAM CITY

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Abstract: In Indonesia, rice is a staple food consumed daily. The high purchasing power of the public for good quality rice makes this a reason for producers to add dangerous bleaching agents such as chlorine to improve the physical quality of the rice they sell. The use of unclear bleaching agents on rice that do not meet the requirements for permitted additives in food and whose concentrations exceed the threshold limits is dangerous for human health. This research aims to determine the presence of chlorine in white rice sold at the Pagesangan market. The methods used are qualitative and quantitative. Three of the five rice samples tested at the Mataram STTL Laboratory tested positive for chlorine. Chlorine levels in rice samples, sample C, were 367.4 mg/L, sample D was 275.1 mg/L, and sample E was 93.4 mg/L.

Keywords: *Argentometry, Mohr's Method, White Rice*

INTRODUCTION

Good health is everyone's dream. Therefore, efforts to improve health must be approached in various ways. Developing technology and information systems also helps to understand the need for healthy food. Healthy food must not contain dangerous ingredients or contaminants such as food additives (BTP), which can cause disease or are toxic. Instead, food must contain ingredients that support health.[1].

Rice is a food source that contains carbohydrates, a staple food that cannot be separated from the lives of the Indonesian people. Carbohydrates are substances whose primary function is to produce energy, and each gram provides four calories [2].

Nowadays, all kinds of food in Indonesia are no longer pure and contain many dangerous chemical additives. The problem of manipulating rice quality is often carried out by traders/millers, such as spraying aromatic substances and using bleaching agents. The use of unclear bleaching agents on rice that do not meet the requirements for permitted additives in food and whose concentrations exceed the threshold limits is dangerous for human health. The use of chlorine in food is nothing new. Apart from being used in clothing and paper today, chlorine has also been used to bleach or polish rice, changing ordinary rice into superior rice to increase the selling price and make a profit.[3].

Chlorine is a chemical that is often used as a bacteria killer. Chlorine reacts with water to form hypochlorous acid. This acid is known to damage body cells. Chlorine is a compound in the form of a greenish-yellow gas with a pungent odor. Chlorine is contained in cooked rice, which is processed, turns into rice, attacks the gastric intestinal mucosa, and makes this part of the body susceptible to ulcer disease. Long-term consumption of chlorinated rice causes liver cancer and kidney damage [4].

Rahmi (2016) found five rice samples positive for chlorine in the Tanjung market, Jember Regency with the highest level of 12.31 mg/L and the lowest 3.34 mg/L [5]. The chlorine level test in rice in 2017 was carried out because there was a lot of discussion about rice using bleach. Three brands of rice produced in the Blitar area contain chlorine, as proven by the results of laboratory tests at the Health Service [6].

According to the Regulation of the Minister of Health of the Republic of Indonesia No.033/Menkes/Per/IX/2012, chlorine is not listed as a Food Additive (BTP) in the bleaching and baking flour group. Chlorine is allowed as a disinfectant, and bleaching agents are prohibited in food [4]. This prohibition is also reflected in the Decree of the Minister of Health of the Republic of Indonesia No. 772/Menkes/Per/XI/88, where chlorine is not listed as a food additive (BTP) in the bleaching or baking powder group [7]. Permentan No.32/Permentan/OT.110/3/2007 lists chlorine as a dangerous chemical in milling, peeling, and polishing rice [8].

The choice of Pagesangan market as a place for collecting research samples was based on the fact that this market is one of the largest markets in the city of Mataram and is a shopping center for traders from various regions on the island of Lombok. Hence, the possibility of the spread of rice traders buying stock at the Pagesangan market is higher compared to other traditional markets. At the time of observation, five sellers were selling rice with chlorine rice characteristics, namely white and shiny, because a test will be carried out qualitatively and quantitatively to

determine whether or not there is chlorine content in rice.

RESEARCH METHODS

This type of research is descriptive, qualitative, and quantitative using Mohr Argentometry (direct titration). Sampling was carried out at the Pagesangan traditional market. The number of samples was five rice traders determined by purposive sampling techniques based on criteria, namely 1) the color of the rice is very white and shiny; 2) the texture of the rice is smooth**.** Chlorine levels were analyzed in rice at the Mataram Environmental Engineering College Laboratory. The tools and materials used in the research were a stirring rod, 50 ml biuret, Erlenmeyer, measuring cup, beaker, parchment paper, filter paper, clamps, measuring flask**,** analytical balance, dropper pipette, standative, test tube, AgNO3, starch, distilled water (H2O), potassium chromate indicator (K2CrO4), potassium iodide, NaCl, Rice sample to be tested.

Research procedure

1. Qualitative Analysis

Qualitative analysis was carried out to determine which rice samples contained chlorine using the following steps.

1. Carefully weigh a sample of 10.0 grams of rice.
2. Added 50 ml distilled water, then stir
3. Filtered with filter paper
4. Take the filtrate.
5. Added 5 ml of sample filtrate into each test tube into 2 test tubes
6. Added a few drops of AgNO3 solution in reaction tube I (argentometry identification without indicator)
7. Added several drops of K2CrO4 into reaction tube II, then added several drops of 0.01 N AgNO3 (argentometric identification using indicators)

2. Quantitative Analysis

Based on the qualitative test results obtained, quantitative tests were then carried out with the method to determine The chlorine level in the rice sample as follows [1].

1. Weighed 20 grams of finely ground rice samples
2. Add 10 ml of distilled water
3. Stir and filter the filtrate.
4. Put 20 mL of filtrate into a 250 ml Erlenmeyer.
5. It added K indicator2CrO4 5% three drops.
6. Titrate with AgNO titer solution until a brownish-red precipitate forms.
7. Note the titration volume.
8. The experiment was carried out three times to determine the actual titration volume
9. The amount of chlorine found in rice is calculated

Chlorine levels in mg/L are determined using the formula [9]

$$\text{chlorine levels (mg/L)} = \frac{(V \times N)AgNO3 \times ArCl \times 1000}{V\ Sample}$$

Information:

N = Normality of AgNO3
IN = Volume AgNO3
With = 35,

RESEARCH RESULTS AND DISCUSSION

The qualitative test results are based on the five rice samples tested. Three rice samples were positive for containing chlorine, and two rice samples that did not contain chlorine. Qualitative test results are presented in Table 1.

Table 1. Sample Qualitative Test

Sample	Argentometric Identification	Information
A	No sediment	-
B	No sediment	-
C	White precipitate	+
D	White precipitate	+
E	White precipitate	+

Figure 1. Positive Chlorine Results

Based on the qualitative test results obtained, a quantitative test was then carried out on samples that were positive for containing chlorine. The quantitative test results were that sample C contained chlorine levels of 367.4 mg/L, sample D of 275.1 mg/L, and sample E of 93.4 mg/L. Unit Milligram per liter (mg/l) is a unit of density that can be used with the SI. This unit is equivalent to 0.001 kg/m³. The quantitative test results showed that the chlorine levels in the rice

samples did not comply with the Minister of Health's regulations, which state that there should be no chlorine content in rice. In other words, the chlorine level must be 0 mg/L, considering the danger to the body.

The danger of chlorine in the human body is that in the short term, it can cause irritable bowel disease, and in the long term, it can cause liver and kidney cancer [10]. Tjiptaning Dyah (2017) describes the dangers of chlorine in rice: it damages the respiratory tract and corrosives the stomach lining, making the stomach susceptible to ulcers. Rice traders use chlorine mainly to attract buyers' interest because chlorine can whiten rice and improve texture, taste, and color. Chlorine is mixed with soaked rice or sprayed on the rice to make it whiter and brighter to increase the selling price [11]. The rice sample tested had a chlorine content of 189.44 mg/L [9]. A qualitative test for chlorine content using the color reaction method, where 14 tested rice samples did not contain chlorine [12]. Testing qualitative chlorine in rice carried out by Asrina (2019) shows that one rice brand contains chlorine, and the name brand Three Roses [13]. Analysis qualitative and quantitative using method Argentometry Persist Produce Of the eight samples there were three samples positively contained chlorine, and the chlorine level in the three rice samples, namely A, is 28.85 ppm, sample E is 34.13 ppm and sample H is 28.84 ppm [14].

The chlorine added to white rice is hazardous to the body's health [15-19]. Chlorine is not a food additive, but many individuals add chlorine as a food additive to make rice look white, clean, and shiny [20-21]. The consequences of adding chlorine will have an impact on consumer health. Consuming foods that contain chlorine can cause diseases of the esophagus, nose, and respiratory tract (the esophagus near the lungs) and can disrupt the respiratory system, resulting in death.

CONCLUSION

The qualitative chlorine test showed that of the five samples of white rice taken at the Pagengan market, two samples were negative for containing chlorine, namely sample A and sample B, then three samples that were positive for containing chlorine, namely sample C, sample D, and sample E. The quantitative test showed that the chlorine level in samples that were positive for containing chlorine was the highest, namely sample C at 367.4 mg/L, sample D at 275.1 mg/L, and the lowest chlorine content was sample E at 93.4 mg/L.

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