HERCLIPS *(Journal of Herbal, Clinical and Pharmaceutical Sciences)* , Vol. 07 No.02
PRODI DIII FARMASI UNIVERSITAS MUHAMMADIYAH GRESIK
E-ISSN : 2715-0518 P-ISSN : 2715-3053
Open Access at http://journal.umg.ac.id/index.php/herclips/index
DOI. 10.30587/herclips.v7i02.11466

Qualitative Analysis of Chlorine (Cl_2) and Formalin Content In Raw White Rice Crackers Produced in Sambipondok Village, Sidayu, Gresik

Auliya Dwi Indriani[1*] and Susanti Dhini Anggraini[2]
Universitas Ronggolawe Tuban
Jalan Manunggal No. 61 Semanding East Java Indonesia 62391
Correspondence email: auliyadwi49@gmail.com

Article Information
Received: 03/04/26
Accepted: 06/05/26

Abstract

Crackers are a snack made from starch that is popular with the public. According to a field survey, raw white crackers produced by UMKM in Sambipondok Village, Sidayu District, Gresik have a whiter or lighter color compared to other similar raw crackers. This condition is thought to be due to the addition of additional ingredients that are not recommended. This study aims to analyze the presence of Chlorine (Cl_2) and Formalin qualitatively in raw white crackers produced by UMKM in Sambipondok Village, Sidayu District, Gresik. The method used in this study is a qualitative research method involving several chemical reagents that are in accordance with predetermined characteristics. In the analysis of Chlorine (Cl_2) content using 10% Potassium iodide (KI) and 1% Starch reagents, 5% silver nitrate ($AgNO_3$) solution, Lead acetate $Pb(CH_3COO)_2$. While in the analysis of formalin content using a formalin test kit brand labstest reagent, Fehling A and B solutions, and 0.1N $KMnO_4$. The results of the study showed that raw white crackers produced by MSMEs in Sambipondok Village, Sidayu District, Gresik, were positive for containing Chlorine (Cl_2) and Formaldehyde.

Keywords: Crackers, Chlorine (Cl_2), Formalin.

Introduction

Crackers are a popular snack among all levels of society (Haryani et al., 2022). According to Indonesian Industrial Standard (SII) No. 0272-90, crackers are dry food products made from tapioca flour with or without the addition of other permitted food additives, which must be processed by frying or baking first (SII, 1990 in Agustina and Khaira, 2020). Crackers are not unfamiliar in Indonesia; almost every restaurant serves at least one type of cracker. The most common type of cracker is white, round, and net-shaped (Agustina and Khaira, 2020).

Safe food is crucial for improving human health and well-being. According to data from the World Health Organization (WHO), 1.6 million people worldwide fall ill every day due to unsafe food (BSN Public Relations in Asrina and Anganria, 2019). Food safety is a condition

E-ISSN : 2715-0518
P-ISSN : 2715-3053

or effort to prevent food from possible biological, chemical, and other contaminants that endanger human health, and does not conflict with religion, beliefs, and culture, so it is safe for consumption (Minister of Health of the Republic of Indonesia, 2012). Unsafe food is food that still contains Food Additives (BTP) whose use is prohibited in food. This prohibition is certainly related to the impact of the use of unsafe food additives on human health.

In addition, several dyes are listed in the Regulation of the Minister of Health of the Republic of Indonesia No. 033/Menkes/Per/XII/2012. However, based on this regulation, chlorine (Cl_2) is not listed as a food additive (BTP) in the dye group, either natural or synthetic. Chlorine in food can erode the intestinal mucosa in the stomach (corrosion), making it susceptible to gastric ulcers. Long-term consumption of foods containing chlorine can cause liver and kidney cancer (Ika P. M. et al., 2020).

Regulation of the Minister of Health of the Republic of Indonesia No. 033/Menkes/Per/XII/2012 concerning Food Additives also lists ingredients whose use as Food Additives (BTP) is prohibited, one of which is formalin. Formalin is commonly used in the medical field as a preservative for corpses (Alifia et al., 2023). The use of formalin in food can cause allergies, irritation, watery eyes, redness, dizziness, vomiting, nausea, burning sensation, and stomach ache, and its long-term effects can cause cancer (Chumaidi et al., 2022). Consumers need to be careful in choosing the food they consume. The criteria for determining the quality of raw crackers can only be reviewed in terms of color, aroma of crackers, and the presence or absence of mold on the surface of the crackers (Jamaludding, J., 2018).

One of the white cracker industry centers in Gresik City is located in Sambipondok Village, Sidayu District. The cracker production results produced by this industry are distributed throughout the Sidayu District, Gresik. Based on a preliminary survey that has been conducted, it is known that raw white crackers can last for two weeks to one month and have a brighter color than other similar crackers. Based on the above background, researchers are interested in conducting research on the analysis of Chlorine (Cl_2) and Formaldehyde content in white crackers produced in Sambipondok Village, Sidayu District, Gresik Regency.

Material and Methods

Types of research

This research is an experimental research type by analyzing the presence of Chlorine (Cl_2) and Formaldehyde in white crackers produced by UMKM in Sambipondok Village, Sidayu District, Gresik using appropriate chemical reagents.

E-ISSN : 2715-0518
P-ISSN : 2715-3053

Place and Time of Research

An analytical study of the presence of chlorine (Cl_2) and formalin in white crackers produced by UMKM in Sambipondok Village, Sidayu District, Gresik, was conducted at the Integrated Laboratory of the Faculty of Health, Muhammadiyah University of Gresik. This study was conducted from October 2024 to June 2025.

Sample

The samples for this study were raw white crackers obtained from the white cracker industry center in Sambipondok Village, Sidayu District, Gresik. Sampling was conducted using a random sampling method. Representative samples were collected from the target locations. In this study, samples were taken from the top, bottom, middle, right, and left sides of the sample storage container (Gazali and Ilhamiyah, 2023).

Tools and materials

The tools used were a stirring rod, a glass funnel, a 10 ml measuring cup, a filter cloth, a filter paper, a pestle (lumoang/pestle), a water bath, a 10 ml measuring pipette, a horn spoon, a test tube, an analytical balance, a dropping pipette, and a beaker glass.

The materials used were raw white crackers, 5% silver nitrate ($AgNO_3$), 10% lead acetate $Pb(CH_3COO)_2$, distilled water, 10% potassium iodide, 1% starch, Labstest brand formalin test kit, Fehling A and B, 0.1 N $KMnO_4$, and formalin standard.

Sample Preparation

Weigh 10 g of raw white crackers, then crush them and add 20 ml of hot water, wait until the crackers begin to soften, then stir until dissolved. Next, filtration done using a filter cloth then collect the filtrate (Qolbuque et al., 2024).

Chlorine (Cl2) Content Analysis

a. **Identification of Chlorine (Cl2) with 5% silver nitrate ($AgNO_3$) solution**

   1 ml sample filtrate was placed in a test tube. 1 ml of $AgNO_3$ solution was added and shaken, then the changes in the sample were observed. If a white precipitate forms, the sample is positive for chlorine (Asrina & Anganria, 2019).

b. **Identification of Chlorine (Cl_2) with 10% Lead (II) acetate solution $Pb(CH_3COO)_2$**

   1 ml sample filtrate was placed in a test tube. 1 ml of lead acetate solution was added and shaken, then the sample was observed for changes. If a white precipitate formed, it was positive for chlorine (Asrina & Anganria, 2019).

E-ISSN : 2715-0518
P-ISSN : 2715-3053

c. Identification of Chlorine (Cl2) with 10% Potassium Iodide (KI) and 1% Starch

2 ml sample filtrate was placed in a test tube, 10% KI solution and 1% starch solution were added, then shaken and the changes observed in the sample were observed. If the sample is positive for chlorine, the filtrate will turn purplish blue (Sammulia et al., 2020).

Formalin Content Analysis

a. Analysis of Formalin Content in white cracker samples using the Labtest brand Formalin Test Kit.

Add 1-3 ml of sample and add 1 drop of formalin reagent 1, then stir. Add 3 drops of formalin reagent 2 and shake. Let stand for ± 5-15 minutes. The sample will slowly change color from light purple to dark purple, indicating a positive sample for formalin (Qolbuque et al., 2024).

b. Analysis of Formalin Content in White Cracker Samples with Fehling A and Fehling B Solutions

1 ml of the filtrate into a test tube, then add equal volumes of Fehling's reagent A and Fehling's reagent B, 1 ml, and shake. Place in a water bath at 60°C for 15 minutes. Observe the changes. If a brick-red precipitate forms, the sample tested positive for formalin (Pratiwi et al., 2019).

c. Analysis of Formalin Content in White Cracker Samples with 0.1 N Potassium Permanganate (KMnO4).

3 ml of sample filtrate into a test tube. Add 3 drops (drop by drop) of 0.1 N $KMnO_4$ solution and stir gently until homogeneous. Observe the color change in the sample solution if the sample is positive for formalin, it will turn brown (Jayadi et al., 2023).

Result and Discusion

Qualitative Analysis of Chlorine (Cl_2)

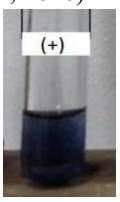
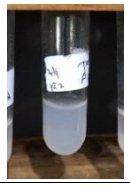
Chlorine (Cl_2) is a hazardous chemical commonly used as a disinfectant, clothes bleach, and paper bleach (Marlinae et al., 2023). Chlorine reacts with water to form hypochlorous acid, which is known to damage body cells (Warsani & Shlihah, 2023). This study conducted a qualitative analysis of chlorine content in several stages, namely sampling, sample preparation, and testing using several reagents, including 10% potassium iodide and 1% starch, $AgNO_3$, and

E-ISSN : 2715-0518
P-ISSN : 2715-3053

$Pb(CH_3COO)_2$. Each of these reagents has a chemical reaction that can identify the presence or absence of chlorine in the sample.

Based on Table 1, it shows that the raw white cracker sample is positive for chlorine (Cl_2). This is in line with previous research conducted by Advaita et al., 2025 which stated that raw white crackers are positive for chlorine (Advaita et al., 2025). However, the chlorine (Cl_2) content test with 10% Potassium iodide reagent and 1% starch showed that the sample was negative for chlorine in 3 repetitions with the same treatment. Previous research conducted by Sammulia S F. at.al 2020 with 10% starch indicator and KI solution obtained similar results indicating that the test sample was not reactive to chlorine or no chlorine was found in the sample.

Tabel 1. Aualitative Analysis of (Cl_2) In White Rice Crackers

Reagent	Control (+)	Observation			Conclusion (+)(-)
		R1	R2	R2	
Potassium iodida 10% and starch 1% Reagen color : - Potassium iodide 10%: clear - starch 1%: Bening	the filtrate will change color to purplish blue (Sammulia et al., 2020) 	The filtrate did not undergo any changes. 	The filtrate did not undergo any changes. 	The filtrate did not undergo any changes. 	Negative (-)
$AgNO_3$ Regen color: $AgNO_3$: clear	White sediment 	White sediment 	White sediment 	White sediment 	Positive (+)
$Pb(CH_3COO)_2$ Regen color: $Pb(CH_3COO)_2$:bening	White sediment 	White sediment 	White sediment 	White sediment 	Positive (+)

E-ISSN : 2715-0518
P-ISSN : 2715-3053

Reagent	Control (+)	Observation			Conclusion (+)(-)
		R1	R2	R2	

In addition, according to Sammulia S F. at.al 2020, the occurrence of clear to purplish blue color in foods containing chlorine is caused by the chlorine contained in the food will oxidize potassium iodide to produce I_2 which then reacts with the starch solution to produce a purplish blue complex (Sammulia et al., 2020). The following is a reaction that occurs with chlorine and iodine:

$$Cl_2 + 2I^- \longrightarrow 2Cl^- + I_2$$

The negative results were likely due to the chlorine concentration in the food being too low, preventing it from oxidizing potassium iodide and producing I_2, which would then react with the starch solution. Therefore, there was no change in the purplish-blue complex in the sample (Warsani and Sholihah, 2024).

The chlorine test with $AgNO_3$ reagent that has been carried out shows the presence of a white precipitate in the sample solution after 3 repetitions, so it can be concluded that the sample is positive for chlorine (Cl_2). The white, clumpy precipitate is a precipitate of Silver Chloride (AgCl) which is insoluble in water and dilute nitric acid, formed through the reaction between $AgNO_3$ and chlorine contained in the sample (Kusumaning et al., 2024). The following reaction occurs:

$$Cl^- + Ag^+ \longrightarrow AgCl$$

The next step is testing using a 10% Lead(II) acetate solution reagent $Pb(CH_3COO)_2$. From the observation results, there was a white precipitate in the sample with 3 repetitions. This precipitate is a Lead(II) Chloride ($PbCl_2$) precipitate. This precipitate is formed when Lead(II) acetate $Pb(CH_3COO)_2$ decomposes and free lead reacts with chlorine (Cl_2) (Sakanthi et al., 2024). The following reaction occurs:

$$2Cl^- + Pb^{2+} \longrightarrow PbCl_2$$

Based on the qualitative tests that have been carried out on all the reagents used, there is 1 reagent that shows the negative sample contains chlorine and 2 reagents show the positive

E-ISSN : 2715-0518
P-ISSN : 2715-3053

sample contains chlorine, so it can be concluded that the raw white cracker sample that has been analyzed is positive for containing chlorine.

The use of chlorine (Cl_2) as a food additive is prohibited by the Regulation of the Minister of Health of the Republic of Indonesia No. 033 of 2012 concerning Food Additives. Consuming foods containing chlorine (Cl_2) is very harmful to the body. Chlorine contained in food will erode the intestinal mucosal lining in the stomach (corrosive), making it susceptible to gastric ulcers. Long-term consumption of foods containing chlorine can cause liver and kidney cancer (Ika P. M. et al., 2020).

Chlorine (Cl_2) is used in crackers as a white coloring agent. By adding white coloring to crackers, the color of the crackers becomes brighter and looks cleaner. This can attract customers to buy and consume the crackers (Putri et al., 2022). To produce clean white crackers with stable colors, safe food additives (BTP) can be added. One effort that can be done is adding whitening agents and flour ripeners, currently known as flour treatment agents (Amrih, 2023). Flour treatment Agent are food additives added to flour to improve color, dough quality, and/or baking (heating). Examples of flour treatment additives are ammonium chloride, calcium sulfate, and so on (Minister of Health of the Republic of Indonesia, 2012).

Qualitative Analysis of Formalin

Formalin is a chemical used as a preservative for corpses and research animals. It is also used as an antiseptic to kill viruses, bacteria, and fungi. At concentrations <1%, formalin is used as a preservative for various non-food products (Berliana et al., 2021).

This study conducted a qualitative analysis of formalin content through several stages, namely sampling, sample preparation, and testing using several reagents, including the Labstest Formalin Test Kit, Fehling Reagents A and B, and 0.1N $KMnO_2$. Each reagent has an observable chemical reaction to identify the presence or absence of chlorine in the sample.

Table 2. Qualitative Analysis Results of the Presence of Formalin in Raw White Crackers

E-ISSN : 2715-0518
P-ISSN : 2715-3053

Reagent	Control (+)	Observation			Conclusion (+)(-)
		R1	R2	R2	
Tes Kit Formalin brand Labtest Reagen Reagen color: - Reagen 1: clear - Reagen 2: puple	The sample will turn light purple to dark purple 	The sample turns light purple. 	The sample turns light purple. 	The sample turns light purple. 	Positive (+)
Fehling A and B Reagen color: - Fehling A: blue - Fehling B: clear	The sample contains a red precipitate. 	The sample contains a red precipitate. 	The sample contains a red precipitate. 	The sample contains a red precipitate. 	Positive (+)
$KMnO_4$ 0,1N Reagen color : purple	The sample changes color to brown 	The sample changes color to brown 	The sample changes color to brown 	The sample changes color to brown 	Positive (+)

Table 2 shows that the raw white cracker samples tested positive for formalin. This finding aligns with previous research by Nurhayati et al. (2014), which stated that formalin was also added to the production of chocolate gendar crackers. According to the Regulation of the Minister of Health of the Republic of Indonesia No. 033/Menkes/Per/XII/2012, formalin is prohibited for use in food. The first reagent used to test for the presence of formaldehyde in raw white crackers is the Labtest Reagent Formalin Test Kit. In this test, the sample turns light purple, indicating a positive result for formaldehyde. In previous research conducted by Herlina

E-ISSN : 2715-0518
P-ISSN : 2715-3053

Y. C (2021), this formalin test kit has been validated and proven capable of detecting the presence of formaldehyde in samples. The Labtest Reagent Formalin Rapid Test Kit does not specify the reagents used to prepare the product (Herlina Y. C, 2021).

Next is the formalin test using Fehling Solution A and Fehling B. The test results showed the presence of brick-red precipitate, so it can be concluded that the sample with Fehling reagent A and B is positive for containing formalin. The color change occurs because the aldehyde compound is oxidized to carboxylic acid and forms a brick-red CuO precipitate (Fessenden in (Pratiwi et al., 2019)).

Formalin testing on raw white cracker samples was also conducted using 0,1N potassium permanganate ($KMnO_4$) reagent. The principle of this test is the addition of $KMnO_4$ to oxidize the formaldehyde in formalin (Jayadi et al., 2023). In the test, the sample slowly changed color to brown, indicating a positive sample containing formaldehyde. This color change occurs due to the reducing properties of the aldehyde group in formalin with $KMnO_4$ to form methanoic acid, which has a sharp and corrosive odor (Khaira, 2016).

Tests using three different reagents showed a positive reaction indicating that the raw cracker sample contained formalin. Therefore, it can be concluded that the raw cracker sample contained formalin. The use of formalin in food is strictly prohibited as stipulated in Regulation of the Minister of Health of the Republic of Indonesia No. 033 of 2012 concerning Food Additives. Consuming food containing formalin can potentially trigger cancer due to its carcinogenic properties (Nur et al., 2022).

The main ingredient in crackers is tapioca flour, which is known to contain protein (Agustina & Khaira, 2020). Formalin contains aldehydes that readily react with protein. Therefore, when added to foods like crackers, formalin binds to the protein. By eliminating the protein's function after being bound by the chemical element formalin, crackers will not be attacked by spoilage bacteria that produce acidic compounds, thus extending their shelf life (Khaira, 2016).

Preservatives are food additives used to prevent or inhibit food spoilage caused by microorganisms. To ensure food safety, food additives (BTP) listed in the Regulation of the Minister of Health of the Republic of Indonesia No. 033 of 2012 may be added, including sorbic acid, benzoic acid, potassium nitrite, lysozyme hydrochloride, and others.

Conclusion

From the results of the research that has been carried out, it can be concluded that the whit

E-ISSN : 2715-0518
P-ISSN : 2715-3053

crackers produced by MSMEs in Sambipondok Village, Sidayu District, Gresik, are positive for containing Chlorine (Cl2) and formalin.

References

Advaita, C. V., Mierza, V., & Sudarjat, H. (2025). Analisis Rhodamin B pada Kerupuk Seblak Prasmanan di Sekitar Universitas Singaperbangsa Karawang Kampus 1. *Jurnal Pharmascience*, *12*(1), 19. https://doi.org/10.20527/jps.v12i1.19358

Agustina, Y., & Khaira, F. (2020). Analisis Pengembangan Home Industri Kerupuk Tempe Di Desa Kubu Kecamatan Peusangan Siblah Krueng Kabupaten Bireuen. *Jurnal Sains Ekonomi Dan Edukasi*, *VIII*(1).

Alifia, N. N., Marlina, E. T., & Utama, D. T. (2023). Analisis Kandungan Boraks dan Formalin pada Produk Olahan Daging yang dijual oleh UMKM di Kota Bandung. *Jurnal Teknologi Hasil Peternakan*, *4*(1), 62–73. https://doi.org/10.24198/jthp.v4i1.46403

Amrih, D. (2023). *Modul Ajar: Ingredien dan Bahan Tambahan Pangan* (1st ed.). Fakultas Pertanian Universitas PGRI Yogyakarta.

Asrina, R., & Anganria, J. (2019a). Analisis Kualitatif Klorin (Cl2) Pada Beras Putih Yang Beredar Di Pasar Tradisional Daya Kota Makassar. *JFS] Jurnal Farmasi Sandi Karsa*, *5*(1).

Berliana, A., Abidin, J., Salsabila, N., Maulidia, N. S., Adiyaksa, R., & Siahaan, V. F. (2021). Penggunaan Bahan Tambahan Makanan Berbahaya Boraks dan Formalin Dalam Makanan Jajanan. *Jurnal Sanitasi Lingkungan*, *1*(2), 64–71. https://doi.org/10.36086/salink.v1i2.952

Chumaidi, A., Maryanty, Y., Ratna Wulan, D., Adani Putri, S., & Teknik Kimia Politeknik Negeri Malang, J. (2022). Bimbingan Teknis Pengujian Formalin Pada Makanan Untuk Kerurahan Pohjentrek Kota Pasuruan. *J-ABDIMAS*, *9*.

Fitriani, F., Raharjo, P., Harnani, Y., Kamalizaman, M. K., & Wahyuni, D. (2022). Analisa Klorin Pada Beras Yang Beredar Di Pasar Tradisional Cik Puan Kota Pekanbaru Tahun. *Media Kesmas (Public Health Media)*, *2*(1), 94–101. https://doi.org/10.25311/kesmas.vol2.iss1.11

Haryani, D. S., Abriyoso, O., & Putri, A. S. (2022). Analisis Risiko Operasional Pada UMKM Kerupuk Bu Mitro Di Kelurahan Tanjungpinang Barat. *Aksara: Jurnal Ilmu Pendidikan Nonformal*, *8*(2), 1513. https://doi.org/10.37905/aksara.8.2.1513-1524.2022

E-ISSN : 2715-0518
P-ISSN : 2715-3053

Herlina Y. C. (2021). Artikel Penelitian Perbandingan Uji Deteksi Formalin pada Makanan Menggunakan Pereaksi Antilin dan Rapid Tes Kit Formalin (Labstest). *Journal Pharmasci (Journal of Pharmacy and Science)*, *6*(1).

Ika Perbina Meliala, D., Rijayanti, & Feri. (2020). Chlorine Inspection On Branded And Unbranded Rice Circulating In The City Of Medan. *Jurnal Pengabdian Masyarakat Putri Hijau*, *1*(1). http://ejournal.delihusada.ac.id/index.php/JPMPH

Jayadi, L., Dwipajati, D., & Sabila, N. (2023). Analisis Kandungan Formalin dan Boraks Pada Bakso dan Tahu di Wilayah Kota Malang. *Journal Syifa Sciences and Clinical Research*, *5*(2). https://doi.org/10.37311/jsscr.v5i2.17998

Khaira, K. (2016). Pemeriksaan Formalin Pada Tahu Yang Beredar Di Pasar Batusangkar Menggunakan Kalium Permanganat (Kmno4) Dan Kulit Buah Naga. *Sainstek: Jurnal Sains Dan Teknologi*, *7*(1), 69–76.

Kusuma W., & Prasetyo, H. (2019). Analisis Kadar Kalsium Oksalat Pada Tepung Porang Setelah Perlakuan Perendaman Dalam Larutan Asam (Analisis Dengan Metode Titrasi Permanganometri). *Journal of Research and Technology*, *5*(2).

Kusumaning, A. P. H., Fajaryanti, N., Malinda Andamari Wahyu Utami, R., & Nur Azizah, T. (2024). Analisis Senyawa Klorin (Cl2) Pada Tahu Putih Yang Dijual Di Pasar Kendal Kabupaten. *LIVING JOURNAL: Jurnal Ilmu Kesehatan*, *1*(1). https://jurnal.usp.ac.id

Marlinae, L., & Husaini. (2023). *Dampak dan Bahaya Klorin Pada Es Batu Kristal* (A. U. Azizah, Ed.; Vol. 1).

Marlinae, L., Husaini, Syamsul, Biwr, A., Khairiyati, L., Rahmat, A. N., Azizah, A. U., Afifah, W., Setiyawan, B., Sari, A. P., Salsabila, A., Fatmawati, Z., Salsabella, Asy'ari, T. S., Berliana, J. D., Sary, R. A., & Kurni, K. J. (2023). *Dampak Dan Bahaya Klorin Pada Es Batu Kristal* (A. U. Azizah, Ed.; 1st ed.). CV Mine.

Menteri Kesehatan RI. (2012). *Permenkes No. 33 tentang Bahan Tambahan Pangan*. Jakarta.

Milehman, A., & Napitupulu, M. (2020). Boraxs and Formalin Analysis in the Shumai Treated in Palu City. *Jurnal Akademika Kimia*, *9*(2), 118–124. https://doi.org/10.22487/j24775185.2020.v9.i2.pp118-124

Nur, E., Gusti, A., & Hidayanti, R. (2022). Effect Of Soaking On Formalin Concentration. *Human Care Journal*, *7*(2), 419–424.

Nurhayati, A. S., Astuti, D., & Rahardiyono. (2014). *Analisis Tingkat Kesukaan Konsumen, Kadar Gizi dan Zat Aditif Pada Beberapa Jenis Kerupuk di Wilayah Gunungkidul*.

E-ISSN : 2715-0518
P-ISSN : 2715-3053

Pratiwi, D., Wardaniati, I., & Dewi, A. P. (2019). Uji Selektifitas dan Sensitifitas Pereaksi Untuk Deteksi Formalin Pada Bahan Pangan. *Pharmaceutical Journal of Indonesia*, *16*(01), 1693–3591.

Proença, C. S., Serrano, B., Correia, J., & Araújo, M. E. M. (2022). Evaluation of Tannins as Potential Green Corrosion Inhibitors of Aluminium Alloy Used in Aeronautical Industry. *Metals*, *12*(3). https://doi.org/10.3390/met12030508

Putri, P., Nia, M., & Igo, A. (2022). Pemanfaatan Umbi Gadung Menjadi Bahan Baku Keripik Kolope di Kecamatan Duruka Kabupaten Muna. *Jurnal Online Program Studi Pendidikan Ekonomi*, *7*(4), 149–158. https://doi.org/10.36709/jopspe

Qolbuque, D. R., Maharani, A., Ghaniyah, F., Anastasia, M., Nurul Iman Albaiti, W., Daffa Azzary, M., Wahyu Darmawan, K., Muhammad Naufal, Z., Rahmatullah, R., & Rini Purbowati. (2024). *Prosiding Seminar Nasional Kusuma III Kualitas Sumberdaya Manusia*. *2*, 3062–9365.

Sakanthi, A. P., Aziz, S., Nabila, S., Ulya, A., & Auli, W. N. (2024). Indonesian Journal of Chemical Science Analysis of Lead (Pb) Contamination in Lipstick and Eye Shadow Powder Circulating in the King Street Market in Bandar Lampung Using UV-Visible Spectrophotometer Method Info Artikel Abstrak. In *J. Chem. Sci* (Vol. 13, Issue 3). http://journal.unnes.ac.id/sju/index.php/ijcs

Sammulia, S. F., Marliza, H., & Siahaan, A. E. (2020). Identifikasi Zat Klorin (Cl) Dalam Beras Putih (Oryza Sativa) Yang Beredar Di Kota Batam. *J. Sains Dan Teknologi Pangan*, *5*(3).

Setiawan, D., & Bahrun, K. (2023). Pengaruh Kualitas Pelayanan Dan Harga Terhadap Kepuasan Pelanggan Pada Usaha Kerupuk Rambak Kecamatan Ketahun Bengkulu Utara. *Jurnal Entrepreneur Dan Manajemen Sains*, *4*.

Sweetman, S. C. . (2009). *Martindale : the complete drug reference. Volume 1, Pages 1-2418*. Pharmaceutical Press.

Tambunan, S., Sari, M. N., Nasution, L. M., & Rahmah, S. (2021). Effect of Differences of HCl Concentration on the Reaction of Chlorine Gas and Acetylene Gas In Clothing Liquids and Floor Cleaning Liquids. *Indonesian Journal of Chemical Science And Technology*, *04*, 58–61.

Warsani, Z., & Shlihah, K. (2023). *Identifikasi Kandungan Klorin Pada Beras Putih (Oryza). Jurnal Sains dan Teknologi*. *6*(3), 356–364. https://doi.org/10.31764/justek.vXiY.ZZZ

E-ISSN : 2715-0518
P-ISSN : 2715-3053