

Analysis of Sebelas Maret University Students Insight of Cosmetic Waste Management that has Hazardous and Toxic Content

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Abstract - Cosmetics contain chemicals including formaldehyde, fragrance and even heavy metals such as lead or mercury. So indirectly cosmetic packaging waste must also contain harmful chemicals and belong to waste B3. Toxic hazardous material waste (waste B3) is waste that contains harmful and toxic substances, so that it can directly or indirectly pollute and damage the environment, disrupt health, and threaten the survival of humans and other organisms. The awareness of students of Sebelas Maret University Surakarta towards B3 waste management can be seen from their understanding of the dangers and how to handle B3 waste in the environment around the residence. An understanding of B3 waste is important in shaping a person's attitude or behavior towards the sustainability of the surrounding environment. The purpose of this study is to find out how much information and knowledge is owned by students of Sebelas Maret University Surakarta related to the management of B3 cosmetic waste in the surrounding environment. The analysis method used in this study is a descriptive analysis method whose descriptive explanation of the data obtained regarding the knowledge of Sebelas Maret University students on B3 cosmetic waste. The data collected is in the form of primary data conducted through questionnaires and secondary data from valid sources. The results showed that the knowledge of students of Sebelas Maret University Surakarta about B3 cosmetic waste was relatively good. However, for B3 waste management is still not good enough proven from 50 respondents only 30 respondents who stated that using the 3R method (reuse, reduce, recycle) on B3 cosmetic waste, the remaining 20 respondents answered never or just thrown away and there was only one respondent who ever sent B3 cosmetic waste to the authorities sent to the installation "Waste for Change". However, 49 respondents were willing to change their attitude by doing 3R before they disposed of B3 cosmetic waste directly. From the results of this study, it is expected that the campus will hold socialization about the dangers of B3 waste to its students because students also indirectly also produce B3 waste.

Keywords - Cosmetic Waste Management Insight, Hazardous and Toxic Content, Cosmetic Waste

Doi: <http://dx.doi.org/10.14710/wastech.10.2.28-34>

[How to cite this article: Matin, H. H. A., Faqih, M. A. H., Aji, M. Y. M. B., Sari, S. P., Hanum, U., Pratiwi, V. M. R. (2022). Analysis of Sebelas Maret University Students Insight of Cosmetic Waste Management that has Hazardous and Toxic Content. Waste Technology, 10(2), 28-34 doi:

<http://dx.doi.org/10.14710/wastech.10.2.28-34>]

1. Introduction

The rapid development and growth of the industrial world is very beneficial for humans. On the other hand, it can also cause considerable negative impacts because it will produce waste that can reduce the quality of the environment. (Setiawan and Purwanto, 2018). One of them in the cosmetic industry that has been worldwide also produces B3 waste in the form of solid and liquid waste (Setiawati et al., 2019). The progress of the cosmetic industry in Indonesia today shows a significant increase. Cosmetics are treatment substances used to improve appearance and are derived from a mixture of various

chemicals (Agustina et al., 2020). But there are also cosmetics that come from natural ingredients. Cosmetics are categorized into several types. One commonly used type is makeup. This product is very identical to women. But at this time, the cosmetic trend is not only for women, many cosmetic products for men are popping up. Starting from skin care products to men-only makeup. Similarly, cosmetic products for women, now the level of production and consumption has also increased. Based on the Ministry of Industry, Airlangga, has placed the cosmetic industry as the mainstay sector as stated in Rencana Induk Pembangunan Industri Nasional (RIPIN) 2015-2035. The existence of the

number of industries in Indonesia in 2018 as many as 760 companies and increased by 153 industries in 2017. This data is estimated at 61% of cosmetics and skin care made from plastic materials in 2017. In 2019, the percentage increased by 12% in cosmetic products purchased and produced. The increase in the cosmetic industry will certainly be directly proportional to the volume of cosmetic waste produced. As a result of the advancement of the beauty industry will certainly have an impact on the existence of waste sourced from the results of cosmetic products. Waste is a material that has no value and cannot be reused (Susi et al., 2018). Former cosmetic containers should not be thrown away carelessly because there are still remnants of creams, liquids, or other ingredients in the container so it needs special handling and is dangerous for the environment if not handled properly. These former cosmetic containers are usually preoccupied with cosmetic waste.

In cosmetic waste contains Hazardous and Toxic Materials (B3) which are widely used as raw materials of the cosmetic industry which is included in solid or liquid B3 waste (Putra et al., 2019). Hazardous and toxic waste, abbreviated as waste B3, is the waste of a business or activity that contains hazardous and toxic materials because its nature, concentration, and amount, both directly or indirectly, can pollute and damage the environment and can harm the environment, health, survival of humans and other living things. (Sidik and Damarhudin, 2012). The properties of Waste B3 include flammable, explosive, corrosive, oxidizers and reducers, non-radioactive, mutagenic, pathogenic, rotting, and so on. The emergence of cosmetic waste is a problem faced by the industry and for the community. In recent years the industry has been looking for effective and efficient solutions to manage B3 waste as it deals with increasingly stringent environmental regulations for the industry to reduce the impact arising from its production activities. However, cosmetic waste is also widely produced by consumers, especially from among students.

Cosmetic waste has the potential to cause pollution (Sidomukti and Wardhana, 2021). If cosmetic waste is not managed properly then sooner or later it will have a bad impact on the environment or for the health of humans and other living things. Usually the impact caused by this comes from cosmetic containers that are difficult to decompose so that it can cause garbage that increasingly accumulates, pollutes water, interferes with marine life, and so on (Kurniawan et al., 2021). So it is necessary to make efforts to manage cosmetic waste and environmental conservation. Efforts that can be done are by changing lifestyle, namely limiting or reducing the use of unnecessary cosmetics, using bottles, containers or cosmetic cups as a place to refill, and managing cosmetic waste using the principle of 3R (Reduce, Reuse, Recycle). This research was conducted with the aim to find out students' understanding of the dangers of cosmetic waste and cosmetic waste management so as not to adversely affect the environment.

2. Materials and Methods

2.1 Research Methods

This research has been conducted at the scope of Sebelas Maret University located in Jalan Ir. Sutami, Kentingan, Jebres Subdistrict, Surakarta, Central Java. The study was conducted from November 2, 2021 to November 11, 2021. The research method used in this study is a qualitative descriptive method. In analyzing the data using qualitative descriptive analysis methods, we explain descriptively the data we have obtained in the form of student knowledge about cosmetic B3 waste and its management.

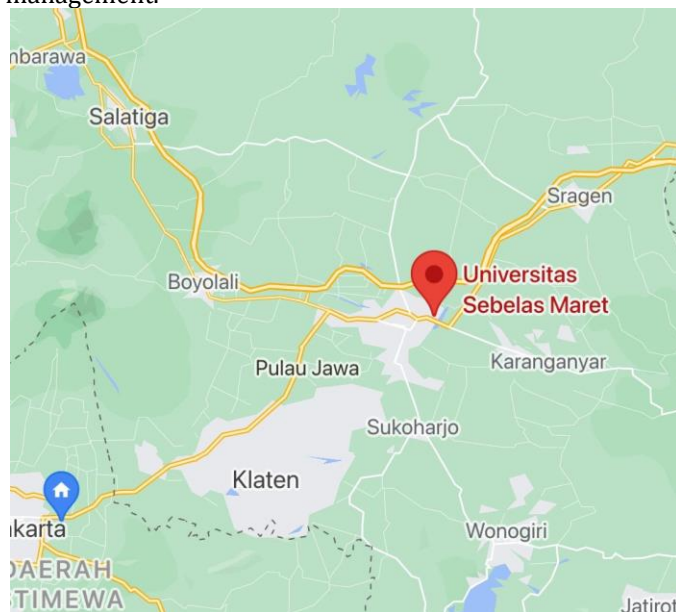


Figure 1. Map of the research site

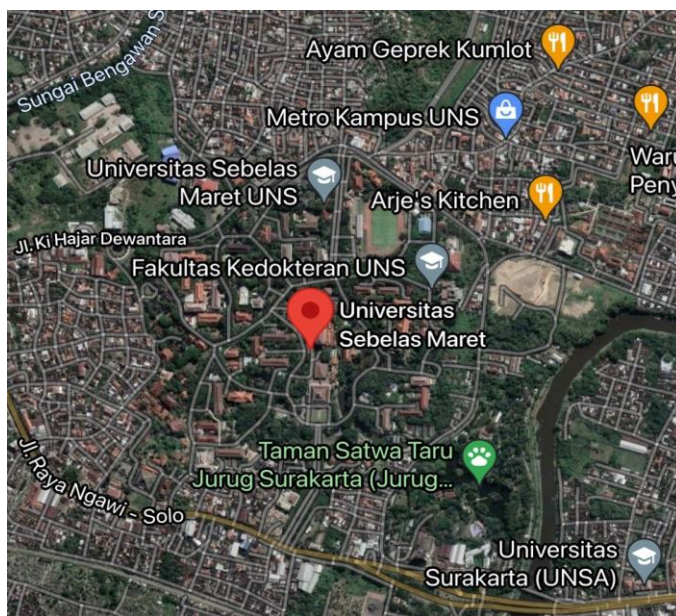


Figure 2. Satellite map image of the research site

For the data itself there are two types, namely primary data and secondary data. Primary data itself is data

obtained directly by researchers. Primary data collected in this study is in the form of student knowledge and B3 waste management, especially cosmetic waste. The data we use is to conduct field surveys by spreading questionnaires in the scope of Sebelas Maret University whose target is all UNS Students who use cosmetics. In the process of data collection we obtained 50 respondents, both women and men. Meanwhile, what is meant by secondary data is data obtained by researchers from other sources as additional information in the study. In this study, secondary data used in the form of libraries such as government rules, books, and several research articles on B3 waste and its management. The material tools we use are laptops or PCs, questionnaire transcripts as well as journal references and tally sheets.

2.2 Research Stage

The research phase begins with the preparation of research and determination of the location to determine the object and place to be analyzed and used as a place to take primary data. The object to be analyzed is the understanding of Sebelas Maret University students to cosmetic B3 waste and its management. Then, there is a question for kuesioner which contains questions about B3 waste, cosmetic waste, and its management. After obtaining primary data derived from questionnaires, the data is processed and analyzed. To strengthen primary data can use secondary data in the form of literature studies related to cosmetic B3 waste.

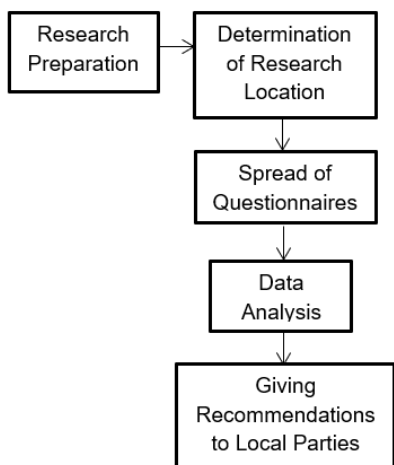


Figure 3. Research flowchart

2.3 Transcript of Questionnaire

Our kuesioner is used as a primary data taker tool. Our questionnaire was given to students of Sebelas Maret University both female and male. We divided the three part of the question on the questionnaire. The division of the three questions aims to be easy when analyzing primary data. The three part questions on the questionnaire are: questions around the general understanding of B3 waste and cosmetic waste; questions about the type and amount of cosmetics owned by students; as well as questions about

B3 waste management conducted by students. From the three parts of the question we combined as a questionnaire "Analysis of Understanding B3 Waste and Cosmetic Waste and Management by Students of Sebelas Maret University". After spreading the questionnaire, we got 50 respondents who were all students of Sebelas Maret University, among others are: questions surrounding a general understanding of B3 waste and cosmetic waste, questions about the type and amount of cosmetics owned by students, and questions about B3 waste management conducted by students.

3. Results and Discussion

3.1 Analysis of Student Understanding of Cosmetic B3 Waste and B3 Waste Management (Hazardous and Toxic Materials)

Cosmetics have a content derived from a mixture of chemicals used outside the body. Chemicals are often used for the manufacture of cosmetics, namely formaldehyde, fragrance and even heavy metals such as lead or mercury. Every product packaging when it has run out will definitely leave the rest of the product. The packaging waste will inevitably end up in landfill. However, special packaging waste containing hazardous chemicals should not be disposed of to landfills without being managed first. Cosmetic waste is one type of B3 waste that has the amount or concentration of toxic and harmful materials (Putra et al., 2019). This is because cosmetic packaging waste contains remnants of chemicals harmful to the environment and is categorized as B3 waste. If there is a B3 waste producing person, it is required to carry out processing according to the procedure of Pemerintah Indonesia nomor 101 tahun 2014 (Kurniawan, 2019). According to Peraturan Pemerintah Indonesia Nomor 101 tahun 2014 About Waste Management of Hazardous and Toxic Materials pasal 3 says that the types of B3 waste exist that come from expired chemicals, spills, packaging waste and product waste that do not meet specifications. Called B3 waste from expired chemicals, spills, packaging waste, or product waste that does not meet specifications because it does not meet the specified specifications or cannot be reused, then a product becomes b3 waste that requires management such as B3 waste that requires management like other B3 waste. The same goes for the rest of the B3 waste packaging and expired chemicals.

With the remaining chemicals in cosmetic waste that can be in the form of creams, liquids or other ingredients will be able to harm the environment, so special handling must be done. Therefore, it is necessary to understand B3 waste and its dangers. In this study, we wanted to know students' knowledge about B3 waste in general, especially cosmetic waste. Cosmetics are often used by teenagers so we decided to take primary data using questionnaires to find out the general understanding of B3 waste by students of Sebelas Maret University. Here are the results of the primary data that has been obtained after conducting a survey using questionnaires distributed to students of Sebelas Maret University.

Table 1. Questions about students' understanding of cosmetic B3 waste

Questions	Respondent's Answer	
Questions about B3 waste and the harmful impact of B3 waste		
Questions about B3 Waste in General	42 respondents answered understand	8 respondents answered not understand
Questions about the Dangers of B3 Waste to the Environment	42 respondents answered understand	8 responden menjawab tidak mengetahui
Questions About The Causes Of B3 Waste Can Be Harmful To The Environment	42 Respondents answered the reason correctly	8 Respondents said they did not know why
Questions about cosmetics that produce B3 waste		
Questions About Whether Cosmetic Waste Is One of B3 Waste	32 respondents answered understand	18 respondents answered not understand
Questions About Agreeing Or Not That Make Up, Deodorant, Skincare And Perfume Are Chemical Products That Have Ingredients Harmful to the Environment	46 Respondents responded in agreement	4 Respondents responded disagreeing

Table 2. Grading of students' understanding of cosmetic B3 waste

Indicator	Grade			
	Not good	Good enough	Good	Very Good
Understanding of B3 waste in general	-	-	√	-
Understanding the dangers of B3 waste to the environment	-	-	√	-
An understanding of the causes of B3 waste can be harmful to the environment	-	-	√	-
Understanding of cosmetic waste as one of B3 waste	-	√	-	-

In the primary data above we asked three questions to find out the understanding of B3 waste and the dangers of B3 waste. Based on these three questions, it can be seen that the understanding of Sebelas Maret University students about B3 waste and the danger is good because 50 respondents with 42 respondents answered know and the remaining 8 respondents answered do not know. Then we also asked two questions to find out if Sebelas Maret University students knew that cosmetics can produce B3 waste that is harmful to the environment. We take several cosmetics, namely makeup, skincare, deodorant, and perfume as a reference for primary data because these cosmetics are at least one or two must be owned by students of Sebelas Maret University either female or male students. So the results of 50 respondents answered with 32 respondents knowing that cosmetics can produce B3 waste and the remaining 18 respondents answered not knowing. Based on the primary data table above, there are questions that ask whether or not to agree that makeup, skincare, deodorant, and perfume can produce B3 waste that is harmful to the environment and has been answered by 50 respondents, 46 of whom answered agreed and the remaining 4 answered disagreeing. Respondents who responded disapprovingly most said that not all cosmetics contain ingredients that are harmful to the environment.

From these results, it can be known that students of Sebelas Maret University already know B3 waste in general but do not quite understand that cosmetics can also produce B3 waste because of the chemical content in it.

From the assessment table above there are four assessment indicators in the form of: Understanding of B3 waste in general; Understanding of the dangers of B3 waste to the environment; An understanding of the causes of B3 waste can be harmful to the environment; and

Understanding of cosmetic waste as one of B3 waste. Then, the rating category is classified into four as well, covering not good, good enough, good, very good. From the results of the assessment, the understanding of Sebelas Maret University students has not reached the category of excellent assessment. For the indicator of understanding of B3 waste in general is a good assessment because most students already understand what B3 waste is generally, but there are still students who do not know. It was concluded that not all students of Sebelas Maret University understand what B3 waste is. Then, for an indicator of understanding the dangers of B3 waste to the environment also has a good assessment which means that not all students of Sebelas Maret University understand the dangers of B3 waste. Furthermore, on the indicator, understanding the causes of B3 waste can be harmful to the environment getting a good assessment which means that not all students of Sebelas Maret University understand about the causes of B3 waste harmful to the environment. The last indicator is the understanding of cosmetic waste as one of B3 waste. This indicator is an indicator that has a fairly good research which means that there are still few students of Sebelas Maret University who understand about cosmetic waste which is one of the wasteSB3 whose content is harmful to the environment.

3.2 Analysis of the Amount and Type of Cosmetic Waste Produced by University Students Sebelas Maret

On Tuesday 9 November-10 November we created a questionnaire aimed at students of Sebelas Maret University. The questionnaire that we have distributed received 50 respondents from all students of Sebelas Maret University. Based on the data we have collected, we can see that of the 50 respondents who have filled out the

questionnaire, 42 respondents have known what B3 waste is and that waste is harmful to the surrounding environment. The average respondent who fills out a questionnaire assumes that B3 waste is harmful to the environment because it is not managed properly, so that B3 waste will cause fatal damage to the surrounding environment. However, respondents who filled out the questionnaire were only 32 respondents out of 50 respondents who understood that cosmetic packaging waste is one type of B3 waste. 46 people agree that makeup, deodorant, skincare, and perfume contain chemicals for the environment, but others say that they haven't felt the danger so far and not all of these cosmetic ingredients contain harmful wastes, depending on their composition. The average respondent has cosmetic B3 waste located in their home. Cosmetics in the respondents' homes are mostly about 5-10 cosmetic items. Of the 4 types of cosmetics that we have determined (makeup, skincare, perfume, and deodorant), almost all respondents have perfume in their homes. However, after understanding the cosmetic waste used is sometimes encountered chemicals that damage the environment, most people still mix cosmetic waste with other waste. This is done because most people find such a thing more difficult than not separating the type of garbage.

Declining quality of the environment has threatened the survival of human life and other living things so that it is necessary to protect and manage the environment. (Muntazarah et al., 2020). The content of cosmetic chemicals also contributes in the degradation of environmental quality. Cosmetic content that can damage the environment includes Triclosan which is often found in deodorants and toothpastes. Its own function is antibacterial. However, Triclosan particles are unable to decompose in the environment, eventually accumulating and polluting the environment. Not only harmful to the environment, this substance itself can react with other chemical compounds and produce new compounds that are more toxic. Then there is chemical sunscreen that is often used to do outdoor activities. This is because chemical sunscreen is more easily permeated in the skin and does not leave the whitecast. However, chemical sunscreen with active ingredients such as oxybenzone can interfere with endocrine glands and other dangers this substance can make marine biota become damaged due to its toxic nature. Another type of bladder is siloksan contained in products in the form of lotions, creams and hair care products. Siloksan if wasted into the environment is difficult to decompose by microorganisms. The danger is that this substance can enter the body without us knowing and is toxic and even carcinogens. In addition to the type of cosmetic content, packaging containers from cosmetic goods can also carry the content of B3 ingredients. The packaging itself when discarded carelessly can create pollution. This is because the packaging used is usually difficult to decompose, plus in the packaging still contains B3 ingredients from cosmetic ingredients, it will be very dangerous if wasted carelessly

and do not get proper and proper management according to procedure.

3.3 Cosmetic Waste Management

Waste B3 (Hazardous and Toxic Materials) is waste or waste that contains harmful and toxic chemicals derived from heavy metal elements such as iron (Fe) and other heavy metal elements (Bempa dan Kunusa, 2020). B3 cosmetic waste management must be managed properly and correctly in accordance with applicable regulations. B3 waste management has been described in Pasal 59 Ayat 1 s/d 6 UU 32/2009 said that (1) everyone who produces B3 waste must do B3 waste management produced, (2) in the event that everyone is unable to do their own B3 waste management then the management is submitted to another party, (3) B3 waste management must get permission from the Minister, Governor, or Regent / Mayor in accordance with his authority, (4) The Minister, Governor, or Regent / Mayor must include environmental requirements that must be met and obligations that must be adhered to by B3 waste managers in the permit. In addition, B3 waste management is also regulated in PP No 101 tahun 2014 at Pasal 3 (1) "Everyone who produces b3 waste is obliged to do the resulting B3 Waste Management". The process of managing B3 waste cosmetic packaging that we can do is:

1. **Reduction** is able to reduce the use of cosmetic packaging that can cause B3 waste, namely by buying cosmetic products that can be replenished so as not to cause a lot of cosmetic waste to be produced.
2. **Storage** is by spraying B3 waste cosmetic packaging in a closed place so that the harmful and toxic materials produced do not pollute the surrounding area. (Murti and Ibrahim, 2018)
3. **Utilization** is by utilizing cosmetic packaging into useful goods through 3R actions that reduce, reuse, and recycle such as using products that can be used repeatedly such as Reusable Cotton Pads, which are environmentally friendly cotton.
4. **Delivery** is by sending cosmetic packaging waste to special waste management parties such as to waste for change.

3.4 Cosmetic Waste Management Analysis

Waste in liquid form can contain harmful and toxic materials (B3) because their properties, concentrations, and amounts can contaminate or harm the environment, health, human survival, as well as other living things (Hariyadi et al., 2020). Cosmetic waste includes B3 waste whose impact is very harmful to the environment. So that good management is needed so that the waste produced does not have a bad impact on the environment. If B3 waste management is not good, it will potentially cause accumulation of hazardous and toxic materials that exist around where the B3 waste is disposed of (Ardiatma and Ariyanto, 2019). Such accumulation may at some point lead to the entry of B3 materials into the environment or direct contact with humans and other living things if not properly

managed in accordance with applicable laws and regulations. B3 waste can be bad for the environment and living things. For the environment, B3 waste can enter through water, soil, air, and biota media. And for living things can go through the food chains that cause organisms or living things (humans, animals, plants) exposed to toxic substances. B3 waste also affects health. Types of diseases caused such as poisoning, damage, organs, cancer, hypertension, asthma broncioli, the effect on the fetus that can result in birth defects, mental setbacks, intelligence disorders, and so forth. In addition, cosmetic waste that is discarded carelessly can also reach the sea and can be eaten

by marine life so it is very dangerous for the sustainability of marine ecosystems. (Rahmadani et al., 2015). In this study, we wanted to know about the management of B3 waste cosmetic packaging carried out by students. Therefore, we take primary data using questionnaires to find out the management of B3 waste cosmetic packaging conducted by Students of Sebelas Maret University. Here are the results of the primary data after a survey using questionnaires on the management of B3 waste cosmetic packaging distributed to Students of Sebelas Maret University.

Table 3. Questions about cosmetic B3 waste management

Question	Respondent's Answer	
Questions about the disposal of cosmetic waste without being managed first.	42 respondents answered ever	8 respondents answered never
Questions about storing cosmetic waste at home	41 respondents answered ever	9 respondents answered never
Questions about the actions of 3R (reuse, recycle, and reduce) on cosmetic waste	30 respondents answered sometimes	20 respondents answered never
Questions about the delivery of B3 waste cosmetic packaging to authorities	1 respondents answered ever and sent to the installation waste for change.	49 respondent answered never
Students' views on cosmetic waste are simply thrown away.	There are 3 views that say that removing B3 waste cosmetic packaging can be done because they argue that there are no patents, human habits, and no education.	
The question of how often to mix cosmetic waste into one with another waste	<ul style="list-style-type: none"> - 2 respondent's rarely - 9 respondent's sometimes - 16 respondent's always - 13 respondent's everyday - 10 respondent's It has become a habit 	
Questions regarding the availability of students to dispose of B3 waste cosmetic packaging to dispose of themselves do not combine with other waste	49 respondent's answered able	1 respondent's answered not able to

Table 4. Assessment of cosmetic waste management as well as the views and responses of Sebelas Maret University students on cosmetic waste

Indicator	Grade			
	1 (not good)	2 (good enough)	3 (good)	4 (very good)
Management about the disposal of cosmetic B3 waste in the trash without being managed first.		✓		
Management of waste storage B3 cosmetic packaging at home			✓	
Management of 3R notion (reuse, recycle, and reduce) on cosmetic packaging waste			✓	
Management of the delivery of B3 waste cosmetic packaging to the authorities		✓		
Students' views on B3 waste cosmetic packaging are simply thrown away.			✓	
Management about mixing cosmetic waste into one with other waste.			✓	
Student responses regarding its availability to dispose of B3 waste cosmetic packaging in its own place do not combine with other waste.				✓

Based on the primary data obtained, the management of cosmetic waste carried out by students is quite good because of 50 respondents 8 respondents answered never and 42 respondents answered ever. Then, the management of students against cosmetic waste storage was good because of 50 respondents 41 answered once doing storage somewhere and 9 respondents answered never. In the next question, namely the management of cosmetic packaging waste with 3R action (reuse, recycle, and reduce) on cosmetic packaging waste gets good because of 50 respondents, 30 respondents answered sometimes doing 3R actions and 20 respondents answered never. Then for the question regarding the management of cosmetic packaging waste sent to the authorities is quite good

because of 50 respondents there is already 1 respondent who has sent cosmetic packaging waste to waste for change and 49 respondents answered never. Then, regarding the student's view of cosmetic packaging waste that is thrown away in general, students answer there are three views that removing cosmetic waste can be done because they argue that there is no patent, human habits, and there is no education about B3 waste cosmetic packaging. Then, for the question of how often students mix cosmetic waste into one with other waste, students answer in several ratios, we classify there are five ratios, namely the ratio of 1 (jawing once) answered by 2 respondents, the ratio of 2 (sometimes) answered by 9 respondents, the ratio of 3 (often and sometimes) answered by 16 respondents. Ratio

4 (often) answered by 13 respondents and ratio 5 (often / already habitual) answered by 10 respondents. Then the last question is the availability of students to dispose of B3 waste, especially cosmetics to be disposed of in their own place does not join other garbage is very good because 49 respondents answered able and 1 respondent was not able to.

4. Conclusion

Based on the results of the study, the understanding of Sebelas Maret University students is quite good, because most already know what B3 waste in general, but they do not quite understand that cosmetics can also produce B3 waste resulting from the chemical content in it. For its B3 waste management, based on cosmetic waste management assessments and the views and responses of Sebelas Maret University students on Cosmetic Waste itself, the average is quite good. However, some students still mix cosmetic waste with other waste. This is because most people find it more difficult than not separating the type of garbage. In addition, students' views on cosmetic packaging waste that is thrown away in general students answer there are three views that removing cosmetic waste can be done because they argue that there is no patent, human habits, and no education about B3 waste cosmetic packaging. Related to that, if cosmetic waste continues to be left unmanageable properly then sooner or later it will have a bad impact on the environment or for the health of humans and other living things. Efforts that can be done so that the environment is not further damaged by B3 waste pollution, actions that can be done are to reduce the use of unnecessary cosmetics, use bottles, containers or cosmetic cups as a place to refill, and manage cosmetic waste using the principle of 3R. In addition, the University of Sebelas Maret is expected to hold a socialization on the dangers of B3 waste in its students because it has been known from this research that students also participate in producing B3 waste. Therefore, students are also obliged to manage B3 waste according to procedure.

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