

An informative search of dyes content rhodamin b in blusher, lipstick, and eyeshadow cosmetics

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ABSTRACT

Decorative cosmetics are preparations used to beautify the appearance and cover up flaws in the skin, such as blemishes on the skin so that the user looks fresher. Examples of decorative cosmetics include lipstick, blusher, eye shadow, and so on, which are usually given the addition of synthetic dyes such as rhodamine. The addition of rhodamine B dye to cosmetics is not permitted. However, the use of dyes is still widely abused by irresponsible people. This review article aims to see whether Rhodamine B dye is present in decorative cosmetics such as blusher, lipstick, and eye shadow. I am writing review articles by searching using search engine assistance, namely Google Scholar, PubMed, and Science Direct. A literature search was performed using the following keywords or terms and strategies: "analysis" OR "determination" OR "Rhodamine B" AND "cosmetics" AND "lipstick" OR "blush" OR "eye shadow." Data used in the review of this article refers to studies or studies that have been carried out previously, namely in the form of articles or journals for the last five years, from 2015 to 2019, and other sources such as textbooks and these data. The results obtained in the search for articles were from 125 journals. They are then selected based on predetermined inclusion criteria. Seven journals fall into the inclusion criteria. The sample criteria include registered BPOM, not registered with BPOM, red and inexpensive color. The search results concluded that there are still many rhodamine B coloring agents in decorative cosmetics circulating in Indonesia, such as blush, lipstick, and eye shadow. Dede Komarudin did the highest levels of Rhodamine B in Siva Fauziah, Ratih Pramintari (2019) with a blush on a 776.98 µg/mg sample taken from Jatinegara Market, Jakarta.

Keywords: Decorative Cosmetics, Rhodamin B, Blush, Lipstick, Eye Shadow

INTRODUCTION

Cosmetics are used in all circles, both when they are babies and adults, both in men and women. Everyone desires an attractive appearance. Humans are social creatures that, when interacting with others, require an excellent impression to increase trust and can also attract attention (Mamoto & Citraningtyas, 2013).

According to the Food and Drug Supervisory Agency (BPOM) in BPOM RI Regulation Number HK.03.1.23.08.11.07331 of 2011 concerning cosmetic analysis methods, it states that cosmetics are ingredients or preparations intended for use on the outside of the human body (epidermis, hair, nails), lips and external genital organs), or teeth and oral mucous membranes, especially for cleaning, perfuming, changing appearance, eliminating body odor, protecting and maintaining the body so that it remains in good condition (Badan Pengawas Obat dan Makanan Republik Indonesia, 2011). The use of cosmetics to increase aesthetics is increasing; based on survey institutions, the ten most widely used decorative cosmetic products, especially for women, are powder, foundation, moisturizer, lip gloss, mascara, lipstick, eyeliner, blush, eyebrow pencil, and eye shadow (Tranggono & Latifah, 2007).

The samples used in this article review include blush, lipstick, and eye shadow. Lipstick is used to beautify and emphasize lip color. Lipstick is the most common type of cosmetic used by women. A good lipstick product is a lipstick that can trim the color of the lips and is also able to provide nutrition and moisturize the lips (Mulyawan & Suriana, 2013). This product aims to redden the cheeks, so users look

prettier and fresher. Eyeshadow or Eyeshadow is a type of decorative preparation that requires very safe ingredients and careful use because it is applied to the skin near the eyes, usually on the upper eyelid (Tranggono & Latifah, 2007).

Lots of cosmetic products are sold in the market at varying prices, from cheap to expensive. There are also many cosmetic products originating from abroad and within the country, both legal and illegal, with many products in circulation, making it easier for consumers to choose products according to their tastes and desires so that people are expected to be more careful in selecting the cosmetics to be used (Sinurat, 2011). Cosmetics - cosmetics in circulation are not entirely free of additives, one of which is the addition of dyes. Adding dyes plays an essential role in decorative cosmetics beautifying the appearance. However, many individuals add shades that are prohibited for use in cosmetics, such as rhodamine B. Rhodamin B is a textile dye used in the textile, paint, and paper industries, which is still commonly found in the market (Mamoto & Citraningtyas, 2013).

Some characteristics of rhodamine B products include striking colors, sometimes not homogeneous and shiny. On products that do not contain codes, labels, brands, content information, or other complete identities, there are colored lumps. The Indonesian government discloses the dangers of more than 30 types of dyes, one of which is rhodamine B; this is determined according to the regulation of the Minister of Health (Permenkes) No.239/Menkes/Per/V/1985 (Herman, 2010). Rhodamine B can be analyzed using Thin Layer Chromatography, High-Performance Liquid Chromatography, TLC – Densitometry, and visible spectrophotometry (Sinurat, 2011). Based on the background above, it is necessary to review articles to obtain information on the content of rhodamine B in decorative cosmetics, research methods, and the highest levels of rhodamine B in decorative cosmetics. It is hoped that the results of this review can provide an overview and information to other researchers in conducting research and compiling written works. In addition, it is expected to provide information so that consumers avoid purchasing products containing rhodamine B.

To determine whether the decorative cosmetics in circulation contain rhodamine B and the analytical methods used to analyze rhodamine B in cosmetic blush, lipstick, and eye shadow. They knew the highest levels of Rhodamine B in circulation in cosmetic blush, lipstick, and eye shadow.

RESEARCH METHOD

Methods

The references used in this article review were searched using search engines, namely Google Scholar and online journal provider sites, including PubMed and Science Direct. A literature search is carried out using keywords or terms and strategies as follows: "analysis" AND "Rhodamine B" AND "cosmetic" AND "cosmetic lipstick" OR "cosmetic blush on" OR "cosmetic eye shadow." In reviewing this article, it refers to studies or studies that have been carried out previously, namely in the form of articles or journals for the last five years, from 2015 to 2019, and other sources in the form of textbooks and thesis data.

The search results of the articles the total number of articles that have been identified from the Google Scholar PubMed database and Science Direct used are one hundred and twenty-five (125) articles, there are seven (7) relevant articles based on title and abstract, as many as forty-one (41) articles were excluded from the search because they did not fit the inclusion criteria, and seventy-seven (77) articles did not fit the inclusion and exclusion criteria). A total of seven (7) articles were obtained that matched the inclusion levels for review.

RESULT AND DISCUSSION

Location Samples were obtained based on the literature.

This article review was made from studies conducted in several regions in Indonesia, such as Bekasi, Boyolali, East Jakarta, and several other areas. Previous research discussed the content of

rhodamine B dyes in circulating blush cosmetics. Mixing Rhodamine B dyes in some decorative cosmetics, such as lipstick, blush, and eye shadow, is strictly prohibited because Rhodamin B is a synthetic compound that is widely used for textile dyes, and is dangerous when mixed in cosmetics, can cause skin irritation to cancer if used for a long time. Previous studies show that many cosmetics are mixed with Rhodamine B dyes to enhance colors and attract consumers. Several areas that have conducted Rhodamin B research on decorative cosmetics include:

Table I. Several areas have conducted Rhodamine B research on decorative cosmetics.

No.	Author (Years)	Article title	Sample	Total sample	Sample criteria	Research place
1	(Komarudin et al., 2019)	Analysis of Rhodamine B in Lipstick and Eye Shadow Preparations by High-Performance Liquid Chromatography	Eye Shadow	5	There is no BPOM permit; it is reddish pink, purplish pink, and cheap.	Market in Jatinegara
2	(Herdini & Wahyudiana, 2019)	Analysis of Rhodamin B in Eyeshadow Preparations Obtained in Bekasi Regency by High-Performance Liquid Chromatography Method	Eye Shadow	4	Cheap, BPOM registered, and not BPOM registered.	Kabupaten Bekasi
3	(Asmawati et al., 2019)	Rhodamin B Content in Lip Tint Preparations Used by Stikes Pelamonia Student	Lip tint	4	Red, no composition, most used lip tint brand.	STIKES Pelamonia, Makasar
4	(Khamid & Christy, 2019)	Analysis of Rhodamin B in Lipstick Circulating in Boyolali Market Using Thin Layer Chromatography (TLC) and Visible Spectrophotometry Methods	Lipstick	5	dark red and pink.	Market in Boyolali
5	(Nanda & Darayani, 2018)	Analysis of Rhodamin B in Lipstick Circulating Via Online Shop Using Thin Layer Chromatography (TLC) and UV-Vis Spectrophotometry Methods.	Lipstick	9	Red.	Online Shop
6	(Yuniarto & Maryam, 2015)	Analysis of Rhodamine B Content in Lipstick Circulating in the Kediri Region	Lipstik	9	Cheap, pink, dark red, bright red, and orange	Kediri
7	(Riyanti et al., 2018)	Identification of Rhodamine B in Lipstick by TLC and UV-Vis Spectrophotometry Methods	Lipstick	11	Flashy red and cheap	Market in Jakarta Timur

Cosmetics are used, especially by women, to increase confidence when interacting. The role of dyes in cosmetics is very influential, especially in decorative cosmetics such as lipstick, blush, and eye shadow. Cosmetics suspected of containing rhodamine B are cosmetics with a red color. As described in the literature listed in table 1, this shows that there is still a lot of abuse of rhodamine B dyes in decorative cosmetics, such as eye shadow, lipstick, and eye shadow, in the last five (5) years.

Komarudin et al. (2019) is an experimental study using the high-performance liquid chromatography (HPLC) method. Samples were taken at the Jatinegara Market, and five (5) eye shadow samples were obtained with the criteria of a low price without a BPOM permit and reddish pink and purplish pink. Research to Herdini & Wahyudiana (2019), the method used in this research is an experimental method using high-performance liquid chromatography (HPLC). The sample analyzed in this study was eye shadow collected from several cosmetic shops in Bekasi Regency. The samples were grouped into two: eye shadow, which had been registered by BPOM, and which had not been registered by BPOM.

Research by Asmawati et al. (2019), this research was conducted at STIKES Pelamonia, where in this study, all the lip tints used by female students became a population after conducting a survey, nine populations were found lip tints found in STIKES Pelamonia. The sample population is calculated by the formula $\sqrt{n} + 1$. Where n is the number of the sample population. Based on the calculations, four (4) types of lip tint samples were obtained. The sampling technique was carried out by purposive sampling, namely taking samples with considerations made by researchers, such as lip tints whose composition was not listed and lip tints mostly used by female students. The purposive sampling technique was also carried out in the research of Khamid & Christy (2019); the sample used was red or dark red lipstick sold at the Klaten Market.

Nanda & Darayani (2018), online sampling was randomly selected. Nine (9) lipstick samples were obtained for the study with red lipstick criteria. Yuniarto & Maryam (2015). This study surveyed several cosmetic shops in the Kediri area, where lipsticks were found at low prices and were in great demand among Indonesian teenagers and women. Sampling criteria to be used Cheap, pink, dark red, bright red, and orange.

Riyanti et al. (2018) Sampling was done by surveying four (4) markets in East Jakarta. These markets include the Kramat Jati Market, Jatinegara Market, Cakung Market, and the Old Klender Market. This market is the center of cosmetics distribution in East Jakarta, then eleven (11) lipsticks were obtained from different brands, with the criteria of cheap, pink, dark red, bright red, and orange. Tests were carried out on eleven (11) samples.

The method used in previous studies.

In previous studies, it can be concluded that there is still a lot of misuse of rhodamine B dyes as cosmetic dyes. The article review is continued by examining the methods used to analyze Rhodamine B in cosmetics.

Table II. Methods used in Rhodamine B research on cosmetics

No.	Author (Years)	Methods	Solvent	Mobile phase
1	(Komarudin et al., 2019)	High-Performance Liquid Chromatography (HPLC)	N, N-Dimethylformamide (DMF)	acetonitrile 95%: 20 mM diammonium hydrogen phosphate buffer solution pH 6 (80:20),
2	(Herdini & Wahyudiana, 2019)	Qualitative: High-Performance Liquid Chromatography Methods	Methanol	-
3	(Asmawati et al., 2019)	Qualitative: Thin Layer Chromatography Quantitative: UV-Vis Spectrophotometry Test	Ethanol 96%	n-butanol-ethyl acetate-ammonia 25% (55:20:25).
4	(Khamid & Christy, 2019)	Qualitative: Thin Layer Chromatography Quantitative: UV-Vis Spectrophotometry Test	Methanol	n-Butanol, Ethyl Acetate, and Ammonia (5:20:25)
5	(Nanda & Darayani, 2018)	Qualitative: Thin Layer Chromatography Quantitative: UV-Vis Spectrophotometry Test	Ammonia 10% (which is dissolved in 70% ethanol)	n-butanol: ethyl acetate: ammonia (10:4:5)
6	(Yuniarto & Maryam, 2015)	Qualitative: ester reagent, Test Kit: TLC (Thin Layer Chromatography) Quantitative: Visible Spectrophotometry Test	Methanol	n-Butanol, Ethyl Acetate and Ammonia (55:20:25).
7	(Riyanti et al., 2018)	Qualitative: TLC Quantitative: UV-Vis Spectrophotometry	Methanol	Ethyl acetate-n-butanol-ammonia (20:55:25)

There are various methods used in the research of this article, including the TLC method, HPLC, UV-Vis Spectrophotometry, Test Kits, and ester reagents; each method has its advantages and disadvantages, such as sensitivity, sensitivity to the sample being analyzed. The use of instruments for analysis is an effective method; still, each instrument requires skill and expertise in its operation to obtain valid results; besides that, the use of instruments is quite expensive.

The method used in the literature to determine rhodamine B levels in cosmetic blush, lipstick, and eye shadow includes high-performance liquid chromatography. High-performance liquid chromatography (HPLC) is a widely known method for analyzing and purifying certain compounds in a sample. Chromatography is a technique for separating solutes due to differences in elution rates. Solute will pass through the chromatographic column; this separation is governed by the distribution of the mobile and stationary phases (Gandjar & Rohman, 2007).

Literature using the High-Performance Liquid Chromatography method includes research conducted by Komarudin et al. (2019), in this study using N, N-Dimethylformamide (DMF) solvent, which is a polar solvent. 95% acetonitrile mobile phase: diammonium hydrogen phosphate buffer solution.

The same thing was used by Asmawati et al. (2019) used methanol in this study. The cracking phase used was n-Butanol, Ethyl Acetate, and Ammonia (55: 20: 25). The same is used in the research of Khamid & Christy (2019), Nanda & Darayani (2018), Riyanti et al. (2018); Yuniarto & Maryam (2015).

Methods of identification and results of samples containing rhodamine B.

Identify cosmetic samples to determine the presence or absence of Rhodamine B dye. In several methods, as listed in table 4, different qualitative analysis methods are used to determine whether the sample contains rhodamine B. The identification method uses Thin Layer Chromatography (TLC) and High-Performance Liquid Chromatography (HPLC). Thin Layer Chromatography (TLC) by comparing Rf standard rhodamine B with samples. A sample is said to contain rhodamine B if the stains between the sample and the standard are the same or close to each other, with a price difference of ≤ 0.2 . High-Performance Liquid Chromatography by comparing the standard retention time (tR) with the rhodamine B sample. The sample is said to contain rhodamine B if the standard retention time (tR) with the sample is the same or almost the same as the standard.

Table III. How to identify the identification of the sample used in previous studies and the results obtained.

No.	Author (Years)	Metode	Identification method		Hasil
			Standard	Sample	
1	(Komarudin et al., 2019)	High-Performance Liquid Chromatography (HPLC)	Retention time (tR): c5611 min	A: 5.6 minutes	Positive for rhodamine B (+)
2	(Herdini & Wahyudiana, 2019)	Qualitative: High-Performance Liquid Chromatography Methods	HPLC: tR: 1,081 minutes.	B: 5.605 minutes	Positive for rhodamine B (+)
3	(Asmawati et al., 2019)	Qualitative: Thin Layer Chromatography	TLC	C: 5.578 minutes	Positive for rhodamine B (+)
4	(Khamid & Christy, 2019)	Quantitative: UV-Vis Spectrophotometry Test	RF: 0.45	D: 5.579 minutes	Positive for rhodamine B (+)
5	(Nanda & Darayani, 2018)	Qualitative: Thin Layer Chromatography	Vis Spectrophotometry:	E: 5.596 minutes	Positive for rhodamine B (+)
6	(Yuniarto & Maryam, 2015)	Quantitative: UV-Vis Spectrophotometry Test	545nm	sample code	Positive for rhodamine B (+)
7	(Riyanti et al., 2018)	Qualitative: Thin Layer Chromatography	TLC	EYR 1:1.058	Positive for rhodamine B (+)

According to Badan Pengawas Obat dan Makanan Republik Indonesia (2011), the High-Performance Liquid Chromatography (HPLC) method can be used for rhodamine B analysis because it is a separate system with high speed and efficiency because advances in column technology support it; high-

pressure pump systems, and highly sensitive and diverse detectors that can be used to qualitatively analyze various samples, both single components, and mixtures.

Research using the high-performance liquid chromatography (HPLC) method, namely in the study of Komarudin et al. (2019), in this study used five (5) blush samples with sample codes A, B, C, D, and E obtained sample retention times with almost the same standards, so that all blush samples contained rhodamine B. Research by Herdini & Wahyudiana (2019) used four samples, namely two (2) registered eyeshadow samples BPOM with codes EYR1 and EYR2 and two (2) samples not recorded with BPOM with codes ETR1 and ETR2; after being identified, two (2) samples of eye shadow registered with BPOM contained rhodamine B, and one sample that was not registered with BPOM contained rhodamine B with code ETR2.

Sample identification using the thin layer chromatography (TLC) method by comparing the Rf value of the sample with a standard and viewed under UV light 254 nm and 366 nm; if the spot fluoresces yellow or orange, then the sample can be said to contain rhodamine B. Asmawati et al. (2019) used samples (4) of four lip tint samples and obtained two (2) samples containing Rhodamine B with codes A2 and A4.

Khamid & Christy (2019) research used five (5) lipstick samples and four (4) samples containing rhodamine B with sample codes LA, LC, LG, and LJ. In Nanda & Darayani (2018), the samples used in this study were nine (9) lipstick samples, and five (5) out of nine (9) samples were positive for rhodamine B with codes P4, TR1, TR2, TR3, and M1. Research by Yuniarto & Maryam (2015) used nine (9) lipstick samples and found seven (7) containing rhodamine B with codes B, D, E, F, G, H, and I. Research by Riyanti et al. (2018) used eleven (11) lipstick samples and obtained one (1) sample containing Rhodamin B.

Rhodamine B levels in decorative cosmetic samples.

Once it is known that the sample being analyzed contains rhodamine B, the next step is to determine the amount of rhodamine B contained in the sample; the greater the amount of rhodamine B contained, the greater the impact has on health.

Table IV. The amount of Rhodamin B contained in decorative cosmetics samples.

No.	Author (Years)	Sample	Results (rate)
1	(Dede Komarudin, Siva Fauziah, 2019)	Eye shadow	A: 776,98 µg/mg B: 182,71 µg/mg C: 167,99 µg/mg D: 411,88 µg/mg E: 514,31 µg/mg
2	(Herdini & Wahyudiana, 2019)	Eye shadow	“EYR1” 23,5791 bpj “EYR2” 74,5073 bpj. “ETR2” 21,3514 bpj
3	(Asmawati et al., 2019)	Lip tint	code A2: 34,0 µg/mg code A4: 41,9 µg/mg.
4	(Khamid & Christy, 2019)	Lipstick	A: 10,195 µg/ml C: 4,350 µg/ml G: 10,469 µg/ml
5	(Nanda & Darayani, 2018)	Lipstick	lipstick J: 1,042 µg/ml. P3: 0,0765%, M1: 0,1457%, TR1: 0,066% TR2: 0,0100%, TR3: 0,3664%.

6	(Yuniarto & Maryam, 2015)	Lipstick	B: 0,236 µg/mg D: 1,344 µg/mg F: 2,114 µg/mg G: 1,456 µg/mg H: 1,82 µg/mg I: 55,65 µg/mg
7	(Riyanti et al., 2018)	Lipstick	Sample 4: 9,09 %

The identification results obtained in each literature are different, based on differences in brands and dosage forms in the samples studied. Rhodamine B is a synthetic dye prohibited in food and cosmetics because it is carcinogenic and dangerous if exposed continuously. Rhodamine B is a dye used in the textile industry. Mixing rhodamine B coloring in blush, lipstick, and eye shadow cosmetics is strictly prohibited, even at very small levels. Besides that, there are still products that have been registered with BPOM which still contain rhodamine B, so it is recommended to be more careful with BPOM, as well as cosmetics that have not been registered with BPOM.

Komarudin et al. (2019), the sample used is blush; this analysis uses the HPLC method, and the levels of 5 positive samples containing rhodamine B, namely Sample A: 776.98 µg/mg, sample B: 182.71 µg/mg, sample C: 167.99 µg/mg, sample D: 411.88 µg/mg, and samples in choosing cosmetic products both in cosmetics that have been registered E: 514, 31µg/mg. Research with spectrophotometric methods is also still widely used. In the study of Asmawati et al. (2019), the levels of 2 lipstick samples were positive for rhodamine B, namely code A2: 34.0 µg/mg and code A4: 41.9 µg/mg. Khamid & Christy (2019) used nine lipstick samples and obtained four positive rhodamine B lipstick samples; the results of the Rhodamine B levels in the samples included: lipstick A: 10.195 µg/mg, lipstick C: 4.350 µg/mg, lipstick G: 10.469 µg/mg, and lipstick J: 1.042 µg/mg. Nanda & Darayani (2018) the samples used were nine (9) lipstick samples and four (4) samples containing Rhodamin B with levels in samples with code P3: 0.0765%, M1: 0, 1457%, TR1: 0.066%, TR2: 0.0100%, and TR3: 0.3664%.

Research by Yuniarto & Maryam (2015) using nine lipstick samples obtained six lipstick samples containing Rhodamine B dye with lipstick sample levels including samples with code B: 0.236 µg/mg; D: 1.344 µg/mg; F: 2,114 µg/mg; G: 1.456 µg/mg; H: 1.82 µg/mg; and I: 55.65 µg/mg. In Riyanti et al. (2018), The identification results using thin layer chromatography (TLC) and UV-Vis spectrophotometry obtained data that out of 11 samples, one lipstick sample was positive for containing Rhodamin B with a concentration of 9.09%.

The analysis results obtained from each literature are different because the trademarks and preparations analyzed are also different. Rhodamine B is a synthetic dye often used in the textile industry. Rhodamine B is a dye prohibited from being used in cosmetics, even at the smallest concentration. However, there are still many rhodamine B found in circulating blush, lipstick, and eye shadow samples with various levels found. It is known from the reviewed literature that in every article within the last five (5) years, there has been much abuse of Rhodamine B, both in cosmetics that have obtained BPOM permits and in cosmetics without BPOM permits. In the seven (7) articles reviewed, the highest levels were found in the research by Komarudin et al. (2019) with a blush sample level of 776.98 µg/mg and in several studies. In others, many rhodamine B are still found in cosmetic preparations with various levels. There are still many rhodamine B found in cosmetics that have obtained BPOM distribution permits, so cosmetic products that have obtained BPOM distribution permits are not necessarily protected from the dangers of rhodamine B.

CONCLUSION

All the articles used in this review showed that there was still rhodamine B in the blush, lipstick, and eye shadow cosmetic products used as samples. The method used to identify rhodamine B in lipstick

blush and eye shadow, among others, for qualitative analysis includes ether reagents, test kits, and thin layer chromatography (TLC). In contrast, the quantitative method uses UV-VIS spectrophotometry and high-performance liquid chromatography (HPLC). It was found that the highest level of rhodamine B was blush, 776.98 mg/kg, taken from Pasar Jatinegara, Jakarta.

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