Borax Crystallization Experiment for Fashion Accessories

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Abstract. Borax is commonly used on ceramic and glass industry, or as an antiseptic in medicine. In recent years, borax gets a negative image due to an inappropriate usage. Borax has characteristics that shaped white crystals and dissolves easily in water. With proper treatment, borax has the potential as a material that can be used in the fashion industry. The characteristics of the Crystal, making borax has aesthetics value. The aim of this study is to expand the usege and gain aesthetic potential of borax. This research uses experimental methods approach with laboratory observations using borax. The experiment was done to find the perfect crystallization quality to be applied as a fashion accessory. They are three level of explorations in the study, the first experiment focused on crystallization and the use of other media that could increase the effect, the second exploration is coloring and the third is design exploration. This research resulted in the findings of the innovation of processing borax so allowed as aesthetic material on fashion accessories.
Keywords: borax, innovation, material experimentation, fashion.

1 Introduction

Borax is harmful chemicals if it is consumed by the human body. Basically the chemical borax is used in the manufacture of ceramics and glass or an antiseptic in medicine. Currently the society only know and make use of borax just to industrial use and domestic use as toilet cleaners, pest control, remove stains soap there are even some people who have abuse it for profit personal by mixing borax in food as a preservative. Borax has a characteristic white Crystal-shaped and white powder that is readily soluble in water. Made of boron and sodium, this mixture naturally on Earth in mining to get the powder. If carried out chemical experiments is simple then powdered borax will turn into a chunk of crystal clear.

Borax look similar to resin, but borax has its own uniqueness and distinctive character that is in terms of the visual, borax has a sparkle like Crystal and borax is not having a sting like resin. Based on this author finds the presence of the potential for the development of borax as fashion accessories products. The current development of the increasingly diverse and accessories has many variations of the material used for the interests of the community so that a lot of companies as well as designers compete to produce the products with uniqueness through innovation in design material. Based on the above phenomenon the

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author has an idea to make borax as fashion accessories because of the potential that has not been explored thoroughly also the use of the idea of the material that is still rare.

According to the book The Dictionary of Fashion History, accessories are secondary objects that provide added value in clothing [1]. Accessories have been used since the 19th century and usually for complementary parts in dress. Accessories are divided into two parts, namely accessories used for the body such as bonnets, caps, hats, boots, shoes, cravats, ties, gloves, mittens, muffs, jewelry, scarves, shawls, sock and stockings. Accessories that are only as a complement and for carrying or traveling such as bags, canes, parasols, umbrellas and swords. Throughout the end of the Georgian era in 1804 women began to reduce the amount of jewelry he wore. They began to like clothing, necklaces and other accessories including braided hair and jewelry that were all influenced by Greek culture. Fashion accessories from material innovation nowadays increasingly diverse due to follow the development of the times. Any use of the material varies as resin, ceramic, clay or metal. Many local brand that does the innovation to create a unique product because of increasing competition. The more unique materials are used then the growing number of requests because the public likes a novelty and uniqueness on a product.

Borax that has a negative image can serve as fashion accessories for women who have aesthetic value and economy. It is used merely industrial use and in Indonesia itself borax processing for accessories not yet found much to offer it. Due to those perspective and potency of borax, these research was develop from those potential aspect of borax into aesthetic value. These potency could move towards new material ideas in the world of fashion accessories.

2 Literature Review

According to the Encyclopedia Britannica and the Indonesian National Encyclopedias the word borax comes from Arabic, namely *bauraq*. The term in Malay "tingkal" which means white is a soft crystal that contains boron, is colorless and easily soluble in water. Borax or boric acid is a chemical compound derived from heavy metals boron is a hydrate compound of sodium tetraborate salt. In borax trade is known as *borofax three elephant*. In domestic terms boraks have different names. In Central Java, Boraks is called the name of *air bleng* or *bleng garam*, in the Sunda region it is called *gendar* powder, in Jakarta it is called *Pijer*. Borax is traded in the form of solid blocks, crystalline powder, or yellowish white flour, or in the form of a colorless liquid. Borax does not have a strong odor.

Borax is used by people for a long time, namely as a cleansing agent (cleaning agent), a food preservative (additive), and for tanners. Borax as an antiseptic and germ killer. Because of that Borax is widely used as an antifungal, wood preservative, and for antiseptic ingredients in cosmetics. In the textile industry borax is used to prevent fleas, mosses and fungi. Borax is also used as an insecticide by mixing it in sugar to kill ants, cockroaches and flies. In an impure form, borax has been available since 1700 in the form of water or cetitet. Boraks has long been used by the Indonesian people for making *gendar* rice, *gendar* crackers, *puli* crackers which are locally called *karak* or plates. Borax has a weak bacteriostatic and functional function which is commonly used as an antiseptic for use outside the ingredients or antiseptics in the toilet. Boric acid is always used with borax as a buffer and antimicrobial in eye drops. As a lubricant in making tablets.

Borax can be absorbed through the digestive tract, which is the skin that blisters through the wound and through the mucous membrane. Borax is said to be harmful to health because the results of experiments using mice show carcinogenic properties (the nature of sediment and damage to internal organs that cause cancer). If consumed in the human body can cause reproductive process disorders, irritation of the stomach, liver and kidney disorders. Information about health due to borax is still very small, and it can even be said that there is

no sufficiently strong evidence. This is understandable because the consequences cannot be immediately seen. Symptoms of health disorders that can be observed in the short term due to sucking or direct contact with borax include irritation of the nose, respiratory tract and eyes [2].

Wen and Fester said that borax is relatively less toxic when taken orally because it has a safety limit between the dose of poisoning in animals and the actual amount in humans. In high enough doses in the body will cause dizziness, vomiting and stomach cramps. In young children and infants if the dose in the body as much as 5 grams or more can cause death, while in adults death occurs at a dose of 10-20 grams more.

3 Research Method

This research uses experimental methods. Experimental method used with laboratory material observation approach using borax. Research experiments according to Jaedun is an approach to base it on the positivistic paradigm at the beginning, but did not close the possibility to be used as a grounding in social research [3]. This research, sees the test experiments using the materials as part of the analysis of the aesthetic potential in borax. Such analysis can be used as a foundation for development, especially in the design of fashion accessories.

According to Sugiyono, there are four kinds of experimental method, first Pre-experimental, second is true experimental, third factorial experimental, and four is Quasi experimental [4].

In pre-experimental, there have been no real experiments, because there are still external variables that influence. This type of research has two types of treatment, the first is a one-shot case study, in which all variables are applied and treated equally. The second is one group pretest-posttest, where the variables before and after the experiment are compared. And intec-group comparison, when the variable is divided in half, half is used for research and the other half is used as a comparison.

At true experimental, the researcher performs full control of the variables used in the study, so that internal validity is high. in this type of research, there are two experimental designs, the first is the post-test control design, the variables are randomly selected and grouped into two. This design approach was then compared to one group given experimental treatments with another group that did not. The second design is the pre-test and post-test, or the initial treatment or test of the variables before being compared.

Experimental experiment, is when there are variables that divide and group the sample into certain types, for example gender.

Quasi experimental design, is a development form of true experimental which is a little difficult to do. In this research there was a control group. The control group includes time series design and sample non-equivalent control group design.

This study uses a quasi-experimental approach with non-equivalent design because basically the control has been narrowed by only doing experiments on borax which is then added to some selected material not randomly. In this model also applied pre-test and post-test. Pre-tests are related to efforts to form borax crystals, while the post-test is to develop crystallization into aesthetically pleasing objects. This stage is also called the design development stage.

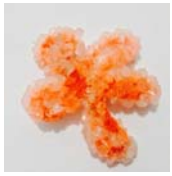
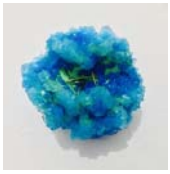
There are three stages of experiments used in this study. The first is exploration of crystallization, which is an effort to produce a strong and solid crystal formation using stimulant material. Second is exploration of coloring and coating, and the last is borax exploration which has been crystallized and colored to be combined with metal material as a design element. the three laboratory explorations produce borax material that is ready to be applied as an aesthetic object

4 Result and Discussion

The following table shows the results and analysis of experimentation character borax crystals. The exploration was in three stages, first was crystallization, second is colorization and coating, third is applying other material for design purposes.

4.1 Pre-test Crystallization

Table 1. Pre-test Crystallization

No	Results	Description	Analysis
1	 	The result of the crystallization techniques. After going through the process of forming clots like borax crystals. It has a shiny texture and not have the smell. The weakness that is easily destroyed when in drop. Yet any crystals is not have the strength so the granules and crystals brittle easily. Material used i.e. brushed wire and food coloring.	At this stage, the quasi produced is through the process of crystallization by adding food coloring. At this stage other ingredients have not been added which can make the borax structure so fragile and easily broken. Further experiments are still needed.
2		Exploration with synthetic resin added. The resulting texture is different with the latest experiment, the texture is not shiny and not easily brittle	At this stage synthetic resin is used as quasi which can strengthen the structure of borax crystals, but the results obtained are maximum in color.
3		Synthetic flower as a stimulant material for crystallization. The crystal formed is fragile and break easily.	At this stage quasi is replaced by synthetic flowers, and the results are fragile.
4		Material exploration with spray paint and oil based color added. The result is dull and the texture is sticky	At this stage the crystals are sprayed and the results are not suitable for use.

5		The Crystalized borax soaked in warm water for 24 hours. the resulting texture is different, the resulting color has become faded and matte but has better quality in strength. Either soaked in warm or cold water, the result is the same.	At this stage quasi was replaced by immersion in water and the results were satisfactory although the color was not.
6		Exploration with resin and resin pigment. Resulting good strength but dull form.	At this stage quasi is combined between resin and colored resin, the results are quite good.

4.2 Advance Exploration I (Colorization)

Table 2. Advance Exploration I (Colorization)

No	Results	Description	Analysis
1		Exploration using spray paint and then coated by varnish. The crystal character is not sticky and does not smell. and the wire is being shown. The dye material used is the *wantex*	Varnish becomes an important point in making the texture not sticky after coloring.
2		Exploration using spray paint, coated by varnish, spray using water while it hanged.	The color spraying process turned out to produce a different effect.
3		Exploration using spray paint, stored for 12 hour before coated by varnish. Resulting color is faded.	Varnish application also produces different effects.
4		Exploration with 2 times of dyeing, resulting gradation colors.	Dyeing also produces different effects.

4.2 Advance Exploration II (post-test Design Development)

Table 3. Advance Exploration II (post-test Design Development)

No	Results	Description	Analysis
1		In this exploration, beside wire, author adds supporting material such copper ring as the part of design element.	To make borax crystals as disposable objects, the author uses accessories elements.

From the three step of exploration committed using borax material, seems that are aesthetically borax has a shiny crystals creations but has the weakness in the strength it is relatively fragile. In the first experiments or pre-test crystallization, added of synthetic resin assuming results will be stronger and not easily crushed. However, the weakness that emerged was, glassy element originally appeared lost. The easiest solution based on experimentation, is soaking water with borax crystals for twenty-four hours. Soaking proved effective to strengthen the character of the borax crystals. The problem are the color appears dimmer, and it shinny has disappear it became matte.

Second experiment was color experimentation and coating to increase the color spectrum of the soaked borax crystal. Borax tends to be more flexible and could easily receive almost assembled types of dyes and coloring. But the most optimal results is the addition of a layer of varnish on each result of coloring. The varnish layer can coat colors, and make the surface is not sticky. In addition, the borax crystals can also be attached to a metal surface, so that the relative could be developed as a material in the design of accessories easily.

5 Conclusion

Borax has positive and negative character, positive character of borax has a sparkle like Crystal, having a visual resemblance to crystal clear, colored, affordable price and borax does not have an odor. Whereas the negative sides of borax is hard to obtain because borax is not sold freely, easy fragile, the texture is a bit sticky and when given the dye then color quickly fades. But on the other hand, the exploration towards the characteristics of borax and its potential are aesthetically and economically is still open. Especially as an ingredient on the design of accessories and fashion products.

Through these experimental research, borax achieves its own aesthetic value and has the potential to be developed as a fashion product. These experimental also proved that Borax has special aspects so that it can be developed into a material that is safe and aesthetically valuable. These aspects includes borax having a unique crystallization potency similar like synthetic resin but with an easier and shorter process and easier to color. Cristal borax also has a natural and aesthetic shape so it reminds us to natural kinds of rocks.

We hope that we can continue to develop the borax experiment in a more sophisticated direction, considering the potential that is still possible to be developed especially on design.

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