

Utilizing Sand as Glaze in Agung Glazinia Ceramics

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Abstract: This study aims to practice the application of sand to the glaze which is intended to produce glazes with different colors for staining ceramics. Qualitative methods are used with the data collection process through observation, interviews, and documentation. To find out the results resulting from the use of sand to glaze, an experimental method is applied as a reference in this study. The process of making glaze with a mixture of sand is still the same as the process of making glaze in general, starting from preparing tools or materials, mixing materials, applying to burning to find out the results obtained. The sand can produce new effects such as melting glass melts on glazes with certain colors. Characteristics of sand that is difficult to melt produces its own texture from the sand that is mixed into the glass. Sand glaze is very suitable to be applied to ceramic media which needs different shades from the glaze color in general. In the future sand glaze can be one of the glaze options that are in great demand by the public because it can reduce the material costs of making glaze.

Keywords: utilization, sand, glaze, new effect, texture.

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Introduction

Nowadays, there are more and more enthusiasts of ceramic products along with the rapid development of tourism who wants ceramic products with newer designs, shapes and colors. The development of demand for ceramic products is increasing, in direct proportion to the rapid competition between craftsmen. Ceramic craftsmen compete with each other to produce ceramic products at low prices, to face competition and increasing market demand, ceramic craftsmen are increasingly innovating and developing more innovative designs. Kriyawan (the ceramic craftsmen) also instill the characteristics of their work to be easily recognized by the public. One of them is a ceramic manufacturer in Guwang Sukawati Village, ceramic producers have started to develop product designs with newer shapes or colors to keep up with increasing market competition.

In the process of creating ceramic crafts, ceramic craftsmen often conduct surveys to collect data and seek information through seminars, books, internet and information media such as newspapers and television. Through this information search process, ceramic craftsmen will be able to create ceramic works that are more innovative and more modern in terms of material and function. According to Anak Agung Raka Manggis, innovation that is now in great demand by the public is the use of materials sourced from nature, either

as decorations or dyes for ceramics. These materials such as leaves, rice husks, mountain stones, sand and so on. Utilization of these natural materials will produce newer shapes, motifs or colors in the ceramic products produced.

Sand is one of the abundant materials provided by nature. Sand is also in the form of small grains and is expected to do well when mixed with glazes. Sand also has a coarse texture and if applied to the glaze it is possible to produce a glaze with a different texture from glaze in general.

The researchers' interest in researching the use of sand into the glaze coloring technique is because there is still a lack of recognition among ceramic craftsmen on the use of sand in ceramic dyes. Apart from being easy to find around us, sand has different characteristics from ceramic dyes in general.

Methodology

The importance of research is necessary before carrying out the process of creating. In a study entitled Utilization of Sand as Ceramic Glaze, the researchers wanted to get results in the form of more innovative colors in ceramic staining. In the process of approaching data collection the researchers use qualitative methods obtained from the data collection process through observation, interviews, documentation.

Observations are carried out in order to obtain information in the community. In this study, the researchers made observations through the internet as well as direct observations made at AGZ Ceramik, Guwang Sukawati Village. Interviews, the researchers will do with Anak Agung Raka Manggis as the owner of AGZ Ceramik with the aim of getting direct information about ceramic dyes. Where Anak Agung Raka Manggis explained "sand will give a very good and interesting effect on the glaze and can add its own artistic". Documentation can strengthen research that can be sourced from non-human sources such as photos or videos.

Coupled with the experimental method or experimental method, where an activity is planned to generate data or test a hypothesis. (Widarmika, 2012). In the process of researching sand as a glaze, the writer will later conduct an experiment to find out the results of mixing sand into the glaze.

Results and discussions

Ceramic Glaze and its Contents

Glaze is a special type of glass that is chemically formulated to adhere to the clay surface or melt into the clay body when burned. Most functional containers are glazed to make them impermeable, durable and easy to clean. Glazes can be colored or covered and are very effective when used as decoration. Glaze is a combination of one or more basic oxides (fluxes), an acidic oxide, and a neutral oxide (alumina) in order to balance it out. The basic ingredients for making glazes are: silica, fluxes (basic oxides), substances that give body to the glaze such as feldspar and clay, refractory components that provide strength and hardness and frits for fusing (fluxing) and coloring pigments. In addition, the decolorizing agent will cover the transparent glass, then the stain and metal oxides will give the color (Astuti, 2008: 87).

The Content Contained in the Sand

Sand is formed due to the physical and chemical weathering of rocks. Sand is a component that already exists before weathering of rocks occurs, the formation of sand can only occur in harsh environments such as hot cold or humid. The content contained in the sand for example quartz (Friite) is one of the sand-forming minerals and is a determinant of the color of the sand, in the composition of sand, heavy mineral (placers) such as gold, casister, ilmenite, monazite, magnetite, zircon, rutile, mineral weight of nini is also a one of the sand-forming components (Smiagiung, 2015). Sand is the most widely used building material from the lowest building structure to the upper part of the building.

Here are some uses of sand as a building material: (1) The use of sand as a mortar or species is usually used as a mortar for floor work, installation of river stone foundations, installation of brick walls, installation of ceramic floors, and others. (2) The use of sand as backfill. (3) The use of sand as a concrete mixture for both reinforced and non-reinforced concrete which is often found in concrete foundation structures, floors, plastering, etc. (Wikipedia, 2020).

Sand Glaze Making Process

The process of applying sand glaze the researchers conducted two experiments, namely the first the researchers tried to make a glaze by using a mixture of sand as much as 10% with a burning temperature of 1200 degrees Celsius and secondly the use of a mixture of sand will be increased to 20% with the same combustion temperature. The first step before conducting an experiment is to know the tools or materials used to make the glaze.

The tools that need to be prepared before conducting sand glaze research include: electric scales, 120 mesh filter, water bucket, glassware mortar, brush, spoon, sponge, tongs, recipe book, place to put glaze. The tools prepared must be clean from dust, because in the process of making glaze a clean place or equipment is very important to produce glaze with a good color.



[Source: Diatmika, 2017]
Figure 1. Tools for making glaze

According to Ni Wayan Lindya Dewi as an employee in the glazing field at AGZ Keramik, the glaze-forming ingredients are very diverse and have their

respective properties or characteristics and all of these materials are related to each other, for example one of the ingredients is replaced or there is no big chance that the glaze will not turn out perfectly. The materials that must be prepared in the process of making sand glaze are as follows: (1). Photas: In ceramic dyes, photas act as binders and melters because they are easier to melt than other materials. (2). Smooth Zinx ox: Zinx acts as a softener in ceramic glaze so that the glaze will look soft and not stiff. (3). Barium carbonate: Barium carbonate plays a role in ceramic coloring to produce soft or matte colors. (4). Sircosil: Sircosil is a pigment or dye that gives white color to ceramic glazes. (5). Talc: Talc functions as a melter and is easily absorbed by the ceramic body so that it can stick perfectly. (6). C.aCo3: C.aCo3 functions as a melter and besides that it also acts as a binder for other materials to melt or melt at the desired temperature. (7). Kaolin: Kaolin serves as a reinforcement so that the glaze matches the soil temperature and can be attached to the soil body or ceramic body. (8). MD: In glazes the use of md is only as an auxiliary to make it easier to apply to the ceramic body. (9). Biorin: Biorin functions as a preservative so that the glaze lasts longer if it is left to stand. (10). Fj-360 (Frit) serves as a helper so that the glaze looks softer and not stiff after the glaze is cooked or after it is burned. (11). Pigments or colors: Pigments serve to give different colors to the glaze. Pigments are metal oxides or chemical processing. In this research, the writer will try to make green glaze using C-500 pigment, red glaze using He-28 pigment, and black glaze using M-700 pigment. (12). Water: Water is indispensable as a changer from solid to liquid glaze that is easy to use. (13). Sand: In this case, sand is applied as an additional material in the ceramic glaze which the writer hopes will be something new, useful, and liked by others.



[Source: Diatmika, 2017]

Figure 2. Glaze material

The process of making sand glaze will be explained as follow. Sand filtering means that the sand will later be mixed with a smoother glaze and avoid dirt from nature found in the sand.



[Source: Diatmika, 2017]

Figure 3. Filtering process

The second step in the process of making the glaze is to weigh the ingredients used according to the prepared recipe.



[Source: Diatmika, 2017]

Figure 4. Weighing process

The process of mixing all the ingredients that form the glaze is done by pulverizing it so that all the ingredients can be mixed well.



[Source: Diatmika, 2017]
Figure 5. The process of mixing glaze materials

The next process after all the ingredients is well mixed is filtering. Filtering functions so that the glass is smoother before use.



[Source: Diatmika, 2017]
Figure 6. Filtering process

The next step is coloring. The ceramic staining process can be done with the celub technique or sprayed depending on the level of difficulty and the size of the object to be glazed.



[Source: Diatmika, 2017]

Figure 7. The coloring process with the celub technique

The last process, after all the above processes, the last stage is combustion (burning).



[Source: Diatmika, 2017]

Figure 8. combustion process

Results of Utilizing Sand as a Glaze Mixture

The sand used has a certain dose, in this study the researchers will make 4 types of glaze and to further clarify or facilitate understanding of the materials used to make the glaze and the results of the study, in which case the researchers will explain as follows.



[Source: Diatmika, 2017]

Figure 9. Red glaze with 10% sand

Table 1. Red glaze with 10% sand Composition

Type/ material	Percentage
Photas	5
Zinx ox halus	24,5
Barium carbonat	9,5
He-28	4,1
Talc	7
C.aCo3	3
Silica	18,8
Kaolin	10
MD	0,1
Biorin	0,5
Fj-360	10
Sand	10

Red glaze mixed with sand as much as 10% produces a red color effect that has black spots, brown, besides that, the effect of melted glass melts is visible. The coarse texture of the sand in this glaze is not visible or the red glaze mixed with 10% sand has a texture. smooth like glass in general. This red sand glaze is suitable to be applied to functional ceramic objects but also emphasizes the beauty of the object.



[Source: Diatmika, 2017]

Figure 10. Red glaze with 20% sand

Table 2. Red glaze with 20% sand Composition

Type/ material	Percentage
Photas	5
Zinx ox halus	24,5
Barium carbonat	9,5
He-28	4,1
Talc	7
C.aCo3	3
Silica	18,8
Kaolin	10
MD	0,1
Biorin	0,5
Fj-360	10
Sand	20

Red glaze color mixed with sand as much as 20% produces a red color with a rough texture and irregular white spots. The white color is the content of fine stones in the sand that cannot melt when burned. The application of red glaze with a mixture of sand is not suitable when applied to functional ceramic objects because the texture is very disturbing when used. Another case is suitable if applied to ceramics that function as decorative objects because it can add to the beauty of the color or texture produced from this glaze.



[Source: Diatmika, 2017]

Figure 11. Green glaze with 10% sand

Table 3. Green glaze with 10% sand Composition

Type/ material	Percentage
Photas	5
Zinx ox halus	24,5
Barium carbonat	9,5
C-500	4,1
Talc	7
C.aco3	3
Silica	18,8
Kaolin	10
MD	0,1
Biorin	0,5
Fj-360	10
Sand	10

Utilization of sand into green glaze with an amount of sand as much as 10% produces a slightly faded green color, the addition of sand can produce black spots like the color of parasitic plants attached to the rock. The green glaze mixed with sand also creates a rough texture to the touch.



[Source: Diatmika, 2017]

Figure 12. Green glaze with 20% sand

Table 4. Green glaze with 20% sand Composition

Type/ material	Percentage
Photas	5
Zinx ox halus	24,5
Barium carbonat	9,5
C-500	4,1
Talc	7
C.aco3	3
Silica	18,8
Kaolin	10
MD	0,1
Biorin	0,5
Fj-360	10
Sand	20

The result of adding sand to the green glaze as much as 20% produces a green color which causes the effect of black spots to become increasingly concentrated and the resulting texture to be coarser. The faded green glaze is caused by being covered in burnt sand. The green color that resembles the color of solid rock is overgrown with parasitic plants. The application of this green sand glaze is perfect for ceramic objects that want a different feel in general. This glaze can also be applied to functional objects such as ceramic bathroom sets or ceramic bathroom fixtures because it makes the product not slippery when used and the texture produced from this glaze is not too distracting when used.



[Source: Diatmika, 2017]

Figure 13. Black glaze with 10% sand

Table 5. Black glaze with 10% sand Composition

Type/ material	Percentage
Photas	5
Zinx ox halus	24,5
Barium carbonat	9,5
M-700	4,1
Talc	7
C.aco3	3
Silica	18,8
Kaolin	10
MD	0,1
Biorin	0,5
Fj-360	10
Sand	10

Black glaze mixed with sand as much as 10% does not change the black color of the glaze, it's just that the sand gives a rough texture as if it resembles the texture of natural stone. This glaze is suitable to be applied to ceramic objects that want a soft color but have its own texture.



[Source: Diatmika, 2017]

Figure 14. Black glaze with 20% sand

Table 6. Black glaze with 20% sand Composition

Type/ material	Percentage
Photas	5
Zinx ox halus	24,5
Barium carbonat	9,5
M-700	4,1
Talc	7
C.aco3	3
Silica	18,8
Kaolin	10
MD	0,1
Biorin	0,5
Fj-360	10
Sand	20

The same as before, the addition of sand as much as 20% still cannot change the black color of the glaze but only adds to the coarse texture resulting from sand mixed with glaze. This glaze is suitable to be applied to decorative ceramic objects because of its attractive color and texture.



[Source: Diatmika, 2017]

Figure 15. White glaze with 10% sand

Table 7. White glaze with 10% sand Composition

Type/ material	Percentage
Photas	5
Zinx ox halus	24,5
Barium carbonat	9,5
Sircosil	4,1
Talc	7
C.aco3	3
Silica	18,8
Kaolin	10
MD	0,1
Biorin	0,5
Fj-360	10
Sand	10

Mixing 10% sand with white glaze produces an effect like melted glass clumping. Another effect is the appearance of brown spots on the white glaze. In this glaze the coarse texture of unleaded sand or white glaze mixed with sand has the same physical form as glaze in general. This white glaze is suitable to be applied to functional ceramics or decorative ceramics because of its attractive color and not textured.



[Source: Diatmika, 2017]

Figure 16. White glaze with 20% sand

Table 8. White glaze with 20% sand Composition

Type/ material	Percentage
Photas	5
Zinx ox halus	24,5
Barium carbonat	9,5
Sircosil	4,1
Talc	7
C.aco3	3
Silica	18,8
Kaolin	10
MD	0,1
Biorin	0,5
Fj-360	10
Sand	20

The results of white glaze mixed with 20% sand, the resulting effect is almost the same, namely in the form of appearing to appear like a lump of melted glass, the difference is that the color of the black spots is very clearly visible and the initial texture in the previous experiment disappeared but in the sand mixture as much as 20% reappeared. although the resulting texture is very thin.

The overall results of the research that the researchers have done can be explained as follows: (a) The addition of sand to the glaze gives a different impression and appearance to the color. (b) The addition of sand can produce a different texture from ceramic glazes in general. (c) The addition of sand to ceramic glazes is very beneficial for old glazes that are no longer in demand

because they can produce new effects and add to the esteric value of the dye. (d) The addition of 20% sand will be more attractive than the addition of 10% sand. (e) The addition of sand in addition to creating a different impression and appearance or texture, certain glaze colors can also produce a very beautiful glass-like texture. (f) Some types of glaze, coarse texture of the sand is not visible or the sand melts along with the ripening of the glaze. (g) Sand glaze is very suitable to be applied to ceramic objects that want different textures and colors to appear like ceramic glazes in general. (h) The more sand content is mixed with glass, it will produce a different color or texture and have its own characteristics.

Conclusions

Utilization of sand as a mixture of glazes in the manufacturing process is still the same as the process of making glazes in general, starting from the preparation of tools or materials, mixing to burning. Different colors are produced by using color pigments such as Sircosil for white, M-700 for black, He-28 for red or C-500 for green. The process of applying to the body or body of sandy glaze clay can only be applied with the celub technique because the glaze liquid mixed with sand produces a textured glaze liquid. The results obtained from the use of sand as a mixture of glazes produce different colors or textures on the glaze and cause an effect such as melting glass on several types of glazes.

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