



Technical Diversity of *Raku*-Ceramics: An Analysis of Characteristics of *Raku* Glaze and their Application on Ceramic Body for Sustainability

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Abstract

Clay is an important component of earth. It is widely used in various forms of art, such as terracotta, earthen-ware, stone-ware, porcelain, *Raku-ware* and so on. *Raku* is a specific technique of firing ceramics that uses raw glazes where the pottery is removed from the kiln while it is still hot and cooled quickly. This creates a unique textural crackled surface on the pottery. In Japan, China, America, this technique is used extensively. The diversity of culture of these different countries made the *Raku* technique unique and culture-specific. Therefore, *Raku* has a lot of techniques, such as *Obvara*, *Naked Raku*, *Crackled glaze* etc. The Glazing techniques and firing techniques are different for these *Raku* Ceramics. In India also the *Raku* technique is being used widely in the recent years. In this study, an extensive exploration has been done in the analysis of *Raku techniques* in Indian Cultural context to get different knowledge about glaze-textures on the ceramic body. Initially the exploration has been done through experimental approaches in the ceramics studio and the results are noted sequentially. This experimental observation has been documented systematically in this research work. The findings of this research provide practical knowledge of various type of Indian *Raku* glaze techniques to the ceramic art practitioners, so that they can easily create *Raku* glaze on ceramic body for a sustainable ceramic art practice.

Keywords: *Raku*-glaze technique, Ceramic, Cultural diversity, Sustainability in ceramic art practice.

Introduction

'*Raku*' is a process to pottery and art works making which speeds up the firing processes and brings quick result. *Raku* is traditionally used at Japan in occasion of tea ceremonies, they are using porous *raku* body for making pots, art works, crafts and which are high bisque and low glaze firing. The firing process is quite different from normal earthen ware, stone ware firing. Normally the removal of pieces from kiln while it came normal temperature but at the *raku* process the removal of pots or pieces from the kiln when still shining hot. After reaching the temperature pots or art pieces are removed from the *raku* kiln in hot position and kept all this pieces one by one in a covered iron or metal container filled with inflammable material like - saw dust, newspaper, dry leaf and ceramic oxide for reduction. After half an hour or as a potter's required time, all pieces are removed from

the metal or iron container and allow to cool in the normal air. This process gives a great diversity of colors and surface effects. Raku technique is very simple and convenient for potters. In India raku is very popular for potter because Raku kiln is very small, you can shift anywhere easily. Raku kiln making are economically comfortable for studio potters.

Now a days in India lots of studio potters and ceramic artist practice this method because its low cost, getting first result process. Raku has a lot of techniques, such as: *Obvara*, *Copper glaze* and *Necked raku* or *horse hair*. Each technique is incredibly unique and creates vastly different effects.

Raku ware:

Raku process have historic development in Japan ceramics and it was a mile stone to concentrate on close collaboration between potters and investor. Raku became popular with American potters in the late 1950s with the help of Paul Soldner. Americans kept the general firing process, that is heating the pottery quickly to high temperatures and cooling it quickly, but continued to form their own unique style of raku.

Raku's unpredictable results and intense color attracts modern potters. These patterns and color result from the hot- cooling process and the amount of oxygen that is allowed to reach the pottery. Depending on what effect the artist wants, the pottery is either instantly cooled in water. Water instantly cools the pottery, ending the chemical reactions of the raku glaze and fixing the colors in to the pot surface. Inflammable material gives smoky effects, it gives stains the unglazed portions of the pottery black.

Japanese are mainly used is hand-built pottery for raku, raku glaze have large of range colour variation. Western potter sometimes used hand build technique and they used throwing technique. Western culture has developed a new technique of raku firing which is called horsehair raku firing. These pieces are often white with thin dark black lines. After removing hot raku pieces horse hair, feather can apply on the surface, that given beautiful texture. The pottery was taken out of the kiln at approx 730 °C and horse hair, feathers, or even sugar applied on pot surface. Which burned and gives texture.

Firing:

The nature and dimensions of kiln used in raku is very important. Different kinds of kilns are used in raku firing. Mostly used kiln is updraft. Gas kin, electric kiln, wood kiln, coke /sager kiln are also used in raku firing. But at the same time gas kiln are most popular rather than another kiln. When we make a gas kiln the contain is ceramic fiber or bricks for be used in oxidation or reduction firing. Gas kilns is more essential for raku firing because it is quickly than electric kilns.



Mostly top loaded kilns are used in raku firing. The kiln door must be detachable and light weight for easily opened and closed. When the required temperature reached as per potters' requirement. Timing of glaze firing is very short and faster than stone ware glaze firing. Raku glaze completed or mature point is lower than 980 °C. Loading and unloading process can be continue between glaze firing process, at the same time temperature fluctuating rapidly during the firing process. Raku ware are totally different from stone ware body. Presence of grog or quartz into the raku body is being able to cope with effective thermal shock. We can use any kind of stone ware body adding of grog or quartz which incise porosity of the body and protect wit thermal shock.

This thermal shock creates sometimes colour variant and glaze surface textured at raku firing. At present potters are experimenting with pottery shapes, some time they create small ceramic sculpture, toys etc.

Reduction methods:

Reduction methods or process are very essential for raku firing. It creates glaze texture, helps to changing colours at presence of carbon di-oxide. At the reduction chamber draws oxygen from the raku glaze react with carbon di-oxide. Supply of inflammable materials like- sawdust, dry leaf, sugar is allowing to react with glaze material and its gives different accidental textures, colours at the pots surface. All this process needs supply of fire. At this atmosphere lack of oxygen creates black colours on unglaze portion of the raku pieces.



Different technique of Raku firing:

1. *Obvara Technique*
2. *Crackle glazes*
3. *Copper reduction process*

4. Horse hair technique

1. The *Obvara-technique* was originated in Eastern Europe around the 12th Century. Now a day in Indian studio potters are in this process. The process involves burning the surface on the pottery to seal the porous surface and gives black /brown texture. Each piece had been thrown or handmade and bisque fired before, comparable to the raku process.

Obvara-composition: Flour- 2 kg,
Yeast powder -3 (tea-spoon) /Beer - I bottle (750ml)
Water-9litter worm
Sugar -2(tea-spoon)

The *Obvara* solution is mixed three days in advance of firing. Pieces are made and bisque before the final firing.



A high bisque pot is heated at 850°C temperature and removed from the heat kiln. Then the hot raku pieces are dipped into the obvara solution and soaked in water very quickly for cooling. The solution is a mixture of flour, yeast, and worm water. Mixed the solution properly and kept on 3 days. The effects are quite stunning. When in local area yeast is not available, we can mix beer 750ml. The worm water stops the burning and color change. Using a raku kiln the *Obvara* pieces are removed at the time and soaked into the solution and then quickly into water. Then they air cool and the solution burns quickly on the surface of the piece before going into the water. After that we get the expected results.



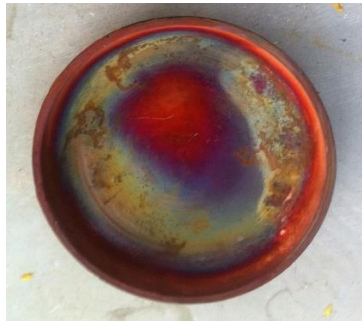
2. *Crackle glaze* can be defined as glazes whose tendency to craze is used for decorative effect and there are many colour possibilities available. If we want deliberately made crackle effect, alkaline or high -expansion oxides can be added. The crackling happened when the tension developing the fired piece when the glaze and body expand and contract at different rates during the firing and cooling process. Although this type of glaze has often been considered defective. Crackle glaze can be made from large or fine crackle patterns depending on composition of the glaze. After applying crackle glaze on the bisque pieces is heated at 850°C temperature and removed from the heat kiln. The hot raku pieces are kept on open air for few minutes.

Suddenly changing temperature creates crack on the surface of raku pieces. After that thermal shock the pieces allow for reduction and after reduction process remove all and kept for cooling. In between glaze and raku body carbon creates black colours. Crackle glaze are made manly decorative and should not be apply for ceramic utility items.

Crackle glaze-composition: Grestley Borate- 65%
 Nepheline Syenite -15 %
 Ball Clay- 50 %
 Tin Oxide- 10 %
 Silica-50%

3. *Copper reduction process:* copper oxide in reduction gives unique colours known as red, brown, celadon, blue green.

Crackle glaze-composition: copper oxide black - 89 %
 borax -9 %
 bentonite- 2 %



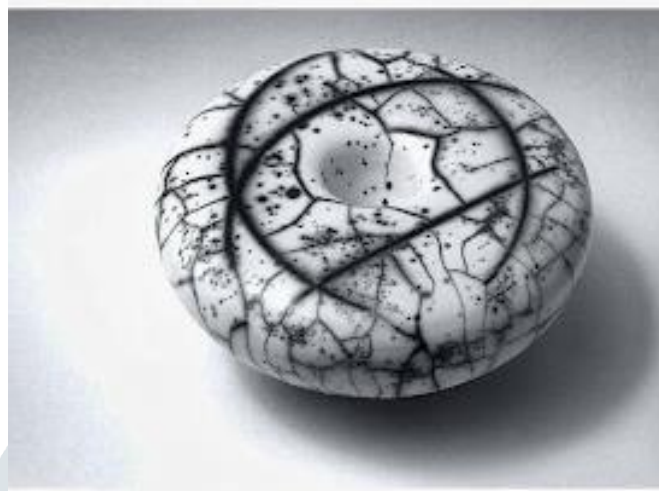
After bisque firing all the said materials mixed with water properly and kept to settled over night. The next day before applying on bisque ware again mixed the glaze properly and apply thick coating. Ureses of raku kiln when the temperature comes 1050°C, then switch the temperature turn off and waiting for cooling down to 760°C and rest for 5 minutes. After that come out the pots from the raku kiln and keep this in to the sawdust area.then cover up these pots for reduction and leave it for 2 minutes. after few minutes lifting the cover and put it back down again for oxygen supply. Leave it for hour for cooling down at normal temperature and tee results come.

4. *Horse hair:* Horse hair firing is also similar to crackle glaze firing. Horse hair firings used for decorative effect where the piece remains unglazed. After reaching temperature in the raku kiln the raku pieces come out from the raku kiln and kept in the natural temperature. Normally the removal of pieces from kiln horse hair kept on pot surface. After that horsehair burns quickly and marks thin line on the pot surface. This technique also used for decorative items.



One of the Indian artist Manisha Bhattacharya and her Raku works:

Manisha Bhattacharya was one of a famous potter in India for necked raku process. Manisha is one of them who established that studio potters can replace local potters. Manisha grew up in a in North Delhi.



Her raku journey began in the UK in 1992, working with Alan Hamlin. Her black and white raku style became famous in Indian ceramic. She was not trained at formal education in ceramics. Studio pottery is very young in India, for this reason most potters in India began learning under the guidance of ceramic artists. Manisha also follows this process and started her journey in 1984 with guidance of Nirmala Patwardhan. In 1989 she studies with Ray Meeker and Deborah Smith. After two years she left Golden Bridge with strong impression as Japanese influences.

She started raku practice in 1993. That time raku is not famous in India. She installs her own portable raku kiln. Her works is creative and extraordinary standard which we know today. She creates her own league to create raku in white, black and grey Series. Her raku works is very reach and rear. She creates a bridge between art and craft like decoration and function. The ceramic pottery practice as a whole has come a long way from local potters who held a position its pride of local community.

Her works purpose to be used only as an art pieces or decoration. At present the young generation studio potters like-Arun Mukhuty (from Jamshedpur), Sandip Mancharaker (from Pondicherry), Abhay Pandit (from Bihar) is also practicing raku process. Its start from Japan but spread quickly all over the world, India is one of them, where studio potters are regularly experimenting their ceramic art practice as a sustainable item.



Conclusion

In conclusion, Rakuis a unique and beautiful addition to ceramic art pottery. Its variety of different types of clay body's, glaze technique and firing process can be applied to pottery in a number of ways. The resulting glazes can have a wide range of aesthetic values of color and texture depending on the type of clay body and the application method used in the firing process. The use of Rakuprocess can create a unique and natural look to pottery, and can be a great alternative to traditional pottery.

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