



Documentation and Restoration of Silver Artifact: A Case Study

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ABSTRACT

Museum's collection have various collection such as wooden, copper, silver, aluminum, bone, ivory, hair, feather, organs and mixed that could based on the archeological collection, ethnographic collection, biological collection etc. It is necessary to preserve that collection for future but there are many deterioration problems occurs in those collection. It could be environmental problems based on biological factors, chemical or physical factors. The case study has been done on the silver artifact which is composite material of silver, glass and thread. For the documentation and restoration of silver artifact conservators used the method according to the condition and type of deterioration of object and we use to follow the conservation guidelines. In this case study process of documentation and restoration along with the complete condition assessment report of the artifact has been shown. There are many chemical methods and physical methods available to restore the object but the recent work is to find out the non toxic method to conserve the object which should be reversible and suitable for the object. The priceless collection cannot be treated with any random method so we have to go through the reliable method after using the patch test. This case study has been done with the sodium hydroxide solution with using appropriate procedure after literature review and the method gives satisfactory results after work.

KEYWORDS: Conservation, Museum, Metallic object, Silver artifact.

INTRODUCTION

Generally artifact could be any object which is made by human hand that exists in the tangible form to demonstrate the material culture that is the intangible attribute. We all know that every tangible and intangible attribute needs care from different threats of deterioration such as from environmental factors, biological factors, physical damages, chemical components etc. Suppose a

condition where any object placed in the environment which is not suitable for the artifact so it will surely damage the object, now think about it on the global view were the deterioration of heritage is worldwide problem and we know that every object has its own importance. For the conservation of such artifacts new researches are going on because the conservation of antique and precious artifact cannot be done by any random

method to conserve or restore the object. Museologists and conservators know how to diagnose the object and how to give it a long life. This case study has been done to conserve the silver artifact which is the silver base necklace decorated with glass ruby crystals and colorless moissanite crystal in diamond shape. It is precious object because it has the glorious past with highly sentimental values but this artifact has been damaged, to restore the object an appropriate method has been used.

1. History of the object

Life of every person is filled with number of memorable moments which could be connected to our family, relatives, any object, any place or it could be a dream. In India there are number of masterpieces created by experts although India is always known by the rich craftsmanship and performing art that is famous in all over the world. This case study has been done on the silver necklace which is decorated with moissanite and glass. This object was purchase from Saharanpur Uttar Pradesh India in 1980 by Mr. Ameer Ahmad.

2. Identification of the object

In the field of museology and conservation it is necessary to identify the object before starting work, we must have to acquire exact knowledge about the object, its history, its role, material by which it was made, its composition etc. it is the part of conservation to document the object which will be helpful for future. After inspection this object has been interpreted as necklace, its color and characteristics shows that the object is made up of silver and decorated with glass and moissanite crystals in the shape of diamond.


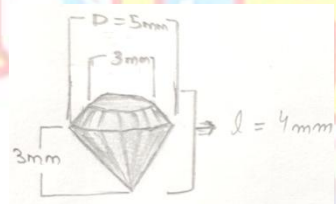
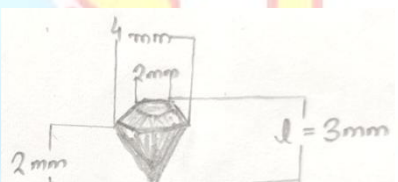


3. Documentation of the object


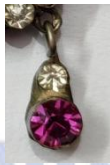


Before starting restoration work it is necessary to document each and every aspect of object. It should be clearly documented in the manual form as well as in digitize form. CIDOC is the committee which provides guidelines for documentation.

Fig 1: The object was badly damaged, firstly the object was interpreted and its original shape was drawn on paper through sketching, every hook and loops along with crystals was counted with their color, and mentioned in the documentation sheet. More in formation can be seen in the documentation report of the object.



Fig 1: (a, b, c, d, e, f, g, h, i)- Condition of the silver artifact before restoration

Examination form for the documentation of silver artifact					
Identification	Object name Necklace	Identifier name Humera Ameer	Date 02 july 2020	Material Composite :includes Silver, Thread, Moissanite, Glass	Image 
Production	Silver necklace decorated with crystals and tied with golden thread to support in neck of the women				
Shape	Silver base Leaf attached to form a necklace	Crystals Small white. Small pink and large pink crystals in the shape of diamond	Thread Long golden color supportive thread is tied with hooks in both ends by red thread		
Object dimensions (in length)	Leaf 4 cm each	Supporter 10 mm each	Hook 3mm each	Thread 54 cm & 3 mm D each	Hanging hoop 3mm each
Crystals Dimensions	Glass ruby pink crystal Total length- 4mm Cone length- 3mm Cone diameter- 5mm Upper surface diameter- 3mm 		Moissanite colorless crystal Total length- 3mm Cone length- 2mm Cone diameter- 4mm Upper surface diameter- 2mm 		
Color	Base Silver color with dull and blackish appearance	Large crystal Pink ruby # E0115F Complementary color	Small crystal Two types: Colorless Shiny and pink ruby #E0115F shade	Thread Golden shiny	
Crystals	Specialization type Moissanite crystals in supporter Ruby pink glass crystals in supporter  Left Right 				Total number 4 (8 in both sides) 1 (2 in both sides) 28 168 4 (2 small & 2 large)

	<p>Ruby glass crystals in all leaves</p> <p>Hanging crystals in one leaf</p> <p>Hanging crystals in all leaves</p>	 	<p>24 (16 small & 16 large)</p> <p>2 (1 small colorless & 1 large Pink Ruby)</p> <p>12</p>
Condition	Damaged	Description of deterioration Dust and dirt found on the object, blackish colored due to the environmental effect of pollutants, tarnished due to reaction with Sulphur compounds, broken hook and loss of crystals	
Treatment	<p>Consolidation</p> <p>Mechanical cleaning</p> <p>Chemical cleaning</p> <p>Restoration</p>	<p>-Cleaning with soft brush</p> <p>-Cleaning with ethyl alcohol</p> <p>-NaOH (Sodium Hydroxide)</p> <p>-Added similar hooks to joint it together, pasted crystals with non toxic adhesive, owner gave parts of that object for restoration.</p>	
Photograph before restoration	<p>Front view</p> 	<p>Back view</p> 	

environment. Firstly we have to inspect the object keenly to diagnose it completely.

There are two aspects covered in this case study is the conservation and the restoration, these two fields may overlap to each other because both are working for the preservation of artifact, here restoration means the process which return the artifact into similar to the original condition or which make the object complete for the interpretation and the conservation is the part of conserving the object for future and make it stable in the present condition which prevent the deterioration. There are many methods which can be used but we have to use that method which is safe for the object, conservator and as well as to the

4. Method and Methodology

Generally organic substances deteriorate faster than inorganic substances; metallic objects are prone to deteriorate with environmental factors and when the chemical reaction occurs between acidic components and the metallic object. Silver is the metallic chemical element which is non toxic to human beings used in chemical laboratories, industries, day to day used in jewelry, and from long time used as utensils, decorative items, silver also have medicinal values etc. As already said that

every object have its antique or historic value and uniqueness, it is necessary to conserve the object. Method of conservation varies according to the type and nature of the object. There are many researches have been done to conserve silver artifact and researchers are finding best way to conserve the object with the method which is non toxic and safe for the object, conservators and environment. In this case study safest practical method has been used to conserve and restore the object

Parts Naming and Numbering:

This sketch has been drawn to represent the original condition of the object. Right to left: Hook, Supporter, 1, 2, heart 3, 4, Supporter, Hook connected with thread. (Fig: 2)



Fig 2: Parts naming and numbering

Material required: Plucker, forceps, 1 hook, 2 hoops, crystals, non toxic adhesive, ethyl alcohol, brush, cotton, isopropyl wipes, NaOH, swab stick, soft brush and tarnished silver object, bowl etc



Fig 3: Material required

5.1 Method of cleaning silver

Museum collection have different kind of materials such as wood, copper, silver, aluminum, bone, ivory, hair, feather, organs and mixed that could

based on the archeological collection, ethnographic collection, biological collection etc. for the conservation of silver artifact conservators used the method according to the condition and type of deterioration of object we use to follow the conservation guidelines.

5.1.1 Dry cleaning: - Dry cleaning can be done with the help of soft brush, soft cotton cloth and cotton swab stick.

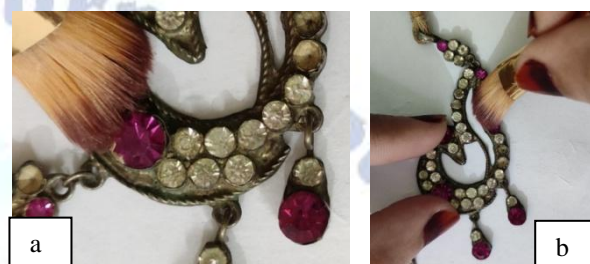


Fig 4 (a), (b): Cleaning with soft brush

4.1.2 Solvent cleaning:- Generally silver artifact shows silver tarnish, blue green patina, dust and dirt etc which can be conserved by the many methods such as treatment with calcium carbonate, citric acid, isopropyl alcohol, baking soda, precipitated chalk, acid dips, laser cleaning, polishing wheel or buff pad and benzotriazole etc. but here is the important point is that the museum objects have the antique collection which cannot be treated by any random method like chemical dips or acidic treatments and not even we can do harsh treatment which damage the surface of the object so we have to go through the method which retain the object in its original condition or stop the future deterioration without losing its aesthetic look.

Cleaning with ethyl alcohol: Firstly object was cleaned by ethyl alcohol and then precedes the method to clean with sodium hydroxide solution, object have three kind of material like glass thread and silver so other methods has been avoided because in some cases crystals may lose their shine or come out from their position.

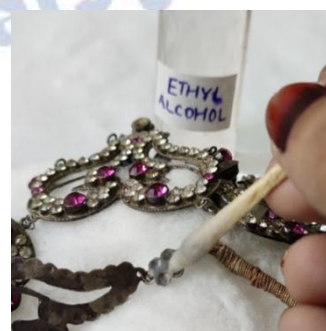


Fig 5: Cleaning with ethyl alcohol

5.1.3 Cleaning with Calcium Carbonate (CaCO₃)

Material required: Glass Container, glass rod, 50gm CaCO₃, 5ml ammonia, 5ml ethyl alcohol, 15 ml turpentine, tarnished silver artifact etc.

Procedure:

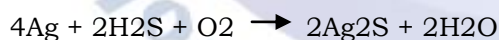
Take 15 ml of turpentine in the beaker, add 5ml of ammonia 5 ml of ethyl alcohol and 50 gm of CaCO₃ in it then mix it well with glass rod. Make a thick paste of the mixture and test the smoothness of the solution on the glass or acrylic sheet that it does not leave scratches on the surface of the object. Take a patch test before applying on all over the object; now apply the paste on the tarnished area of the silver artifact.

In conservation aspect we cannot use this method because here is the combination of the calcium carbonate occurs with the turpentine where in product we are getting calcium cyanamide which is very hazardous and in the safety data sheet given by WHO found that small amount of alcohol combination can affect cardiovascular and central nervous system.

5.1.4 Cleaning with Sodium bi Carbonates (NaHCO₃)

This method helps to recover the aesthetic look of silver artifact because when the silver object reacts with hydrogen sulfide present in environment so it forms the layer of silver sulfide on the surface of the object, for the removal of sulfur molecules we can use aluminum to form aluminum sulfide.

The method is given below:



Silver object + Hydrogen sulfide + oxygen



Silver sulfide + water

Safety data sheet by LTS research laboratory on aluminum sulfate provides information that it can be use for scientific research and development with safety measures.

Material required: Petri dish according to the size of object or aluminum pan, aluminum foil, glass

rod, wooden tongs, wore gauze, burner, tarnished silver object, water and sodium bi carbonate etc.

Procedure:

Place aluminum foil in the container to set it at the bottom of the container. Pour 50gm of NaHCO₃ and add 500ml of water in a container and mix it well with the help of wooden spatula. Then place the tarnished object in the aqueous solution of the sodium bi carbonate in that container and light the burner. Keep solution boiling and observe all the tarnish will remove from the object.



Silver sulfide + Aluminum



Silver + Aluminum Sulfide

When tarnish remove from object cool down the solution and take out the object carefully and wash it with the help of warm water.

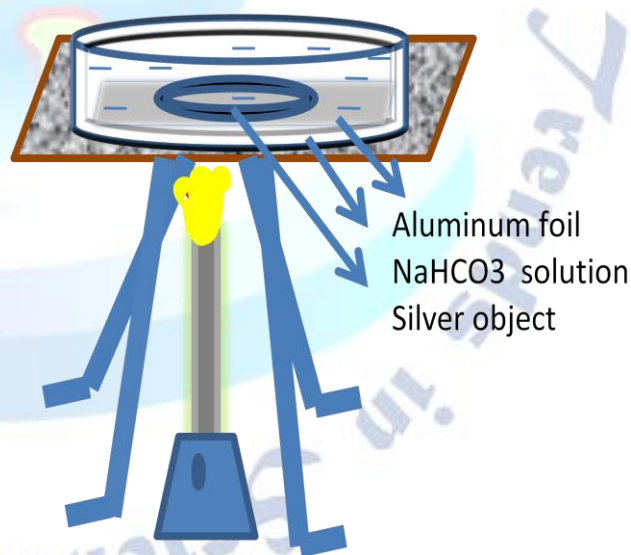


Fig 6: Reaction of silver sulfide with aluminum

5.1.5 Cleaning with Sodium hydroxide: Take 20 gram powdered sodium hydroxide in a petridish add 3 to 4 ml of distilled water and make a smooth paste to make it creamy or smooth because crystals can make scratches on the object surface, now test the smoothness of the NaOH paste on the acrylic sheet or any glass object and observe the scratches. Then apply on the tarnished silver object and leave it for 2 to 3 minutes on it and then clean it with the help of soft brush or cotton swab stick, prepare 30 ml of use to collect the part of the object when it breaks. Take NaOH solution in warm water then leave the object in it for 30 minutes.



Fig 7 (a), (b), (c), (d), (e), (f): cleaning with NaOH solution in warm water

Now take the object out of the solution and give it a final bath in the warm water then dry the object in shade on the cotton in room temperature. Final work was the pasting of the crystals on their actual position with acid free adhesive, here the adhesive was araldite. Already prepared catalyst and adhesive was dropped on the position with the help of needle to give it a final touch.



Fig 8: Dry the object on cotton pad

6. Consolidation:

The object has been cleaned first by the mechanical cleaning method to remove the dust by the soft brush, then proceed by chemical cleaning and restore it to make it in stable condition. According to its history, its owner gave dismantled parts to restore the object. It is easy to restore it but here the crystals were pasted by some adhesive during restoration the acid free adhesive was used which does not contain acid and it is non toxic that means its PH may be alkaline or neutral.

7. Restoration of silver artifact

Restoration is the essential part because it will retain the object in its original shape and helps to understand the form and function of the object. For the restoration process we require some equipment and the similar material like the original, here the original material was provided by the owner, according to owner they use to collect the part of the object when it breaks.



Fig 9: Restoration of artifact



Fig 10(a,b): Restoration of hooks and hanging loop



Fig 11(a,b): pasting crystals with araldite

Comparison of the artifact before and after conservation:



Before



After



Before



After



Before



After

8. Conclusion:

Conservation of cultural property is the important topic to discuss and it is essential to create awareness about the heritage. There are many procedures of conservation of silver artifact by which one can select the method and can create by its own, one kind of material can be cleaned by a specific method but when you are working with mixed artifact so it will be challenging task to do.



Fig 12: Object ready to display

After the conservation and restoration now the object is ready to display in the display area and can be stored in the storage area. For the purpose of temporary exhibition display you can give it a creative display look but for the storage area we should avoid the organic substance because organic material deteriorate faster than inorganic material and it attract the biological agencies which may stain the object by their waste. The range of relative humidity for the storage of silver artifact should be below or 50%. We can create silver tarnish protector kit to protect silver from tarnish. Place silica gel to control humidity level.

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