

The use of Paraloid 44 in completion of archaeological glass: Applied

Experimental study

Mohammad Hefny Abd El Karim (1)*, Hamdy Abd EL Moneam (2)

1, 2- Department of Conservation, Museum of Islamic Art in Cairo, Ministry of tourism and Antiquities, Egypt.

mohammad.hefni@yahoo.com



1- Introduction:

Epoxy is one of the most common materials used to complete antique glass, but it is a non-recoverable material, so an attempt is being made to find another recoverable material that can be used for this purpose.

Paraloid is actually used in assembling archaeological glass, but it is difficult to use it for completion due to the many number of air bubbles present in the paraloid mold. The study aims to identify how to produce a paraloid mold without air bubbles and use it to completion glass. Paraloid 44 was chosen because it can withstand high temperatures, as it does not become flexible except at a temperature of 60° degrees.

The main problem lies in the presence of many air bubbles in the paraloid mold, which causes the solvent to volatilize quickly, so the solvent is worked to volatilize gradually.

2- A description (Methods):

This was done by placing the paraloid 44 40% in the mold first, then placing it in the refrigerator. After a while, it was taken out of the refrigerator and the lid of the mold was uncovered for a little while and left for a while, then the lid was completely uncovered and left until it hardened well. Thus, molds of the paraloid material were obtained without the many air bubbles.

An experimental study was conducted in which thermal, moisture, and moisture aging were performed, as well as light aging using UV. To evaluate the results before and after aging, ATR analysis was used, and color change was measured using a colorimeter.

Applying the Paraloid 44 40% to completion of archaeological glass object dating back to the early Islamic period, Which is missing part in a weak place and needs protection.

The Aging:

Aging of samples was done by (Heat – moisture) and U.V rays. Aging of the samples was done with Heat 50 ° C – moisture 90% for 200 hours and aging by UV for 120 Hours. To evaluate the results, an ATR analysis and Colorimeter was used, at the Conservation department at the Museum of Islamic Art in Cairo, ATR with specifications (ATR - Platinum, serial number – 12382310, Company name: Bruker) and Colorimeter PCE- XXM 20.

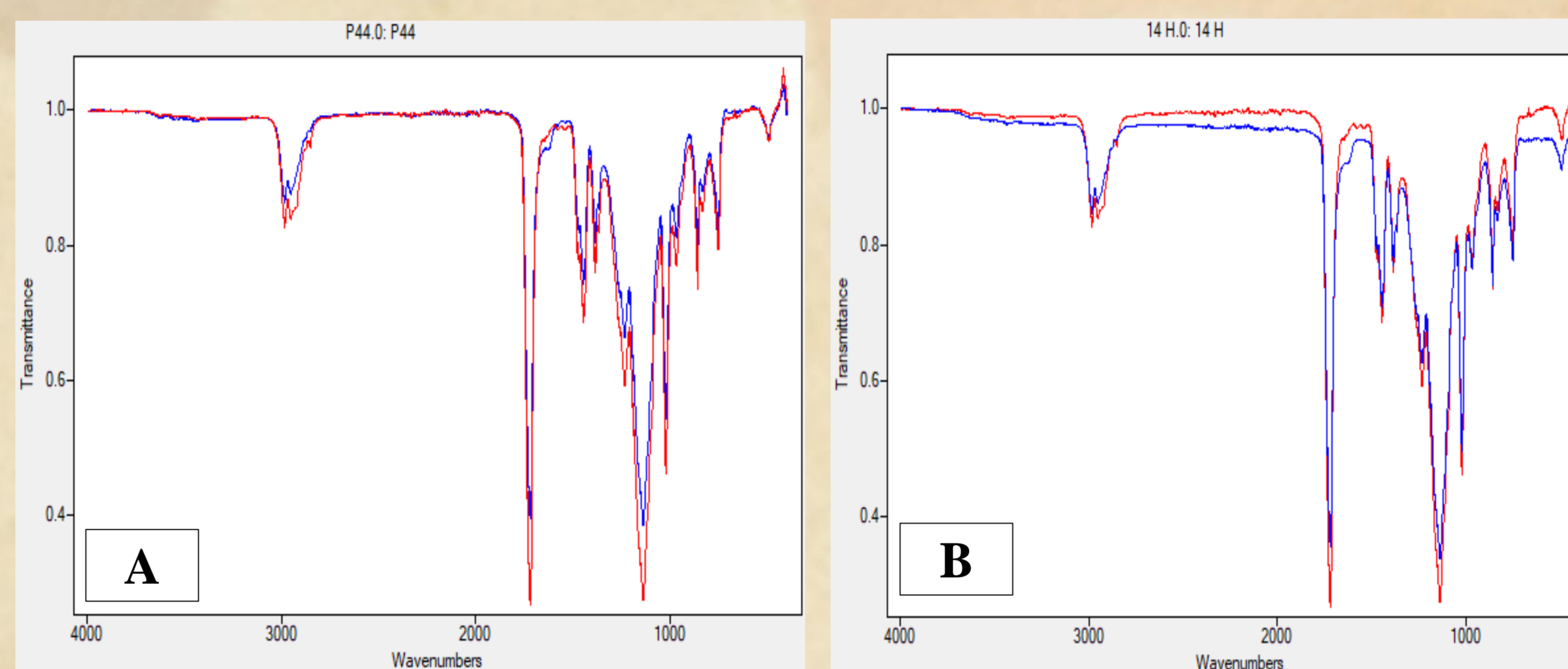


Figure 2: Comparison between the ATR chart before and after aging (A heat and humidity aging, B UV light aging)

Table : Ratios of color change for samples by colorimeter with Aging.

Aging	L	a	b	Δ E
Heat and Humidity	92.06	-18.79	-6.91	8.41
UV light	85.45	-38.95	-8.90	5.61
	90.15	021.41	-8.48	5.61
	87.22	-38.41	-8.68	

3- Results and observations:

Regarding the color change, the percentages are very acceptable, as if E + or - 3 is not considered a color change, as for the results of the ATR analysis, Heat and Humidity aging and UV aging The change in the functional groups is very small, and this proves the efficiency of the material for use in conservation, There was a slight decrease in the OH range from 3300 to 3400, and a slight increase in the C=O range from 1650 to 1750, and a slight increase in the CH range from 2800 to 3000.

4- Applied case:

The application was made on an archaeological glass cup from the early Islamic era in the Museum of Islamic Art in Cairo, with dimensions of height 8.1 cm, diameter 8.1 cm and thickness 1.8 mm. It consists of several parts and was assembled using Paraloid 44 50%, and the completion was done using Paraloid 44 40%.



Figure 4: Missing parts of the archaeological glass object.

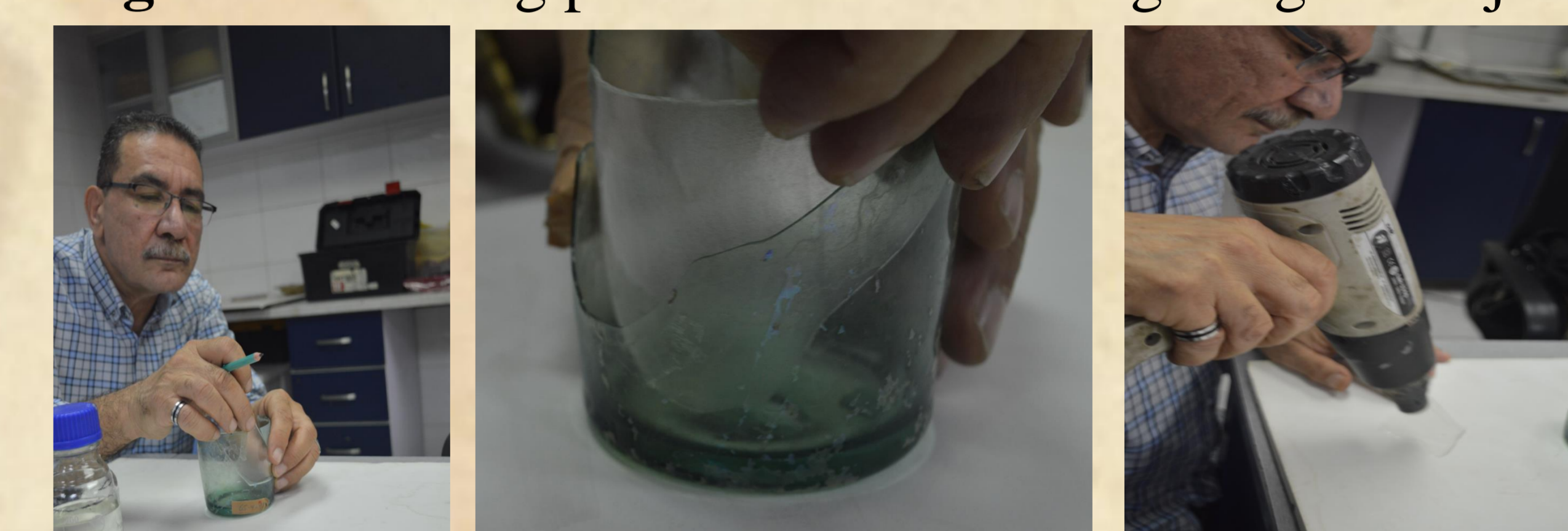


Figure 5: During applying Paraloid 44 to the completion.

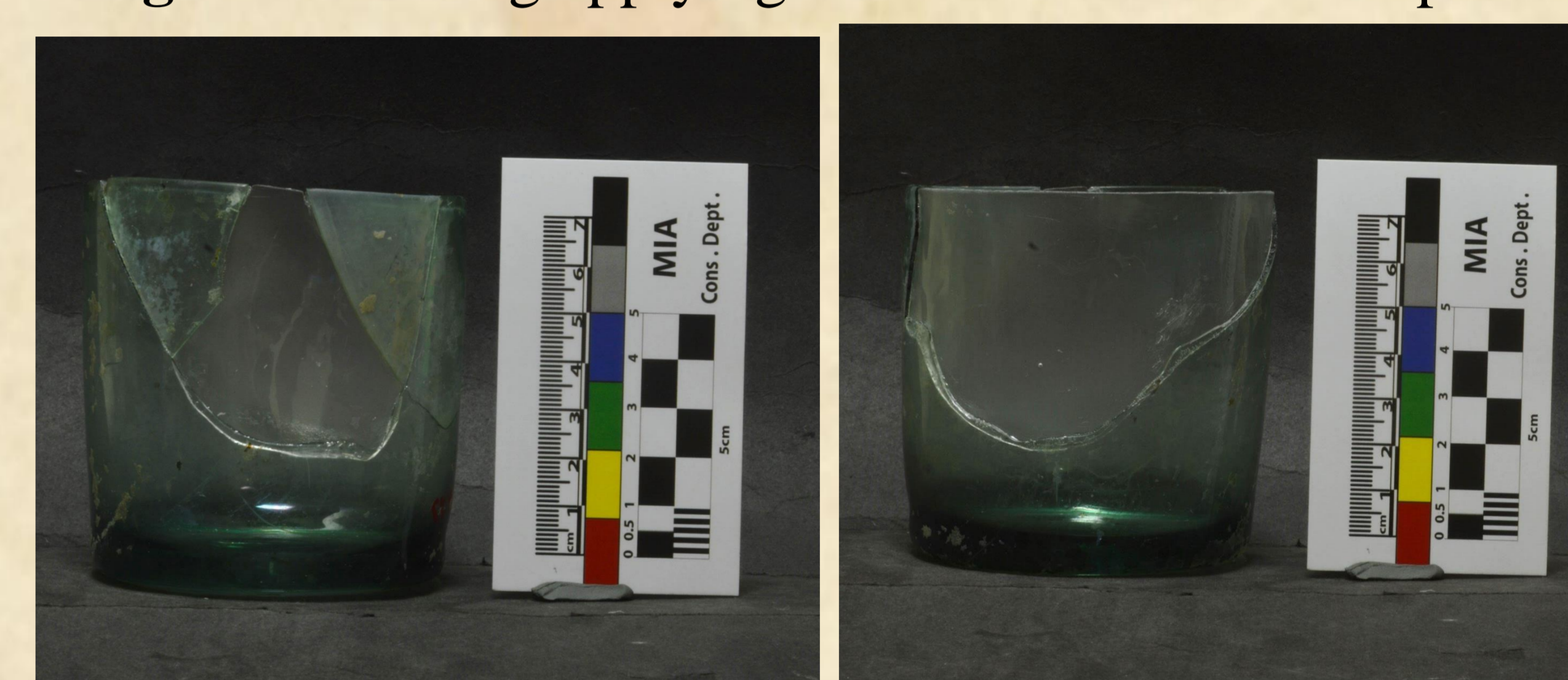


Figure 6: The glass object after the conservation

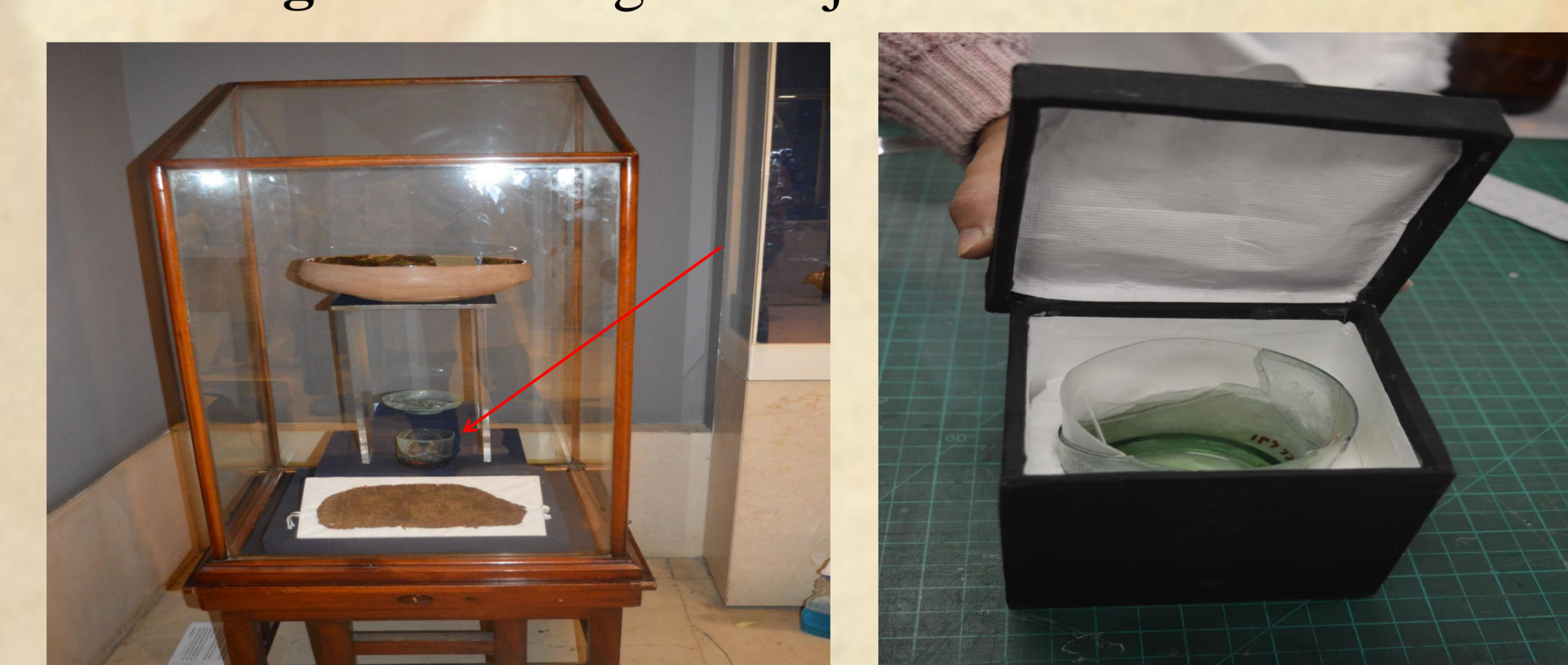


Figure 7: The object participation in temporary exhibition museum.

5- Conclusions and recommendations:

- The study demonstrated the efficiency of Paraloid 44 in its use to complete antique glass. Paraloid 44 can be obtained without visible bubbles by placing the material in a closed box, then placing it in the refrigerator for about a week, then gradually ventilating it.
- Recommending further study to come up with a colored paraloid for completion

6- Acknowledgments:

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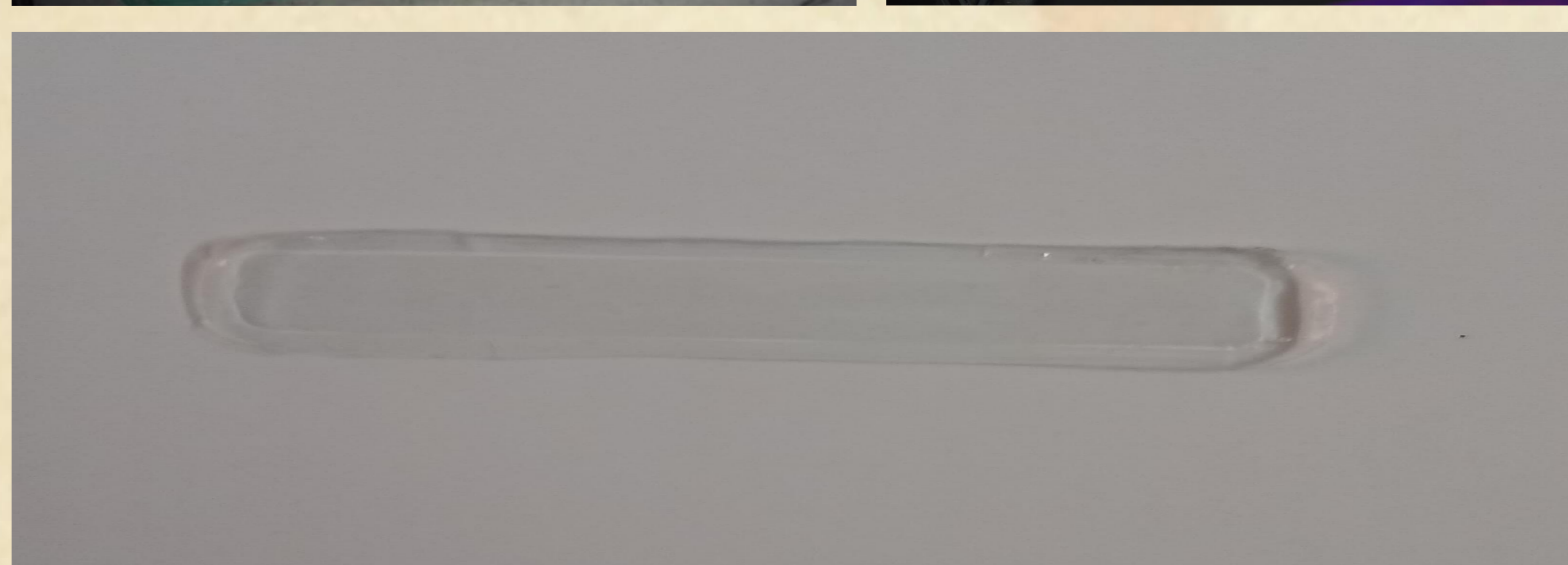


Figure 1: Steps to make samples of Paraloid 44 without bubbles



Figure 3: The glass object before and during assembly.