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Conservation of some Anglo-Saxon glass beads from Barrow Clump, Wiltshire (Pr. 984)

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Summary

Twenty four glass beads from Barrow Clump were examined after investigative cleaning. The condition of the beads were assessed and documented, and selected glass beads were analyzed using X-ray Fluorescence (XRF) to acquire qualitative results on the colourants. To ensure the stability, most of the beads were consolidated with Paraloid B72 solutions in acetone.

Keywords

Glass
Conservation
Early Medieval

Author's

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Introduction

Twenty four damp glass beads were excavated from the Anglo-Saxon graves in the badger damaged barrow at Barrow Clump, Wilts in 2003 and 2004. The glass beads were packed in two boxes according to their context numbers, and stored at 4ºC in a cold room in order to retain the moisture. The condition of the beads had suggested a conservation treatment was necessary, and the aims of the conservation were to:

1. Investigate and document the beads, which include the surface and compositional details.
2. Assess the condition of the beads to determine whether consolidation is necessary.

This report discusses firstly the examination and investigative cleaning on the beads, secondly the condition assessment, and lastly the consolidation treatment and scientific analysis on the beads. The presentation of the report corresponds to the process of the conservation treatment in practice.

Examination and investigative cleaning

The materials in the two boxes are categorized in Table 1 (also see Appendix 1).

Table 1. The materials contained in the two boxes

Year	Glass beads	Other
2003	1 green 5 segmented	1 coral sphere
2004	18 blue	3 chalk Fragments of bone (x4) and textile (x3)

All the beads were examined under a low powered microscope. The segmented beads have some loose black accretions and brown weathering products; the green bead only has some soil remains. They were easily removed using a soft brush.

All the beads excavated in 2004 are of similar size, and are covered with soil accretions including chalk and rootlets. The colours of the beads range from a pale blue to a very dark blue that is almost black (Appendix 1). Between the glass surface and the accretion, there is a thin layer of brown powdery glass weathering products (Figure 1). The accretions are obscuring the surface of the glass beads, so that the condition of the beads can only be examined after the accretions have been removed. There are several reasons why it is preferable to remove the accretions:

1. The accretions obscure the glass beads, obstructing the presentation and study of the objects.
2. The accretion has the potential to interfere with the glass itself, and it may also cause damage to the objects.
3. The loose accretion layer will cause various problems in packaging and storing the objects.
4. If the accretion is left in situ and consolidated, this might cause difficulties in any future conservation treatments.

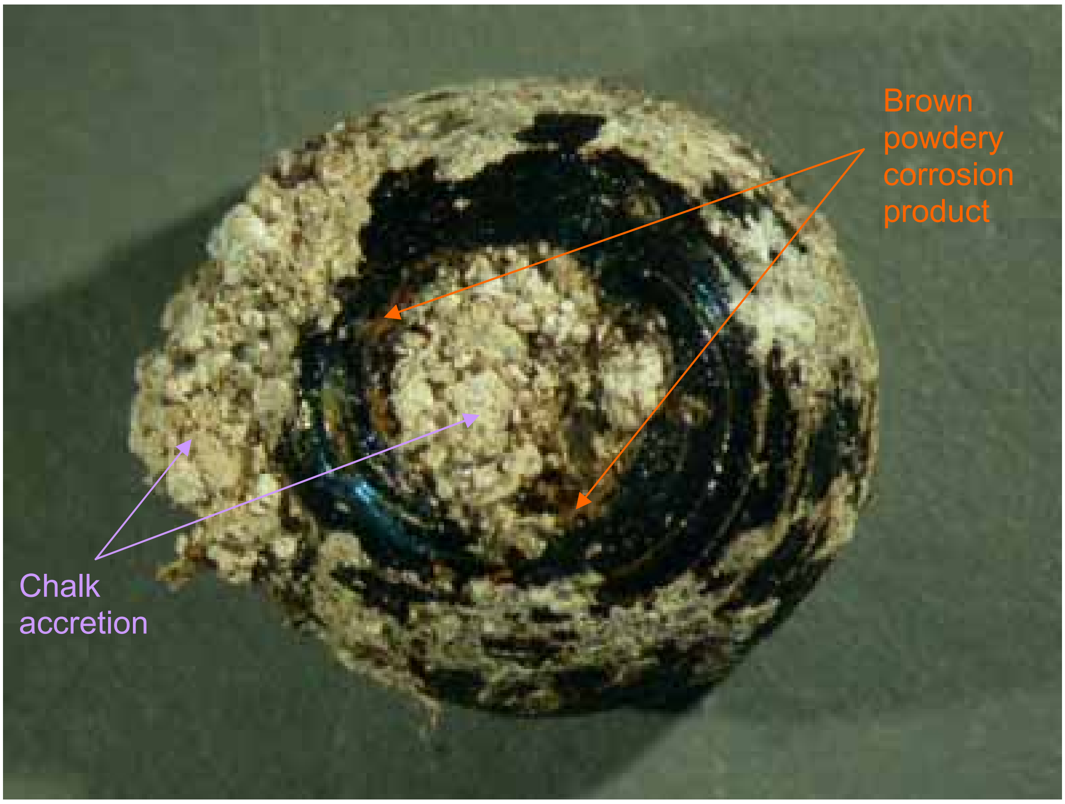

Figure 1. Glass bead (No. 200435036) before cleaning

The accretions were removed from the beads with damp cotton wool swabs and soft brushes using a mixture of deionised water and Industrial Methylated Spirits (1:1) as a cleaning agent. The brown powdery weathering products were also removed except where they were tightly bound to the glass surfaces (Figure 2).

Figure 2. Glass bead (No. 200435039) with brown corrosion product remaining after removal of soil and chalk

Condition assessment

The condition of all the glass beads was examined and documented (Appendix 1), and digital images were taken. The condition of the beads after cleaning is summarized as the following:

1. The segmented beads have lost the outer surface layer and are susceptible of further decay (Figure 3).
2. The green bead is dry and stable, and will not need to be consolidated.
3. Most of the blue beads have iridescent surfaces that are detaching or partially detaching. These beads, which are in different stages of decay, reveal information about the process of the deterioration (Figure 4).
4. Some blue beads have pitted surfaces – the pits being of various sizes (Figure 5).
5. Many blue beads have striated surfaces, which provide evidence of the manufacture of the glass beads (Figure 6).

Figure 3. Glass bead (No. 200304563) has lost most of the outer layer surface

Figure 4. The stages of surface deterioration in the glass beads.
Left: surface iridescence that is becoming detached (No. 200435027)
Middle: the detaching surface has become brown due to decay
Right: the surface has become scaly, and powdery as a result of further decay.

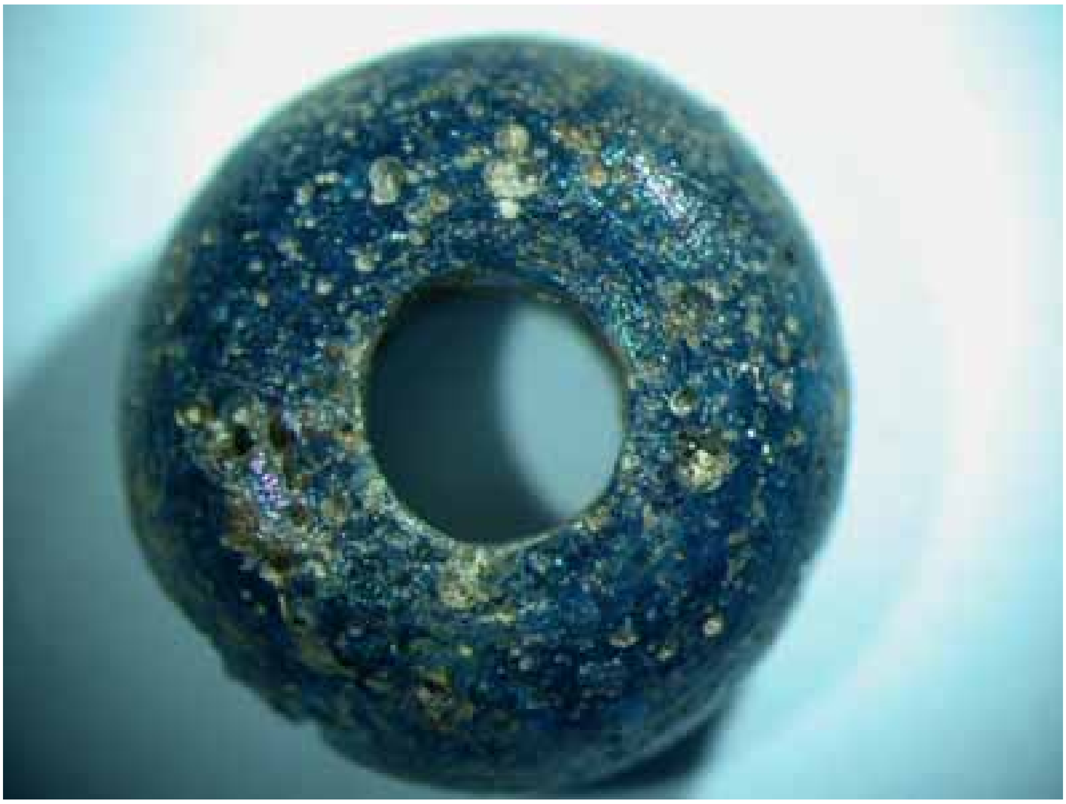

Figure 5. Glass bead (No. 200435040) has a pitted surface

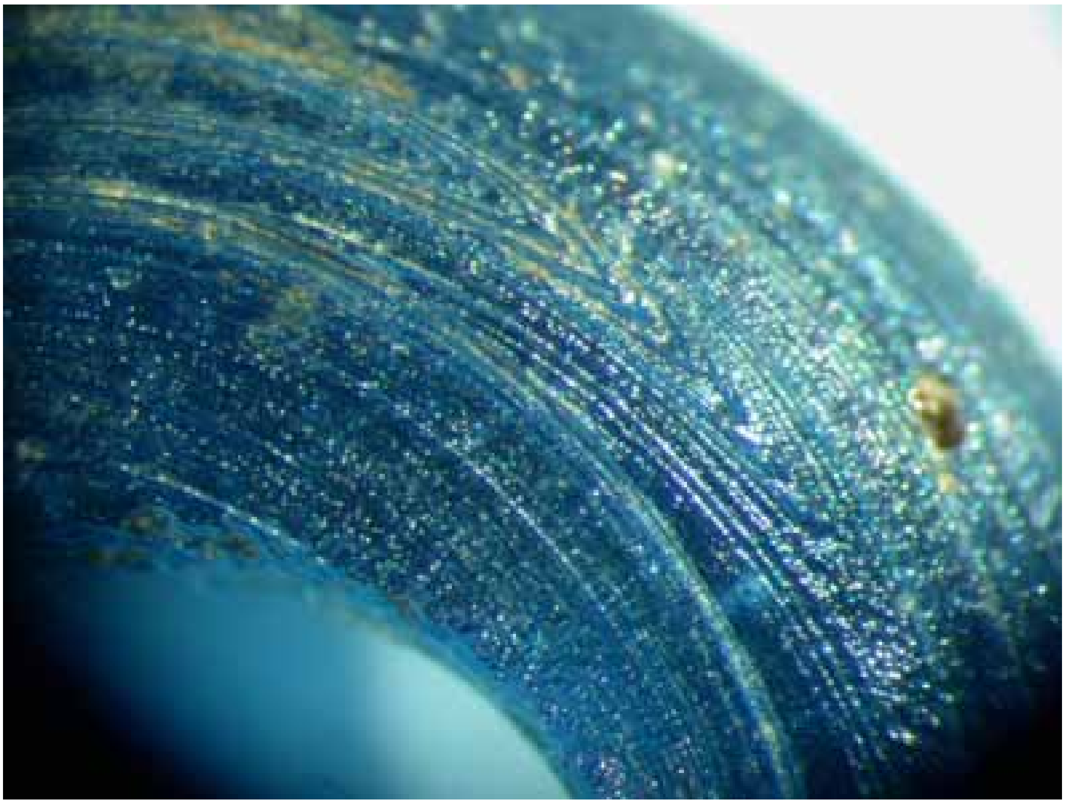

Figure 6. The striated surface on the glass bead (No. 200435037) illustrates how it has been made

Scientific analysis

Because the glass beads are in different colours, it is useful to analyze the colourants of the beads and compare the results. Energy dispersive x-ray fluorescence (XRF-EDX) was used as a quick and non-destructive analysis of the beads, but the results are limited:

1. Only provide qualitative or semi-quantitative surface analysis.
2. Using only a low vacuum sample environment, it is difficult to detect light elements such as sodium and potassium, which are important elements in interpreting the glass type. The overlaps of the peaks generated by different elements are difficult to interpret.
3. XRF analysis will only be able to detect elements, and does not provide any information about their chemical forms. This limits the study on the colourants of the glass beads, since it is the oxidation states and the compounds present that give the colours.

Two blue beads (No. 200435024 & No. 200435036), one segmented bead (No. 200304549) and the green bead (No.200304424) were selected as the samples for the analysis, and the spectrum results are listed in the Appendix 2. It was concluded that:

1. The elements that exist in the beads are similar, and iron and copper seem to be the main metal ions of the possible colourants in the three types of glass.
2. In the segmented bead (clear bead), the peaks of manganese are higher than those in other beads, which explains the clear colour of the bead since manganese oxide was often added to decolourize the glass in ancient

manufacture (Hodges 1964). It is difficult to explain the strong presence of copper in the bead. There is a possibility that copper in the bead is in a clear (non colour) chemical form.

3. The considerably strong peaks of lead in the green bead are interesting, but unfortunately it is the only green bead in the collection. The result is however compatible with the analysis of Anglo-Saxon glass beads from some other sites. Mortimer has analyzed two dark green beads of Anglo-Saxon, and these have unusually high levels of lead oxide (22.6%) also (Mortimer 1996).

Consolidation

Most of the glass beads were in an unstable condition and all but two (No. 200304424 and No. 200435034) required consolidation. Paraloid B72 (acrylic copolymer) was chosen as the consolidant for the physical properties of the film, and its outstanding aging properties. A range of concentrations, 10%, 7.5%, 2.5% of Paraloid B72 in acetone were tested; a 7.5% solution was chosen to consolidate the segmented glass beads, while a 2.5% solution was used to consolidate the blue beads. The consolidant was applied with a soft brush, and more than one application was necessary on some beads depending on their conditions. The consolidated beads were left to dry at ambient conditions in the laboratory overnight, and they were examined on the following day to ensure the success of the treatment.

Discussion

The glass beads were consolidated after the removal of the soil accretions on the surfaces. The beads appear to be slightly glossy after consolidation, but the visual change is acceptable (Appendix 3). The objects are now stable and can be stored, handled and studied safely. It is recommended that the condition of the beads in future should be monitored regularly, and the beads may be treated again if necessary.

Acknowledgement
Many thanks to Vanessa Fell, who has provided supervision for the project.

References

Hodges, H., 1964, *Artifacts*, London: John Baker

Mortimer, C., 1996, *Compositional and Structural Analysis of Glass Beads from Mucking Anglo-Saxon Cemeteries, Essex*, AML internal report 60/96, English Heritage

Appendix 1. The dimensions, colour and condition of the beads

Appendix 1. the dimensions, colour and condition of the glass beads

Lab No.	**Ctx**	**Dimensions** (mm)			**Colour**	**Condition**
		Diam	Diam of hole	length		
200304424	2147	7.9	2.1/ 2.8-3.3	6.9	Green	Dry, no surface losses, not stablilized
200304426	2147	4.5	1.5	8.3	Clear	Dry, large areas of surface loss, accretion
200304549	2147	4.2	1.8	7.5	Clear	Dry, most of the surface has been lost
200304563	2147	4.1	1.8	11.6	Clear	Dry, most of the outer layer (with bubbles)has been lost
200304564	2147	4.6	2.2	8.4	Clear	Dry, most of the surface has been lost
200304565	2147	4.3	1.7	4.5	Clear	The outer layer (about half thickness) is loose
200435000	2379	9.4	5.3-5.8	3.8	Blue	Iridescent surface that is detaching
200435023	2379	9.9	4.8	3.7	Blue	Striated surface, small areas of brown iridescence
200435024	2379	10.0	5.1	4.3	Dark blue	Slightly iridescent and pitting, robust
200435025	2379	10.3	4.8	4.4	Dark blue	Robust
200435026	2379	9.7	4.6	4.1	Blue	Iridescent surface
200435027	2379	9.6	5.0	4.6	Blue	Striated surface, iridescent
200435029	2379	10.3	5.7	5.0	Dark blue	Striated surface but not iridescent
200435030	2379	9.6	5.1	4.9	Dark blue	Very striated surface but no iridescence
200435031	2379	10.0	4.9	3.8-5.1	Dark blue	Pits, robust
200435032	2379	9.1	3.6	4.7	Blue	Two halves, a deep crack, pits
200435033	2379	9.6	4.9	4.4	Blue	Pits, decayed surface
200435034	2379	9.7	4.0	4.7	Blue	Intact, a little decayed, not stabilized
200435035	2379	9.5	5.5	4.4	Blue	Intact and robust, hole was difficult to clean
200435036	2379	10.5	4.0	5.3	Dark blue	Very striated surface, but no iridescence
200435037	2379	10.3	4.8	4.6	Blue	Iridescent surface, partly detaching
200435038	2379	9.2	4.9	3.8	Dark blue	Scaly surface in part. Iridescent surface
200435039	2379	10.0	5.3	4.0	Pale blue	Light brown iridescent surface
200435040	2379	9.4	3.5	5.0	Dark blue	Striated surface but not iridescent

Appendix 2. Spectrum results of the XRF analysis on the selected beads

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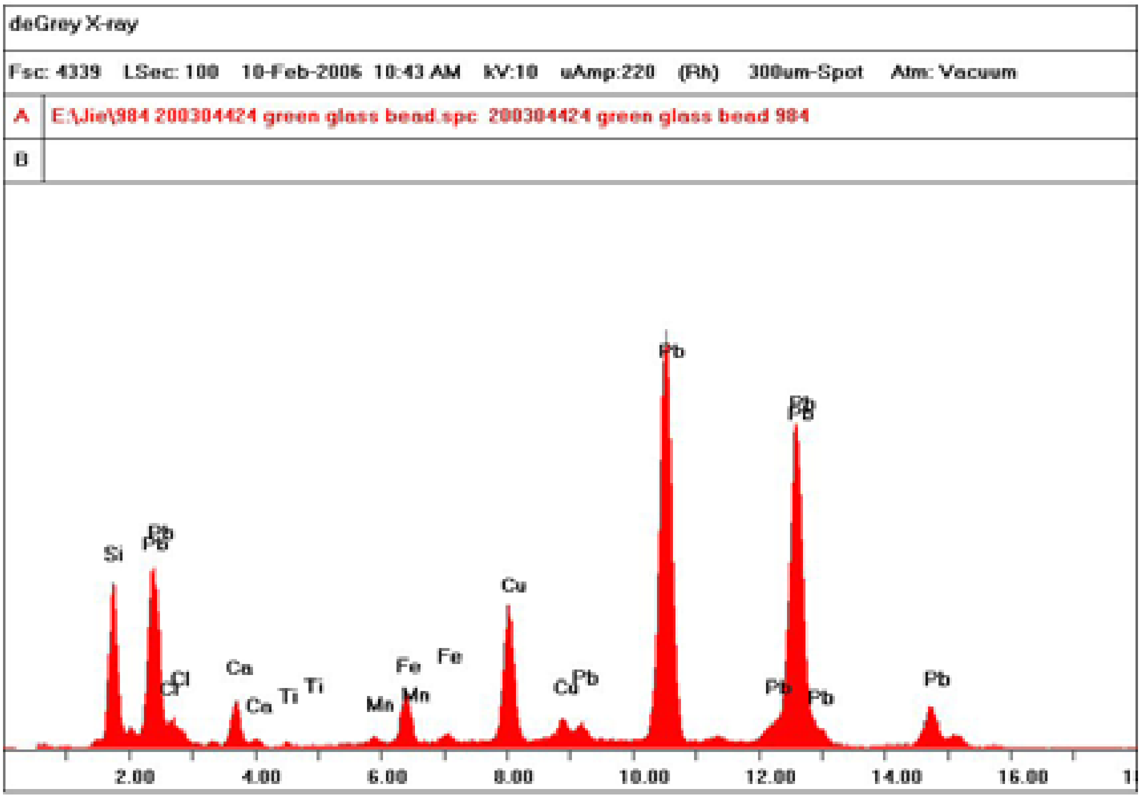
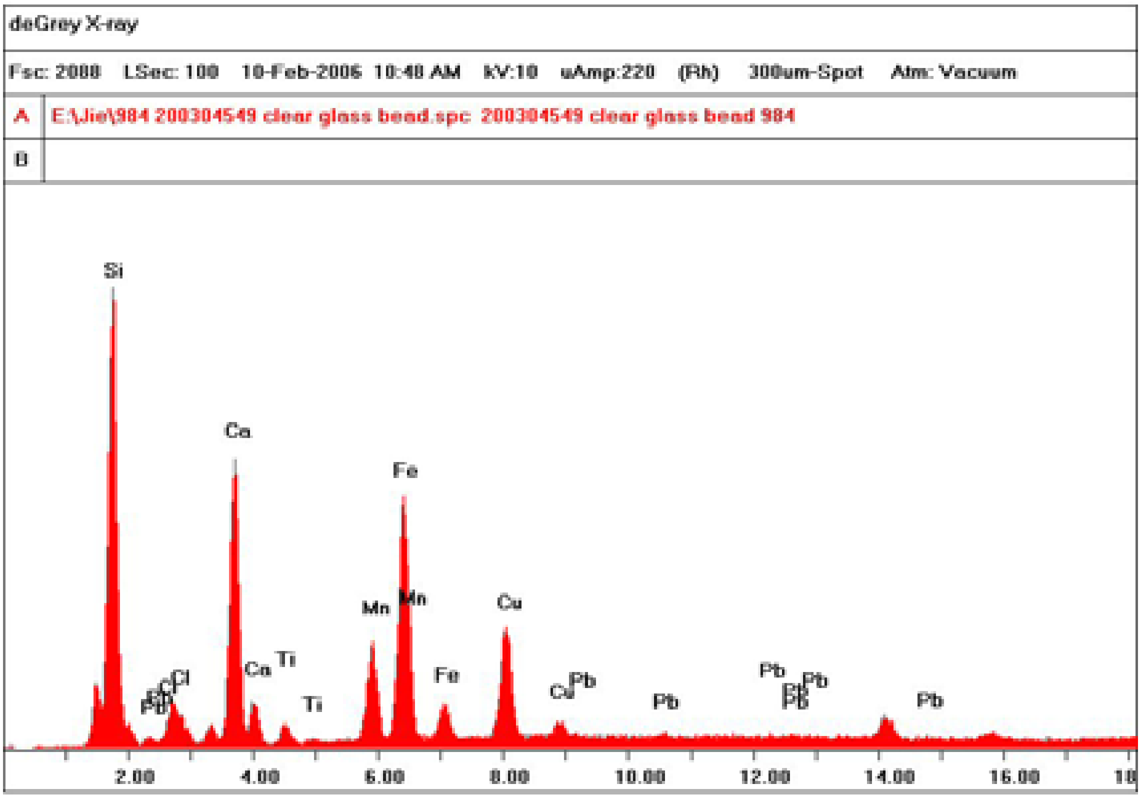
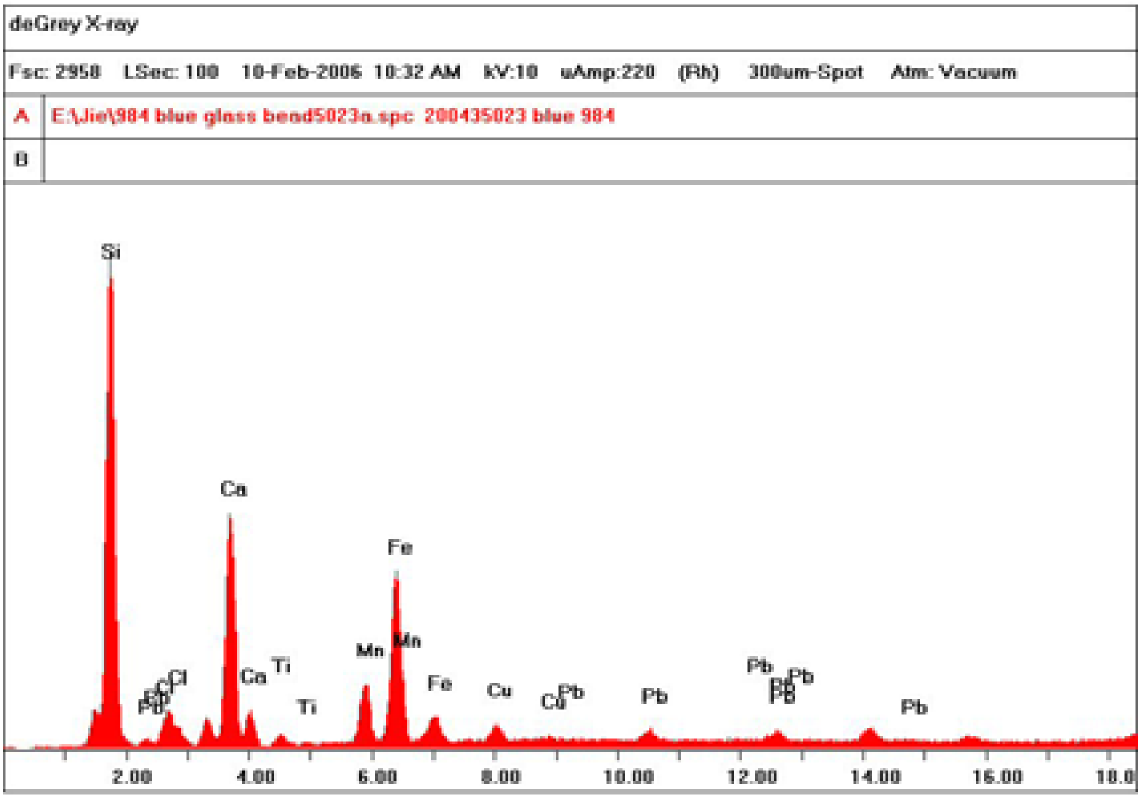
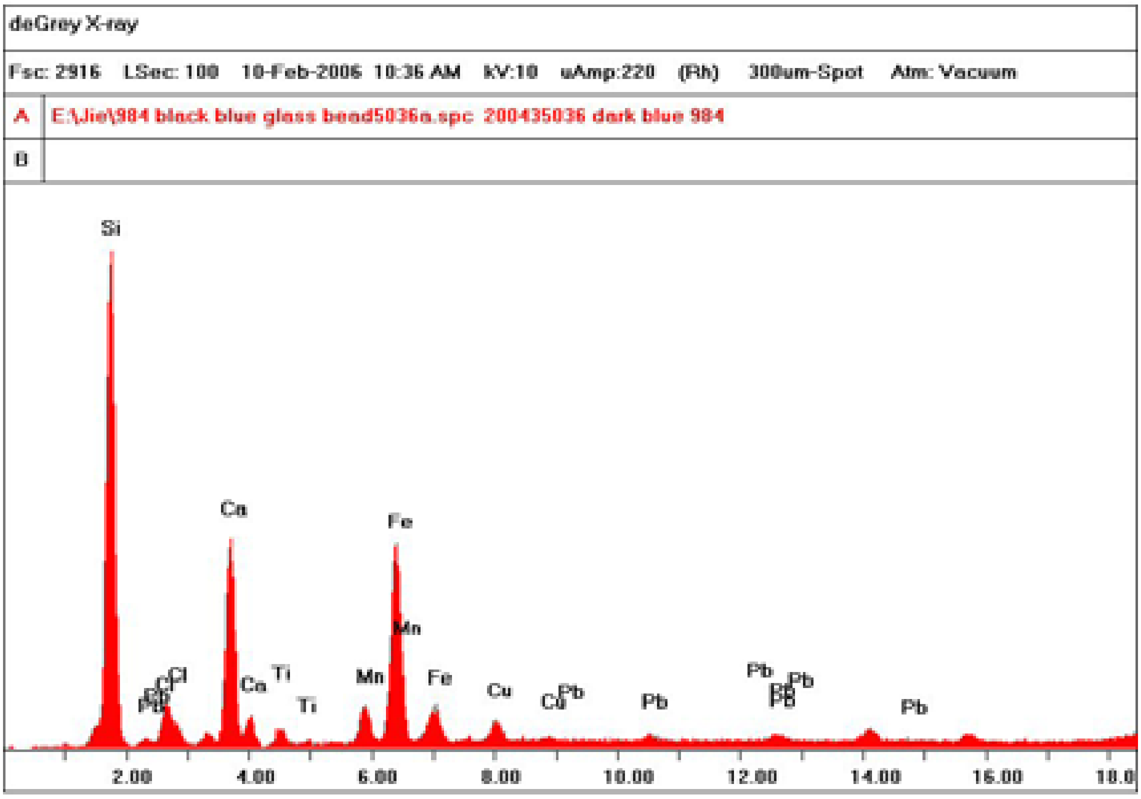




Appendix 2. Continued





Appendix 3. The glass beads after consolidation

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200304424

200304426

200304549

200304563

200304564

200304565

200435000

200435023

200435024

200435025

200435026

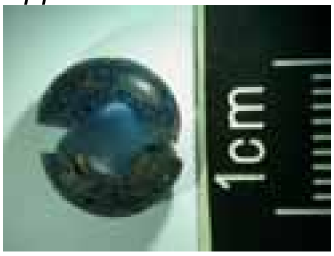
200435027

200435029

200435030

200435031

Appendix 3. Continued



200435032

200435033

200435034

200435035

200435036

200435037

200435038

200435039

200435040