The Petrology of some shell-tempered pottery from Cambridgeshire (Site LHP97)

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Introduction

Sixteen samples of Iron Age and Romano-British pottery containing shell temper were submitted for petrological and chemical analysis. The samples came from four separate sites (8, 28, 36 and 59) and were chosen so as to cover the widest possible range of fabrics, forms and decorations. By eye, the sherds were classified into five groups: IASH, IASHC, IASHF, SHEL and OX. A few samples contained only sparse shell fragments and were essentially sand-tempered wares (IASHF and OX). These were submitted to determine whether or not these wares differed solely in their coarse inclusions or whether they were manufactured from distinct clay sources. Thin-sections were prepared and stained using Dickson's method. Sub-samples of each sherd were then submitted for Inductively-Coupled Plasma Spectroscopy (ICPS).

TSNO	Sitecode	Context	cname
AG90	lhp97/28	1013	IASH
AG91	lhp97/59	1020	IASHC
AG92	lhp97/28	1033	IASH
AG93	lhp97/28	1033	IASH
AG94	lhp97/28	1036	IASH
AG95	lhp97/28	1037	IASHC
AG96	lhp97/28	1038	IASHC
AG97	lhp97/28	1033	IASH
AG98	lhp97/8	1049	IASH
AG99	lhp97/8	1049	IASHF
AG100	lhp97/8	1066	IASHF
AG101	lhp97/8	1072	OX?
AG102	lhp97/28	1075	IASHC
AG103	lhp97/28	1094	SHEL
AG104	lhp97/28	1094	IASH
AG105	lhp97/36	1089	SHEL

Aims and Objectives

The aims of the analysis were to test the validity of the visual classification, to compare the predominantly sandy and predominantly shell fabrics and to compare these with previously-examined Iron Age, Roman and later shelly wares from the East Midlands to see whether or not there were distinctive characteristics which could be used in provenance studies and thus aid understanding of local trade and cultural contacts.

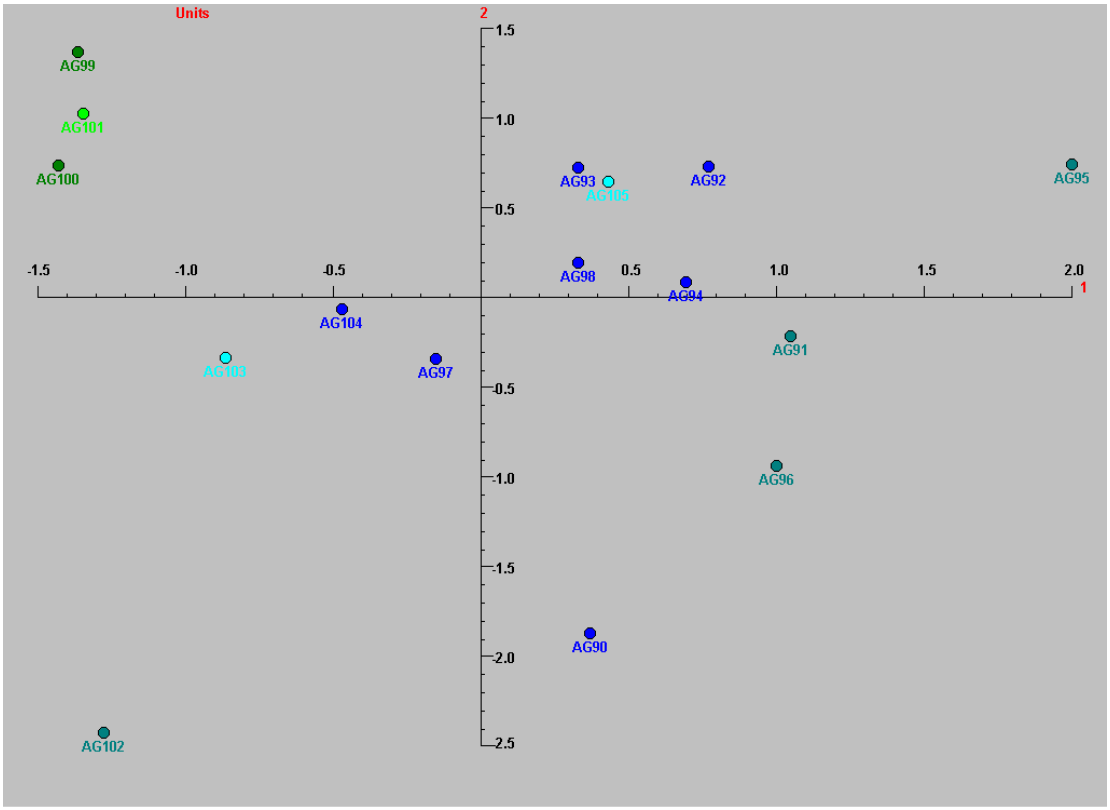
Description

Shell fragments were present in all three sand-tempered sherds but had been so altered by the firing that no petrological details were visible. All three contained only sparse rounded quartz grains, up to 0.3mm across but all contained rounded grog, which in one case was abundant (AG99).

The remaining samples all contained a range of calcareous inclusions in a low-fired, inclusionless clay matrix. Only one, AG91, contained sparse rounded quartz grains up to 0.3mm across. The majority of the inclusions were shell fragments of two types: nacreous bivalve shell (ie oyster-like) and punctate brachiopod shell. In addition were fragments of sparry calcite which the staining showed was rich in iron (ferroan calcite, stained blue). Fragments of echinoid shell and/or spine were also present.

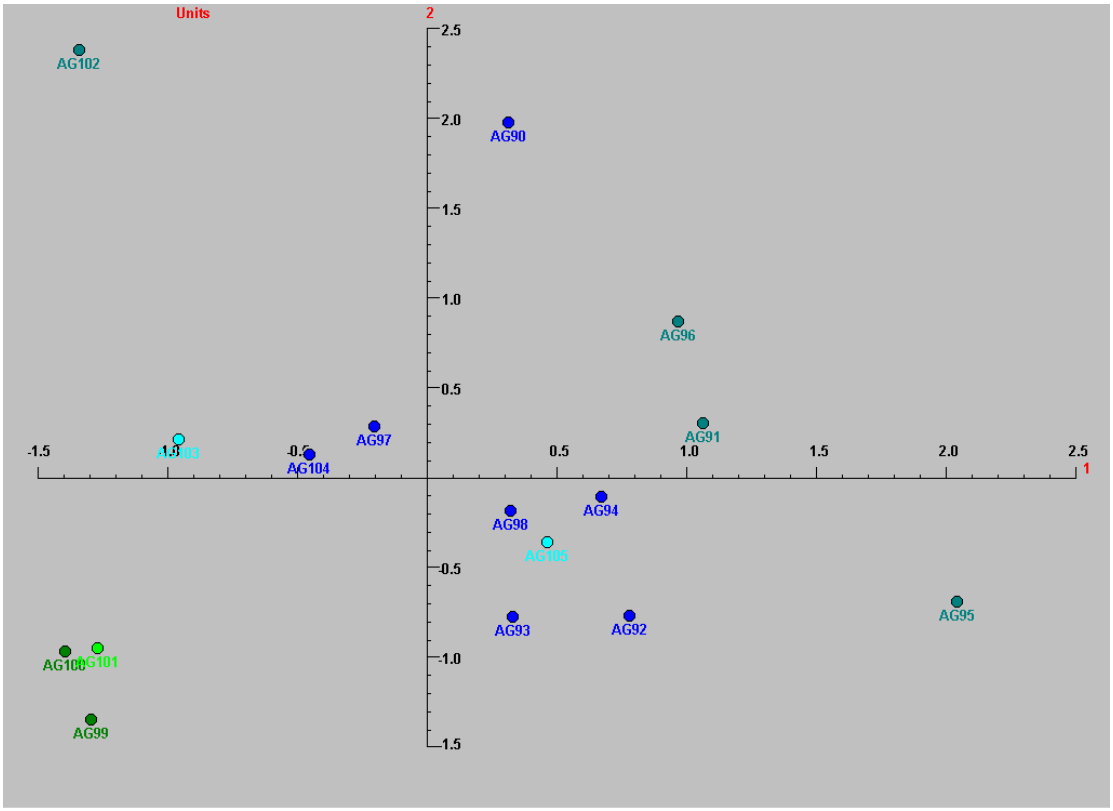
A single sample contained fragments of bryozoa (AG104). This sample was also distinguished by not containing ferroan calcite. A further sample, AG95, was distinguished by having no punctate brachiopod shell or echinoid shell. In addition, a large proportion of the shell inclusions were encased in ferroan matrix leaving no doubt that in this case the inclusions were of shelly limestone.

The ICPS data was analysed using the Bonn Archaeological Statistics Package (Winbasp) package. Using Principal Components analysis



Using the raw data, the main determinant of Principal Component 1 was calcium, followed by phosphorous. Naturally enough, those samples with mainly grog temper were grouped at one end of the diagram. However, one of the coarse shelly wares, AG102, was also placed at this end. However, the second component served to distinguish this sample from the grog tempered ones. The main determinant of PC2 is a mixture of rare earths (ND, SM, Y, DY, YB), which are higher in AG102 than in the grog-tempered sherds.

To ensure that the analysis was not simply grouping samples on their calcium content and was not affected by post-burial changes the program was re-run excluding both CaO and P_2O_5 (Fig 2).



This re-analysis demonstrated that it was still possible to distinguish the grog-tempered from the shelly wares even without taking CaO and P_2O_5 into account and that sample AG102 still had the same relationship to the grog-tempered samples (grouped together with them by one Principal Component and distinguished from them by the other. The shelly sample containing no punctate brachiopod shell or echinoid fragments (AG95) also fell to one side of the main shelly ware cluster both with and without the inclusion of CaO and P_2O_5. The second atypical shelly ware sample, AG104, was placed in the centre of the shelly ware cluster.

Examination of the main cluster showed that samples tended to trend diagonally across the graph, showing a relationship between the two components (an increase in one component being matched by an increase in the other). This is typical of situations where the relative proportions of elements stays the same but their absolute frequency differs. In other words, it is a dilution effect. Bearing this in mind, it is interesting to note that the three samples of IASHC (ie coarse shell) trended diagonally but with their trend line displaced from that of the remaining shelly wares (with the exception of sample AG90). It is possible, therefore, that IASHC and sample AG90 form a compositional subgroup. Coarse here refers to size of inclusions rather than their percentage by volume within the fabric and the IASHC samples span the entire range of the graph. We are not, therefore, looking at another dilution effect. The Romano-British shelly wares, fabric SHEL, had compositions which places them centrally in the IASH cluster.

Discussion

The ceramic petrology indicates that the three samples containing low quantities of shell have similar petrological characteritics and that all three contain grog. All three have a very similar chemical composition and form a discrete cluster using Principal Components analysis.

The shell-tempered sherds in the main are very similar to each other, with the exception of AG 95 and AG104. AG104 is similar to shell-tempered wares of Roman, mid Saxon and later date from the Lincoln area whereas the presence of bryozoa is characteristic of shell-tempered wares from Bedfordshire and Cambridgeshire (eg Harold in the Romano-British period and St Neots type ware in the late Saxon period). The first of these, AG95, is also distinguishable chemically from the remainder, although the second one is not. There is a probable chemical difference between the coarse and standard shelly fabrics (IASHC and IASH) but this is not visible petrologically and the Romano-British shelly wares (SHEL) are both petrologically and chemically identical to their Iron Age predecessors (IASH) and probably therefore used the same raw materials, prepared in the same manner.

The three main shelly wares (IASH, IASHC and SHEL) therefore form a group which share petrological characteristics and, in the main, chemical ones too. They are distinguishable from their northern and southwestern neighbours using petrolology and since the main difference is one of shell type it is probable that this distinction will be visible in the hand specimen using a binocular microscope. It is likely, now that these characteristics have been stated, that the presence of punctate brachiopod shell could be used to identify further examples of this fabric group.
One sample, AG95, is both petrologically and chemically distinct and may be an import to this area from further north, since it shares many characteristics with the shelly wares of the Lincoln area.