

Ancient Monuments Laboratory  
Report 55/96

THE CRUCIBLES FROM CASTLEFORD,  
YORKSHIRE

J Bayley

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Summary

A total of 28 crucible sherds from Roman sites were examined and the metal-rich deposits on them analysed qualitatively by XRF. Form and fabric were varied and atypical for the Roman period. Most of the crucibles were used to melt mixed copper alloys, but some evidence for silver melting and cupellation (assaying/refining) as well as the parting of silver from gold was also noted.

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## THE CRUCIBLES FROM CASTLEFORD, YORKSHIRE

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Crucible sherds were found both in the vicus and in the fort. Most provide evidence for the melting of copper alloys of various compositions but precious metals were also worked. The metal-rich deposits on all the sherds were analysed by X-ray fluorescence (XRF). The elements detected are listed in the catalogue in order of descending signal strength — which is not directly related to their abundance in the metal being melted. These results can sometimes be interpreted to suggest the type of alloy being worked.

The collection is notable for its diversity; at least ten different combinations of form and fabric are represented. Some crucibles are made of highly refractory fabrics which have been little affected by exposure to high temperatures, while others are deeply vitrified and only just survived their use. The more refractory fabrics are low in iron and the included temper varies from fine (comparable to that used for the clay moulds) to sandy and even coarser with ill-sorted inclusions of up to 5 mm. The forms of most of the crucibles are not those commonly found on Roman sites (Bayley 1988, Fig 5); none of them appear to be wheel thrown. The forms, where they can be determined, vary from hemispherical to globular, most with external diameters of 60-90 mm, though some larger vessels are represented. Many rim sherds have a pouring lip or spout.

Crucibles were found in both Fort I and II contexts in T12, T15 and T18. Apart from the two sherds associated with the vessel moulds (No 28), most were not of refractory fabrics. Two crucibles (Nos 12, 22) had been used to melt (or possibly refine) silver; the rest for melting copper alloys. One group of sherds (Nos 13, 25-27) appear to be from crucibles of a type common in southern Britain in late Iron Age times, though their use continued later in the north; they are triangular in plan and were heated from above. The size of (No 27) suggests a crucible side over 120 mm long, a size only approached by the largest Iron Age examples from Thetford (Wilthew *et al* 1991).

The crucibles from the vicus are all made of refractory fabrics. Two sherds (Nos 2, 4) come from Phase 2 contexts but the rest are Phase 3 or later. These include parts of two cupels (Nos 1, 8) which were used to test the purity, or refine small quantities of silver (Bayley 1988), and four sherds (Nos 3, 5-7) from one or more crucibles, probably of a globular form. The non-cupels were used to melt mixed copper alloys containing tin, lead and zinc.

Further crucibles came from the Phase III dumping of rubbish on the site of the fort. Most are again of refractory fabrics though the form/fabric combinations, where they can be identified, are different from those from the vicus itself. Three sherds are worthy of individual mention: One (No 19) has a thick vitreous layer on its inner surface which has been covered with a thin layer of clay and re-used, producing a second vitreous layer. It is unusual to find positive evidence that a crucible was used more than once. The fabric of the second (No 9) is very coarse, and the wall thickness and likely vessel size far greater than is to be expected before the post-medieval period; I know of no Roman parallels. The metal on this sherd is brass. The third sherd (No 23) is notable as it provides evidence for parting (separating gold from silver). Roman parting vessels have so far only been identified from four other sites in Britain. The form of this vessel can be compared with those of the 1st

century parting vessels from Exeter (Bayley 1991).

Overall, the dating and distribution of the crucibles from Castleford is as variable as their form and fabric. This suggests there were many separate episodes of metalworking, both military and civilian, rather than continuous use of a single workshop by a group of craftsmen.

### Catalogue of crucibles

- 1 Cupel rim sherd. Shallow dish, diam. 65 mm with vitreous deposit inside. XRF: Pb Cu Zn Ag. T10 F145 SF1008: Post vicus 3rd/4th
- 2 Crucible rim sherd of fairly refractory fabric. Vessel diam. 90 mm, wall th. 7 mm. XRF: Zn Cu Pb Sn. T10 L389 SF1662: 2
- 3 Crucible wall/base sherd. Wall th. 7 mm + extra outer layer in same pale grey sandy refractory fabric. XRF: Zn (Cu). T10 537 SF1687: 3
- 4 Crucible wall/base sherd of fairly refractory fabric. Wall th. 12-18 mm. XRF: Zn Cu Pb. T10 L389 SF1730: 2
- 5 Crucible wall/base sherd of pale grey sandy refractory fabric (cf Cat 3). Wall th. 9-18 mm. XRF: (Zn Cu). T10 F909 SF2083: 3
- 6 Crucible wall/base sherd of pale grey sandy refractory fabric (cf Cat 3). Wall th. 10-15 mm. XRF: Cu Zn. T10 F900 SF2115: 3/4
- 7 Crucible wall/base sherd of pale grey sandy refractory fabric. Wall th. 15 mm. XRF: Cu Zn Pb Sn. T10 F900 SF2248: 3/4
- 8 Cupel body sherd. Wall th. 5 mm. XRF: Pb Cu Ag (Zn). T10 F493 SF2393: 3
- 9 Crucible body/base sherd in coarse and refractory fabric with added outer layer of even coarser fabric and thin extra outer layer. Wall th. 25-35 mm. Vessel diam. over 200 mm. Cuprous corrosion products visible in fracture. XRF: Cu Zn. T12 026 SF45: IIIA
- 10 Crucible rim sherd or ? potsherd that has been overheated and collapsed at one edge. Inside is a massive deposit of copper-preserved organic material. XRF: Zn Cu Pb Sn. T12 107/3 SF77: IIB
- 11 Two crucible (?)rim/lip sherds. Wall th. 6 mm. XRF: Zn (Cu Pb). T12 228 SF342: IB
- 12 Crucible rim sherd with pulled out lip. Wall th. 6 mm. XRF: Zn Cu Ag. T12 006 SFSG6:
- 13 Crucible rim sherd, partly oxidised fired on outside. Not curved and thus probably from a triangular crucible. Wall th. 10 mm. XRF: Zn Cu (Pb). T13 001/3 SF12:

## Modern

- 14 Four sherds (3 join) from a crucible, deeply vitrified on the outside of the base and lower part of the walls, with traces of an added clay layer near the top of the walls, possibly a luted on lid (cf Frere 1972, Fig. 141, 2 and 3 - though these illustrations do not clearly show the added layer). Int. diam. 60 mm, depth c.35 mm, wall th. 7-13 mm. XRF: Zn. T13 302 SF82: Medieval
- 15 Crucible rim sherd, ?unused. Wall th 6 mm. XRF: (Zn Cu). T14 039/3F SF73: IIIA
- 16 Crucible rim sherd. Ext. diam. 60 mm, wall th. 5 mm. XRF: Ag Pb (Cu Zn). T14 039/1C SF74: IIIA
- 17 Crucible rim sherd with thick vitreous deposit inside. Int. diam. c.70 mm, wall th. 18 mm. XRF: Cu Zn Pb Sn. T15 201 SF32: Modern
- 18 Parts of three crucibles. A) Rim with pouring lip and thick vitreous deposit inside (cf Cat 17). Ext. diam. 120 mm, wall th. 20 mm. XRF: Cu Pb Zn Sn. B) Body sherd, wall th. 4mm with coarse extra outer layer, th. over 8 mm. XRF: Zn Cu Pb Sn. C) Rim sherd of fine refractory fabric. Ext. diam. 65 mm, wall th. 11 mm. XRF: Zn Cu Sn (Pb). T15 203 SF76: IIIB
- 19 Half of crucible of refractory fabric with thick vitreous layer inside, relined and reused with second vitreous layer on top. Ext. diam. 95 mm, wall th. 20 mm. XRF: Cu Pb Sn. T15 203 SF86: IIIB
- 20 Two rim/?lip and three body sherds, deeply vitrified on the outside, probably from a single vessel (?cf cat 14). Wall th. 8-12 mm. XRF: Cu Zn. T15 624 SF473: ID
- 21 One rim/lip and five body sherds, deeply vitrified on the outside, probably from a single vessel (?cf Cat 14). Int. rim diam 50 mm, wall th. 8-15 mm. XRF: Cu Zn. T15 660 SF492: ID
- 22 Crucible rim fragment, partly oxidised fired on outside. Ext. diam. 70 mm, wall th. 6 mm. XRF: Pb Ag (Cu Zn). T15 680/1 SF528: IB
- 23 Rim sherd of oxidised-fired vessel. Ext. diam. c.150 mm. XRF: Cu Ag (Zn). The ferruginous deposit on the inside of this vessel and the bleached and discoloured purplish-pink of most of the thickness of the wall indicate that it was used to part silver from gold (Bayley 1991). T15 909 SF583: IIIA
- 24 Crucible rim/lip sherd in a refractory, micaceous fabric with traces of a thin added clay layer, possibly originally part of a bar across the crucible lip to hold back any debris floating on the molten metal. XRF: Zn Cu Pb Sn. T16 513/A SF102: IIIB
- 25 Crucible rim sherd of coarse, ill-sorted fabric, oxidised fired on the outside and slightly vitrified inside near the rim. Probably from a triangular crucible. XRF: Zn. T18 032 SF11: IIB

- 26 Crucible rim sherd of coarse, ill-sorted fabric, oxidised fired on the outside and vitrified near the rim; possibly from a triangular crucible. XRF: Zn Cu Pb Sn. T18 034 SF50: IIB
- 27 Crucible rim/wall and rim/lip sherds, from triangular crucible(s) with side of over 120 mm. Wall th. 13-18 mm. XRF: Zn Cu Sn (Pb). T18 031 SF36:
- 28 Two crucible sherds, body and rim/lip, of fine refractory fabric. Wall th. 11-15 mm. XRF: Zn Cu (Pb). T18 087: IIA

### References

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Not crucibles:

T9 F990 SF1210: IIIA/B	Possible clay mould fragments Fabric different to those of two main mould groups
T10 L121 SF2395: 3	Overheated potsherd
T13 002 SF2: Modern	oxidised fired sherd with lead glaze on inside
T12 048 SF65: IIB	fired clay
T14 310 SF505:	potsherd with accidental fuel ash glazing on rim
T15 1145 SF833: IC	iron panning
T15 1128 SF901: ID	potsherds
T18 009 SF4: Modern	pot, not crucible
T19 003 SF12:	potsherd with accidental fuel ash glazing on outside