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Assessment of archaeometallurgical residues from Chepstow Castle Inn

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Abstract

This watching brief produced an assemblage of approximately 13.5kg of archaeometallurgical residues (158 pieces), together with 20 items of other materials (totalling 1.8kg).

Of the archaeometallurgical residues, 77% (by weight) were identifiable as bloomery iron smelting residues, with a further 5% probably so; up to 18% were either certainly or possibly from iron working (smithing).

The iron smelting slags are suggestive of residues of a medieval, rather than older, origin. The larger piece of tapped slag present (e.g. blocks weighing 505g and 1586g from (12) in Plot 1) provide tentative evidence for a technique in which the slag was tapped in relatively small volumes between clearance of the tapping channel/pit. Such a technique may have been practiced in the Roman period and probably also in the late medieval (14th-15th century), but contrasts with common technique of the 11th-13th century which seems to have generated a single large (commonly >10kg) tap slag cake per smelt.

The assemblage included six examples of rounded and polished iron ore pebbles (of Forest of Dean type). These are likely to have arrived at the site as river transported pebbles, rather than as mined ore and can probably be considered as 'natural'.

The evidence for smithing includes some fragments of thick slag masses likely to be parts of smithing hearth cakes (SHCs) produced during the processing of raw blooms, but evidence for smaller SHCs was also present, including a 140g piece from (12) in Plot 2 that showed evidence for the use of coal as fuel – an indicator of smithing as the end use of iron (blacksmithing).

The submitted materials also included seven concretions, most of which were probably cored in iron artefacts. There was also an incomplete example of a post-medieval glass handled linen smoother (from (43) in Plot 1).

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Methods

Background

This assessment was commissioned by Jean-Yves Robic of Cardiff Archaeological Consultants (CAC) following a watching brief on a development at Chepstow Castle Inn.

All submitted materials were examined visually in September 2025, using a low-powered binocular microscope where required. They have been catalogued (Table 1). No instrumental analysis was undertaken.

Setting

The site lies to the rear of Chepstow Castle Inn (12 Bridge Street; centred upon [ST536941] just 100m E of Chepstow Castle, 180m S of Chepstow Bridge and 150m N of St Mary's Priory Church.

Results

General

This watching brief produced an assemblage (Table 1) of approximately 13.5kg of archaeometallurgical residues (158 pieces), together with 20 items of other materials (totalling 1.8kg).

Of the archaeometallurgical residues, 77% (by weight) were identifiable as bloomery iron smelting residues, with a further 5% probably so; up to 18% were either certainly or possibly from iron working (smithing).

Residues from bloomery iron smelting

Residues from bloomery iron smelting were mainly fragments of tapped slags. Some 63% by weight of the overall archaeometallurgical assemblage was made up of dense tapslags, typically showing a maroon surface colour to the upper surface of the flow lobes (resulting from oxidation in the atmosphere when hot). Although the colour of some of the dense slags was noticeably green, there were other examples of coarser, vesicular slags with a greenish colour and visible elongate olivine crystals, that provided an even clearer indication of the presence of a proportion of tapslags with a particularly low iron content.

Most of the tapslags were in small pieces; very few larger pieces were present. Blocks weighing 505g and 1586g from context (12) in Plot 1 provide tentative evidence for a technique in which the slag was tapped in relatively small volumes between clearance of the tapping channel/pit. The 505g block shows that once tapped and detached from the furnace, the blast escaping through the tapping arch was sufficient to remelt and oxidise the rear of the block.

Various examples of pieces of concavo-convex slag blocks ('bowls') that lack certain criteria to allow identification as smithing hearth cakes (SHCs) are likely to be slags formed in the base of the smelting furnace.

A single large fragment of deeply vitrified and bloated reduced-fired furnace wall is almost certainly from a smelting furnace rather than a smithing hearth (in which deep vitrified of the reduced sections is unusual).

Various slag fragments have been recorded in table 2 as indeterminate. These include fragments too small for confident identification and most, as for the category of richly charcoal-bearing slags, are likely in practice to be from iron smelting.

Residues from iron smithing

There was rather little material certainly from iron smithing (489g). Rather more has been categorised as possibly from SHCs, but certain discrimination of pieces from large SHCs from the basal furnace slags from bloomeries is not typically possible on fragmentary material.

Several pieces amongst this uncertain class are sufficiently large, that if from SHCs, they would be indicative of slags produced during bloom refining.

Evidence for smaller SHCs was also present, including a 140g piece from context (12) in Plot 2 that showed evidence for the use of coal as fuel – an indicator of smithing as the end use of iron (blacksmithing).

Other pyrotechnological materials

Clinker (the inorganic residue produced from the burning of coal) was represented by just a single isolated fragment (from context (31)), but was also present as inclusions in a fragment of mortar from context (82).

A small partially melted siltstone pebble was recovered from context (31).

A fragment of a partially melted quartz-rich material – perhaps a coarsely sandy brick, was recovered from context (82).

Iron ore

The assemblage included six examples of rounded and polished iron ore pebbles (of Forest of Dean type). Examples with both stalactitic texture (brush ore) and micro-botryoidal textures were present. The high degree of polish indicates that they are likely to have arrived at the site as river transported pebbles, rather than as mined ore and can probably be considered as 'natural'.

Other materials

The assemblage contained several examples of iron objects coated in rust and concretion. One of these was identifiable as a small nail, but others would require X-radiography to determine the nature of the core of the concretion.

A more significant artefact was represented by a 200g rounded piece of glass from context (43). This may be identified as a substantial fragment form a post-medieval handled linen smoother.

Other materials present included pieces of natural stone from contexts (12), (47) and (82) together with a multi-layered block of mortar from context (82).

Interpretation

The iron smelting slags are suggestive of residues of a late medieval, rather than older, origin on the basis of apparently small individual tap volumes and the presence of a significant proportion of very iron-poor tapslags.

The lack of evidence for the tapslags having been part of large blocks suggests a technique in which the slag was tapped in relatively small volumes between clearance of the tapping channel/pit. Such a technique may have been practiced in the Roman period and probably also in the late medieval (14th-15th century), but contrasts with common technique of the 11th-13th century which seems to have generated a single large (commonly >10kg) tap slag cake per smelt (e.g. Alexander *et al.* 2023; Young 2019). Roman iron smelting in the area involved a technique that produced abundant slag rods (e,g, Young 2014, 2021), a type of residue lacking from the present assemblage and also a high proportion of slags from within the furnace, which again is not a feature of this assemblage. On balance, although a Roman age forr the residues cannot entirely be excluded, a late medieval age seems far more likely.

Late medieval furnaces may have produced larger slag volumes than in earlier periods, making accumulation of a single tapslag cake impractical. The tapping channel was cleared regularly, resulting in smaller individual cakes. The presence of slags of relatively low iron content has been noted on other sites of medieval age in the area (Young 2019).

Discussion

The archaeometallurgical residues are suggestive of a residual spread of materials and cannot therefore be assumed necessarily to derive from a single phase of activity. 81% of the residue assemblage by weight derived from (12) and 6% from buried soil (50). Probably later deposits (soil (3), levelling deposit (41) and the fills of pits [13], [26], [30], [42] and [47]) only produced a total of 13% of the total.

The smaller pieces of bloomery tapslag could, in theory, be of any age between the later Iron Age and the early post-medieval. If, however, the supposition of a single origin is made, then the assemblage would be most likely to be attributable to the late medieval period.

The proportion of the assemblage firmly suggesting bloomery iron smelting is 85%. Iron working (smithing) is likely to be represented by 3% and 9% of the assemblage. There is considerable doubt in the attribution of some of the dense slag 'crust' and 'bowls' – firm discrimination between the large SHCs of the period and the residual slag left inside a smelting furnace after tapping most of the slag is problematic in small fragments and accreted material. The large items, if genuinely from smithing, would derive from the initial working of the raw blooms. A single SHC containing residual coke is indicative of the use of coal as a fuel – which is restricted to blacksmithing rather than bloom refining.

Late medieval iron production is not well documented across the region. Most of both the archaeological and documentary evidence pertains either to a slightly earlier period (12th-13th centuries) or to the early post-medieval. Thus, the present evidence is significant even if tentative and based on solely on residual material.

The broadly riverside area of Chepstow would be an area likely to be involved in the consumption of iron (particularly in association with shipbuilding) but also would be an area with ease of access for ore brought from the Forest of Dean (both by road and by ship). The ore fragments recovered in this project are all Forest of Dean type ores but are, however, highly polished pebbles – and thus likely to be of natural origin from the local river gravels and not directly related to the smelting activity.

Interestingly, the old laws of the mining industry in the Forest of Dean (the 'Book of Dennis'; usually attributed to the late medieval period, probably the 14th century, although the earliest written copy is of the early 17th century; Nicholls 1866, 72-73) makes reference to iron production in the areas outside the bounds of the Forest by reference to the smiths of Caerleon, Monmouth, Trellech, Berkeley and Newport, but makes no reference to Chepstow.

Further work

These materials would be capable of providing further information of archaeological significance through detailed laboratory analysis (for instance the likely source of the iron ores and clarification of details of the process).

However, the utility of that information is greatly reduced by the residual nature of the assemblage.

Accordingly, no programme of laboratory analysis is proposed. However, this project should act as a marker that further evidence is likely to be encountered in this part of Chepstow – and that more extensive assemblages would be worthy of detailed investigation.

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Table 1: catalogue of submitted materials.

Location	C	find	S wt	I wt	I No	I notes
PLOT 1						
Plot1	3		371	371	1	slag encased in concretion, possible burr at one end - if so, probably SHC
Plot1	12	<1>	2300	123	1	concretion, probably on thin curving iron object
				926	12	tapslags, mostly fine grained, all with reddening
				505	1	unusual block of tapslag - the channel appears 120x45mm, the rear end of flow has been melted, very strongly reddened and has dropped away below upper surface; slag in very broad flows; moderately vesicular; base shows flow lobes clearly and has little stalactites of slag below melted end
				163	6	fragments of slightly lobate slags - all probably from lower part of tapslag flows, but not certain
				584	1	block of thick sheet-like slag, 50mm thick; base smooth, slightly curved; slag increasingly vesicular towards very irregular top; rusty patches on top; unclear what this is - hearth slag or large SHC?
Plot1	12	<2>	3273	1586	1	large block of tap slag from margin of irregular pit; 85mm max thickness; if thickest point was central would suggest a subcircular mass; slightly impinged by steep object on one side; internally a bit chaotic, but top layer neat; not strongly reddened
				236	1	concretion probably on iron object
				93	1	large piece of reduced-fired bloated vitrified wall
				669	11	tapslags with reddened surfaces; most are conventional although the slag of many is fine-grained and slightly khaki
				83	2	thin irregular slag sheets, rough
				23	1	thin prilly slag sheet; completely weathered to buff colour
				208	1	irregular lump of charcoal-rich slag - could be from smithing or smelting
				164	1	very dense lump of vesicular slag with curved finely dimpled base; internally shows part of unroofed void; probably a smithing slag fragment
				108	1	part of vertical margin of a tapslag accumulation; reddened top; rough margin; large internal voids
				53	4	scraps of indeterminate vesicular slag
				32	1	dense vesicular slag - possibly a lump fractured from an SHC bowl
Plot1 T2	12		249	50	1	small puddle of conventional tapslag
				39	1	concretion on slag or iron
				23	1	small iron rich concretion - rich in accreted organic material (straw?)
				133	1	slag with accreted surface; morphology hints that this s a smithing slag

Plot 1 T4	12	57	57	1	very worn lobate slag, vesicular; some smooth maroon areas, but not typical low lobes; probably a smelting slag
Plot2 T10 P2-9/P3-1	12	777	66	1	rhomboidal piece of iron 35mm across and 5mm thick; in fragmenting concretion
			181	6	fairly conventional dense tapslag, although some pieces are noticeably finer and greener than others
			446	3	fragments of medium sized SHCs; clearest piece is 35mm thick, shows blown and reddened top; rather layered internal structure (341g)
			45	1	low density greenish slag; lobate base; lots of charcoal inclusions
			39	1	worn slag piece; no detail visible apart from fragments of maroon, slightly lobate, surfaces at one end
Plot1	14		184	2	conventional tapslag, part of moderate cake
			15	1	thin concavo-convex sheet; base of tapping channel? Has dimpled base so probably not from furnace wall (also contains bag of charcoal 44g and bag of pottery 21g)
Plot 1 T2	41	437	128	3	fragments of conventional tapslag
			305	1	very dense angular slag fragment; mostly massive and coarse; one margin shows prilly texture; upper? surface shows a very large fuel/wood mould with very detailed surface; resembles a Roman within-furnace slag, but could just be the proximal end of a large SHC; proximal part contains white sandstone? clast
Plot1 T2	43	200	200	1	incomplete glass plano-convex disk; 90mm diameter by 30mm thick; scar of handle on planar side; handled linen smoother 16th century or later
Plot1 T2/T3	43	112	112	1	concretion on iron - possibly a c50mm diameter ring

PLOT 2

Plot2	3	147	16	1	grey flow slag from inside fuel bed
			128	1	very irregular embayed lump of highly weathered slag containing fine charcoal
Plot 2 T7	12	30	30	1	small fragment of slag, one face pale, the other darker and rustier; dark smooth surface wraps around one side in a few preserved patches, perhaps most likely to be from smithing but uncertain
Plot2 T7	12	90	66	3	small fragments of dense conventional tapslag with maroon surfaces
			24	1	pale greenish tapslag with maroon surfaces; thin sheet with deep fuel moulds on underside; lobes show columnar fayalite
Plot2 T7 P2-5/P2-6	12	68	4	1	iron in angular fragment
			16	1	pale vesicular slag with flat maroon top
			46	1	small piece of conventional dense tapslag

Plot2 T7 P2-4/P2-5	12	358	66	2	dark tapslag like piece, but dark not reddened surfaces, dimpled base with fine charcoal imprints
			46	1	dense lobe of conventional tapslag; maroon surface; little vesicularity
			9	1	small thin tapslag piece; surface maroon upon pale green slag
			231	1	very coarse dense slag; might be basal crust from furnace slag; hint of possible rodding; alternatively, could be close to burr of SHC with fuel dimpled top
Plot2 T8 P2-2/P2-5	12	285	121	4	conventional dense tapslag pieces
			33	1	lobate pale slag, apparently base of a tapslag piece; moderately vesicular and moderately coarse
			126	1	moderately dense, greenish grey, vesicular slag, with some surviving reddened lobes on top; 45mm thick
Plot2 T8 P8-5/P2-7	12	630	229	5	conventional tapslag; grey; moderate to low vesicularity; maroon surfaces
			156	5	fairly conventional tapslag; varying degrees of vesicularity; slag slightly greener than group above
			29	1	polished pebble of iron ore
			10	1	corroded and accreted iron nail; 55mm long with tip turned over
			33	1	iron object in concretion
			27	1	small irregular mass of clinker
			140	1	somewhat irregular semi-circular slag sheet with protrusions both up and down; lots of fuel inclusions in vesicular slag - at least some of which appear to be coke; crudely plano-convex; 80x50x25mm for main body
Plot2 T9 P2-1/P2-2	12	46	19	1	polished pebble of iron ore, passing laterally in brownish micaceous siltstone?
			27	1	very worn dark flow slag with large voids and very little original surface (dark)
Plot2 T10 P2-1/P2-P4	12	174	142	1	very dense fragment from 45mm thick tapslag sheet, conventional, low vesicularity, base very well-developed lobes
			29	1	small fragment of very dense conventional tapslag
Plot 2 T11 P2-7/P2-9	12	165	56	3	pieces of dense conventional tapslag with maroon surfaces and low vesicularity
			48	1	very worn fragment of tapslag; some traces of less vesicular layer with maroon surface on top, but lower part of the piece is coarse, with saccharoidal texture and highly vesicular
			57	1	relatively low-density piece, worn and accreted; top shows some crude raised maroon lobes and dimples, but this could be base and slightly dished opposing surface (covered in accretion the top) - in which case cannot exclude being an SHC fragment
Plot2 T12 P2-3/P2-6	12	328	209	2	pieces of conventional, very dense, maroon-surface tapslag, c25mm thick sheets; bases prilly and dimpled
			74	1	fragment through cake of pale, greenish slag; base lobate and prilly; lower 15mm coarse vertical acicular fayalite; upper 25mm chaotic vesicular slag, culminating in some maroon surface flow lobes; iron-poor tap slag; basal columnar layer rotates to merge with upper lobate layer around block - result of viscous flow after some solidification
			42	1	margin from chaotic, slightly vesicular tapslag; finely dimpled base; deformed upper layer

Plot2 T12 P2-8/P2-12	12		104	104	1	very dense and unusually lustrous tapslag, unroofed, lower parts show columnar fayalite, inclined planar non-wetted surface for base - shallow angle stone/metal? Lustre resembles sheen on some copper smelting slags
Plot2 T12 P2-5/P2-8	12		73	73	1	conventional tapslag
Plot2 T12A P2-11/P2-12	12		196	62	1	tapslag fragment with dark slag and maroon surface; base shows fine flow lobes
				67	1	tapslag fragment in pale, greenish slag with maroon surface, base lobate and dimpled
				64	1	pad of worn slab, shows small lobes internally, but unclear if from somewhat irregular tapslag or a SHC
Plot2 T12A P2-10/P2-11	12		13	13	1	polished pebble of botryoidal goethite, dense
Plot2 T9 P2-1/P2-2	47		826	532	1	large block of 'puddingstone' (quartz conglomerate from the 'Old Red Sandstone'); one surface is smooth, but probably natural wear rather than being a quern fragment
				293	1	highly accreted dense piece; form suggests this is the side of large bowl - but slag obscured so not possible to determine if smelting or smithing; slightly magnetic

PLOT 3

Plot3	12	-0.80m below SF03	83	21	1	coal
				62	1	rather inflated lobe of vesicular grey tapslag with maroon surface
Plot3 T13 P2-10-P3-2	12		559	68	1	fragment of conventional dense tapslag; maroon surface; base dimpled with charcoal impression
				46	1	thin sheet of tapslag; surface maroon, internally greenish suggesting low iron content; base partly torn to reveal coarse fayalites
				286	1	irregular crudely plano-convex fragment; side steep; shows smooth dimpled and reddened surface in places; top fractured, rusty; base irregular; could be furnace slag or SHC
				158	1	margin of shallow cake of vesicular fayalitic slag; base worn, dimpled; lobed in places, but worn to reveal the vesicularity; top irregularly dimpled with fuel impressions; unclear if chaotic tapslag margin or an SHC
Plot3 T14 P3-2/P3-3	12		195	122	2	very dense dark surfaced tapslag, slightly lilac limestone (?) inclusions in vase to 20mm.
				69	1	slightly irregular thin rusty tapslag sheet

Plot 3 T14 P3-2/P3-3	12	152	100	2	dense tapslag with maroon flow lobe surfaces, dimpled bases, very sparsely vesicular
			15	1	grey, lustrous flow slags in prills that chilled in fuel bed.
			39	1	base of flow of fayalitic slag; dimpled base; large internal voids like tapslag, weathered
Plot3 T14 P3-3/P3-4	12	142	142	1	fragment of sheet of highly vesicular slag; flow lobed top; irregular rough base, charcoal inclusions on base; slag coarse grained, fresh; lilac tint to fine coating on vesicle margins
Plot3 T15 P3-5/P3-6	12	338	95	1	upper part of an almost clinkery-appearing tapslag flow; base is a fracture revealing very vesicular slag below
			216	1	large very irregular, porous slag lump; some 30mm grey pebbles on one side; base possibly tool marks; very vesicular
			25	1	small fragment of fayalitic tapslag
Plot 3 T15 P3-6/P3-7	12	91	2	1	narrow slag prill, dark grey
			17	1	small tapslag fragment, dark lustrous surface
			70	1	nub of microprilly slag, large fuel impression on one surface; dimpled; locally rusty
Plot3 T16 P3-5/P3-8	12	31	31	1	lobe of flow slag with reddened surface, rough base
Plot3 T16 P3-2/P3-5	12	134	54	1	rounded lump of dense brush ore
			38	1	small fragment from upper part of tapslag flow; maroon lobe surface; massive fine slag; few vesicles
			39	1	slightly wrinkled worn lobe of highly vesicular fayalitic slag
Plot3 T17 P3-8/P3-9	12	107	107	1	fragment of tapslag, single thick flow; maroon top, dimpled base; large void; only sparsely vesicular
Plot3 T18 P3-4/P2-12	12	173	62	2	conventional dense tapslag fragments
			108	1	unusual large elongate dark-surfaced flow lobe; 30mm wide and 25mm deep; fine on vertical fracture but torn base is more coarsely granular
Plot3 T17 P3-9/P3-10	12	40	38	3	abraded fragments of tapslag with strongly maroon surface, moderately vesicular
Plot3 T18 P3-7/P3-10	12	83	24	1	lobe of conventional dense tapslag, dimpled base, maroon top
			55	1	pale vesicular tapslag with maroon surface to lobes; carries fine charcoal inclusions
Plot 3 T19 P3-9/P3-6	12	307	18	1	lobe of flow slag with reddened surface, rough base
			170	1	rather irregular worn block of tapslag; has wispy, finely lobed and rough surfaces, not good flow lobes; moderately vesicular; base rich in fine charcoal
			117	1	irregular block of vesicular fayalitic slag; some maroon smooth surfaces and some chaotic (?) internal prills

Plot3 T19 P3-3/P2-11	12		16	16	1	polished pebble of dense iron ore
Plot 3 T19 P3-6/P3-3	12		130	129	1	fragment of highly vesicular, slightly irregular slag sheet 20mm thick; where surface preserved it is black and dimpled, with charcoal imprints; probably a furnace slag
Plot3 T14 P3-2/P3-3	12		64	13	1	small fragment of conventional dense tapslag with maroon surface
				49	1	pebble of red sandstone
Plot3 T18 P3-4/P3-7	12		54	54	1	small fragment of section through sheet of fayalitic slag; one slightly prilly/dimpled surface with charcoal; main body has large-bladed olivine with minor vesicles; opposite face is fractured through very coarse olivine, probably a thick smithing cake (30mm) - most likely from bloom working

PLOT 4

Plot4 T20 P4-7/P4-10	?		33	33	2	smoothed pebbles of reddish oxide iron ore, very fine grained
Plot4	12		170	156	1	tapslag block with a lot of vertical flow - almost a 'birds-foot', but with wide flow lobes
				15	1	flow slag with black surface and dimpled base
Plot4 T25 P4-4/P4-5	12		34	34	1	fayalitic slag with one very lustrous surface; flow lobed; other surface dimpled and duller
Plot4	29		146	146	4	four rather varied pieces but all dense tapslag
Plot4	31		105	40	1	rounded pebble of fibrous goethite
				50	1	well-worn fragment of probable tapslag
				9	1	grey flow slag from inside fuel bed
				4	1	clinker-like material - partially melted siltstone pebble?
Plot4 T21P4-4/P4-5	50	on fill	681	438	1	worn block of very dense fayalitic flow slag; reddened surfaces internally
				78	1	flow lobe of fayalitic dense tapslag, reddened surface
				95	1	base of fayalitic slag with prills and dimples, some included gravel; red/brown surface
				69	1	fayalitic tapslag flow; reddened surface; narrow flow; dimpled base
Plot4 T26 P4-1/P4-2	50		80	34	3	fayalitic tapslags, mostly reddened surfaces
				43	1	crust with tubular vesicles, concavo-convex; top strongly reddened and dished, blown, base finely dimpled; SHC fragment

DRAINAGE

Drainage T28	82	Below ash	477	150	1	fayalitic tapslag, reddened top
				88	1	rounded cobble, siliceous lithology; just possibly blast furnace slag but probably natural
				16	1	vitrified fragment of sandy material with dark clinkery coating on one end; vitrified sandy brick?
				221	1	complex piece - probably two mortar layers; one with coarse rounded sea sand with shells; the other dominantly clinker

Table 2: distribution of archaeometallurgical materials (and selected other materials) by class and context.

context	SHC		SHC?		dense tapslag		low dens tapslag		within bed flow slag		rod/runner		bowl?		charcoal-rich		indeterminate		wall		clinker		iron		glass		ore		coal		total residue (g)	total residue (pieces)	% residue of overall residue assmeblage
	g	no	g	no	g	no	g	no	g	no	g	no	g	no	g	no	g	no	g	no	g	no	g	no	g	no	g	no	g	no			
3			371	1					16	1							128	1													*515*	*3*	4%
12	446	3	994	8	7172	95	947	14	40	3			800	2	253	2	179	4	93	1			491	6			58	3	21	1	*10924*	*132*	81%
14					184	2					15	1																			*199*	*3*	1%
29					146	4																									*146*	*4*	1%
31					50	1			9	1											4	1					40	1			*59*	*2*	0%
41			305	1	128	3																									*433*	*4*	3%
43																							112	1	200	1					*0*	*0*	0%
47			293	1																											*293*	*1*	2%
50	43	1			714	7																									*757*	*8*	6%
82					150	1															237	2									*150*	*1*	1%
total	*489*	*4*	*1963*	*11*	*8544*	*113*	*947*	*14*	*65*	*5*	*15*	*1*	*800*	*2*	*253*	*2*	*307*	*5*	*93*	*1*	*241*	*3*	*603*	*7*	*200*	*1*	*98*	*4*	*21*	*1*	*13476*	*158*	

4%	15%	63%	7%	0%	0%	6%	2%	2%	1%	by weight
18%		77%					4%		1%	
3%	7%	72%	9%	3%	1%	1%	1%	3%	1%	by no of pieces
9%		85%					4%		1%	
Iron smithing		Iron smelting					Indeterminate		Wall	

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