

Chemico-physical studies for sampling of Medieval and Post-medieval majolicas from primary Italian centres

G. W. CARRIVEAUX, G. C. BOJANI, A. KRAJEWSKI, A. RAVAGLIOLI

Introduction

Following up a previous work by same authors (1), some interesting biunivocal relations between certain contained elements present in traces were individuated in a considerable quantity of samples, mostly from the Faenza and Firenze area with many pieces from other sites.

The correspondences specifically concerned two straight lines showing a clearly distinct relationship between the Cerium content and the Hf, Co, Fe, La and Th one. Further relations were determined, some by demonstrating their separability always into two straight lines, though less reliably, while into two straight lines, though less reliably, while in other cases the relationships pointed to a line alone. The Cerium content consequently appears a good statistical estimator parameter in order to discriminate preliminarily the place of origin. We defined by convention one of the lines as the Florence one (because quite all the samples from Florence are located along it) in the same way as always by convention and always for the same reasons the other line was previously defined as the Faenza one.

Along the Florence line were grouped samples from three sites (Florence, Urbino, Palermo) while the other line was determined by all the remaining sites (seven) (§).

Therefore the problem concerning the separation in two groups is also that of knowing how thickly populated the two lines are with respect to the origin of the samples. To confirm the observed trends we went on with the statistical survey of a wide range of samples coming from more places of origin.

Materials

A research was carried out on 22 samples, all taken from pieces now kept in the Faenza Ceramics International Museum. In this case special priority was given to some samples coming from kiln dumps.

The samples are coming from recent digs and the ones taken into consideration, divided according to their origin, are described in Table 1. In Fig. 1 are indicated the Italian sites (Pesaro and Palermo excepted) where the examined samples were found.

In the case of Siena, analyses were carried out also on four samples taken from quarries supposedly utilized in the late Middle Ages.

Methods

The samples to be analysed were taken, in the quantity of few milligrams, from the inside of the biscuits and were tested at the Michigan Phoenix University Reactor Laboratories. During analysis, the treatment procedures were always the same in all cases by adopting sampled quantities in the range between 50 and 100 mg.

The samples underwent neutron irradiation under a flux of 10^{12} neutrons $\text{cm}^{-2} \text{ sec}^{-1}$ activated twice for a time period varying from 1 h. to 24 h. After a few days' rest the samples underwent counting in order to resolve the nuclear emission spectra of the various elements.

Some sampling were several times done on the same samples, to submit them to the same series of tests, but by different operators, with the aim of evaluating to what extent the procedure errors or the possible non-homogeneity of the original samples might affect the total error associated to the concentration value of each element. It was ascertained that the total error by far exceeds the one inherent in the standard error connected with the only instrumental measurement performed by the counting apparatus. The total error, defined for the sake of simplicity as error in the treatment procedure of the samples, was calculated on the basis of the standard deviation deriving from the different concentration values obtained for each element by submitting the different specimens drawn from the same samples (as already indicated).

(•) This work was carried out with the financial support of the Arthur Sackler Foundation (New York).

(§) The samples from certain sites were provided by the "Sovrintendenza dei Beni Artistici e Storici" depending on the Ministry for Cultural Environmental Weals of the Venice and Naples areas.

(1) G.C. Bojani, G.W. Carriveau, A. Krajewski, A. Ravaglioli: "Chemico-Physical Characterizations of Majolica Samples Primarily from the Medieval Tuscany-Romagnolo Area", Proceedings of the Meeting: "Medieval Ceramics in the West Mediterranean Area", (Siena-Faenza, 1984), Edizioni all'Insegna del Giglio, Firenze 1986, pp. 425-541.



Fig.1- Sites of provenience of the studied samples in this and in the previous (1) papers.

Results

NAA investigations have resulted in the elaboration of Table 2, which reports the content of the different elements that were examined for each samples after the samples were divided according to their origin.

As concerns the evaluation of the total error incurred during analysis for the various elements of the tested samples, the relevant data appear in Table 3 (column 4). This table also indicates the standard instrumental error occurred during counting and the number of times the samples indicated a concentration value below the threshold of sensibility.

From Table 2 derive the graphs of Fig.2 showing biunivocal relations between Cerium and the series of significant elements already defined in the introduction. Fig.3 features a relation between Yb and Sm which had not been considered in the previous work (1).

Discussion

According to the graphs of Fig.2 all the examined samples can be located along the line previously defined Faenza. This supports the statistical validity of the relation previously determined in the case of the Faenza line, which also results the statistically more populated as concerns the origin of the samples. None of the tested samples falls along the Firenze line, which so far results to be followed only by the sites named in the introduction and the existence of which needs further confirmation.

Before continuing our work we also decided to ascertain that the concentration differences relative to all the elements useful to define the two separating lines were significant and

were not caused by substantial errors connected with the nature of the samples or the analysis procedures. As for the percentage error on the instrumental counting measures, it appears to be a complex function of the type:

$$E \% = \frac{K}{\sqrt{N}} \left(\frac{S}{S_0 - S} \right) f(x)$$

Where:

K= constant;

N= number of countings, proportional to the number of scattering sources, proportional to the concentration of the element;

S= offset time;

S₀= constant;

f(x)= function of the variable 'and of the proximity of the threshold concentration value;

x= elapsed real time/ elapsed life time.

The total error, besides including the instrumental error, also includes errors deriving from factors inherent in the composition of the samples as well as from factors associated with sampling and manipulation.

The first factor is tied up with the nature of this kind of ceramic samples, whose composition presents a certain non homogeneity much higher than e.g. the one of some metal alloys. The sampling factor is bound up with the procedures used to obtain from the original samples the materials suitable for analysis, in terms of quantities of sampled, of identification of this sampled quantity inside the original sample, of error occurred during weighting, etc.

The manual factor refers to the chemical and physical treatment methods applied to the sampled quantities to make them suitable for the operation of neutronic activation, for the procedures employed in this activation, and for the methods used to feed the counting apparatus.

According to Table 3, the instrument error is always lower than the one connected with the total error. It is also observed that, in many cases, the orders of magnitude of the two errors are comparable, while in other cases the fact that we are working the threshold of sensibility influences the total error.

As for the elements which can help to determine the separating biunivocal relations, the total error is low enough not to invalidate the reliability of the analyses. For these elements the error source is probably connected with factors inherent in the composition of the samples.

From surveys made here and there on the concentration of some elements have emerged great deviations particularly in relation with Sr and Ni.

The Ni concentration exceeds by over two orders of magnitude the average value in three samples from Faenza (FZ4, FZ8, FZ12) all related to saggars. Correspondingly we have always observed a proportionally high content of Sr, which however appears to be present with high values also by itself.

Test on quarry samples coming from Siena, made up on three samples of clay raw materials (SIR2, SIR3, SIR4) and one of sandy raw materials (SIR1), proved that Th is an element almost exclusively typical of clays, while sands show richer percentages of elements in traces Au, Ba, Sr, Hg, Zn, Ag, Se. In the sandy sample the Ba, Sr, Se and Ni elements display a concentration ratio of about 1/10 in comparison with the fired products. Analyses show that none of the SIR samples could be related to the raw materials that were

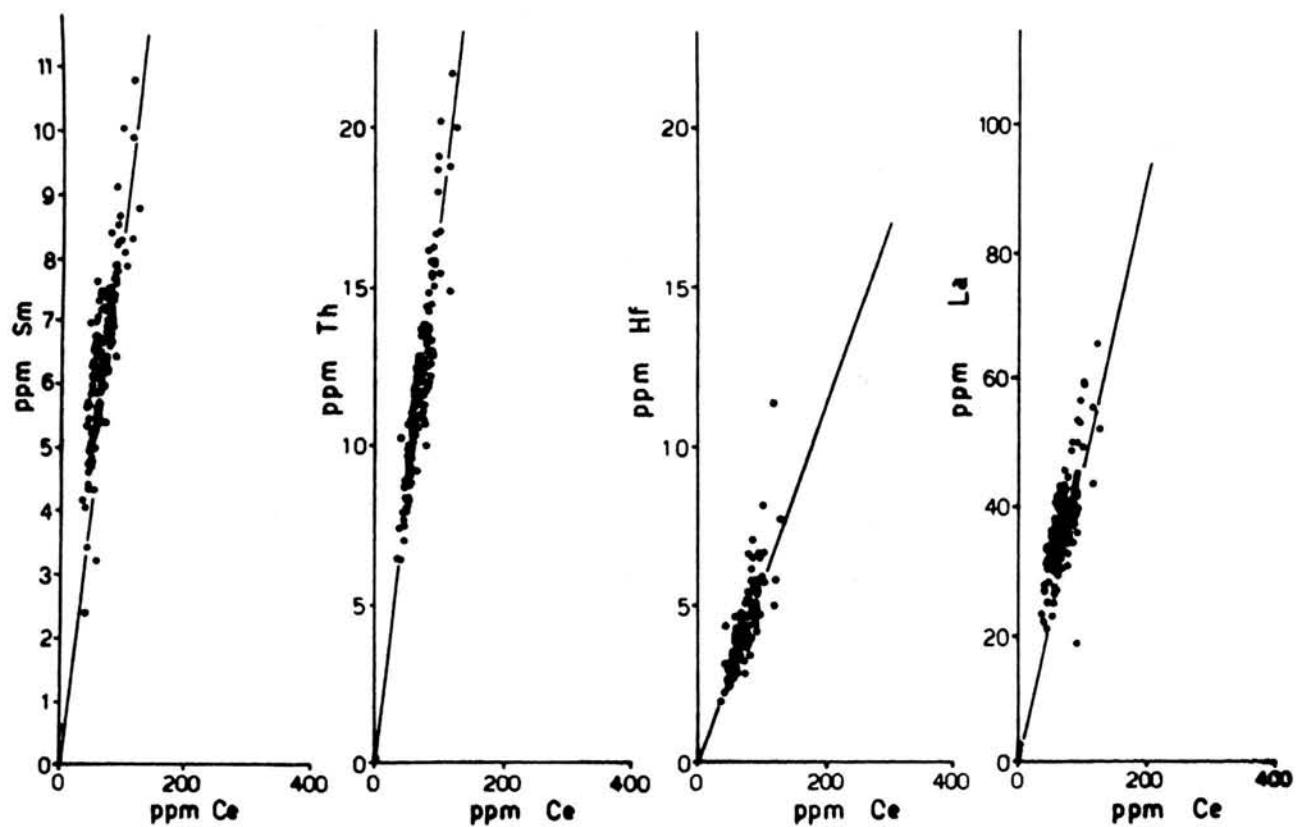
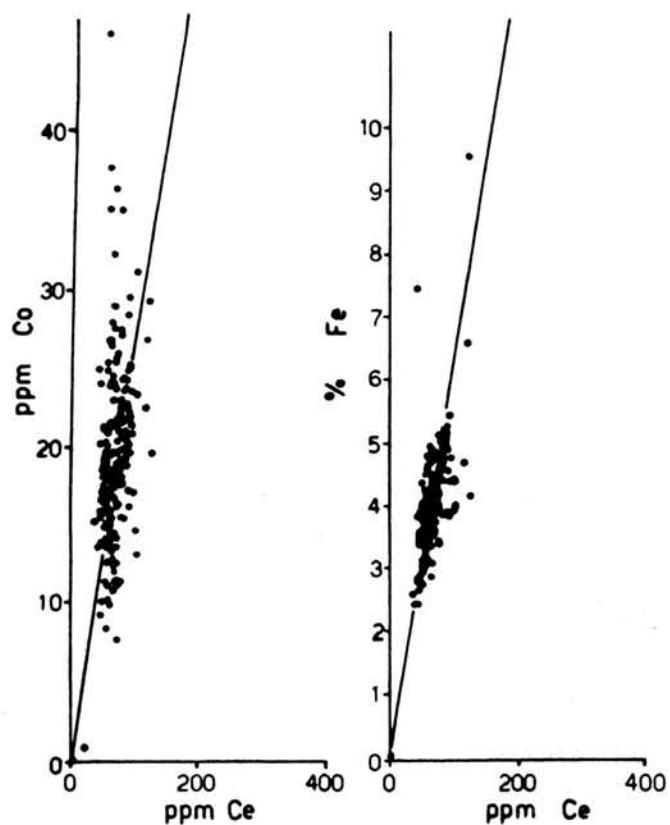


Fig.2. Biunivocal correlations between Cerium and a single stimulator element as indicated in each graph.

employed at that time, because the indicator elements (Ce, La, etc.) always have lower concentration values compared with those of the examined samples. Thought the characteristics of the SIR4 sample are the nearest to those examined in the fired products from Siena, we note in all the SIR samples a high As percentage and a low Cr percentage as against the fired products.

No further relations were ascertained beyond the ones so far known and shown in Fig. 2 and 3, useful to individuate new indicator elements, even though some significance may be attributed to the loose relationship between Ag and Br (in the formation of insoluble salts?) and to the inverse relationship between the sum of the values of Sr and Ba contents as against Cerium.

The content of certain elements and particularly of the alkaline ones, which may produce soluble salts in drainage waters, is not very significant, as they may have been brought or subtracted by ground dampness.

Their content might consequently vary from place to place also depending on the ancient manufacturing methods. This series of samples also proves the incoherence in the As and Sb content which had been pointed out in the previous work (1).

Conclusions

This work confirms the existences of a perfect

biunivocal linear correlation between the content of Cerium and the content of a series of elements such as Hf, Co, Fe, La, Th, which the authors in a previous work (1) defined as useful to separate the late Medieval and Renaissance majolica samples into two groups of place of origin.

All the samples examined in this work have further populated the straight lines conventionally defined Faenza. From a careful survey of the total error that can be incurred (both in terms of procedures and of nature of the materials) it is proved that those elements are reliable for a differentiation into two groups, provided that the existence of the second line may be demonstrated in a next study. A wide variability has been confirmed for elements such as As and Sb, but while the Sb variability can be put down to a very high rate of possible total error, in the case of As a logical explanation will have to be found.

With respect to the error which may be committed, the great variations of Ni content in the Faenza saggars must be regarded as real, while those of Sr fall within the range of the error that may be incurred.

Acknowledgements:

The Authors thank all the persons and Institutions for kindly and freely placing samples of their places in the Faenza's Ceramics International Museum for the appropriate studies

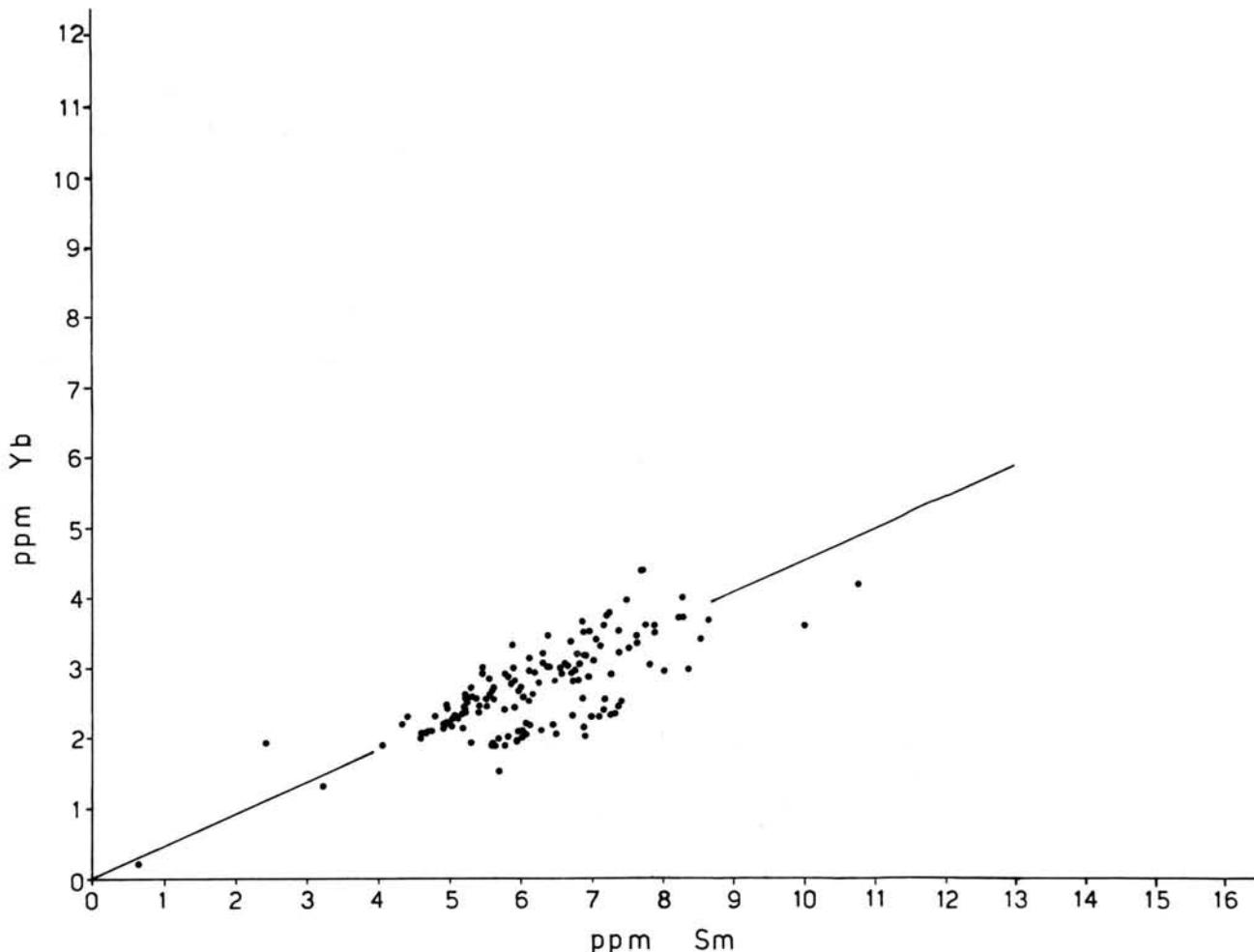


Fig.3- Correlation existing between Samarium and Ytterbium

Table 1 a - Samples put at disposal by E. Tongiorgi, coming from Pisa sites (Porta a Mare, Simonelli Lungarno, Solferino Bridge).

P 11	XIV cent.	P 19 .	XVI cent.
First firing sherd of a fragment of an open shape of arcaic majolica			A fragment of a foot of a kiln sherd in graffito ceramic, invitrated with colourless glass
P 12	XIV cent.	P 10	XVI cent.
First firing sherd of a fragment of a mug base in arcaic majolica			Second firing sherd of a too much fired fragment in engobed and graffito ceramic of a foot covered with colourless glass
P 13	XV cent.	PI 11	XVII cent.
First firing sherd of jar fragment in arcaic majolica			First firing sherd of a fragment of engobes and graffito dish
P 14	XI-XVI cent.	PI 12	XVII cent.
First firing sherd of a fragment of an engobed and graffito dish			First firing sherd of a fragment engobed and graffito with a heraldic bearings as decoration
P 15	XVI cent.	PI 13	XVI-XVII cent.
First firing sherd of an open shape in engobed and graffito ceramic			First firing sherd of a fragment of dish in marmorized ceramic
P 17	XVI cent.		
First firing sherd of an open shape in engobed and graffito ceramic			
P 18	XVI cent.		
First firing sherd of an open shape in engobed and graffito ceramic			

Table 1 b - Samples put at disposal by Schiafancia Civic Museum of Ferrara and Pasetti's Collection, coming from Ferrara sites (Compato S. Romano).

FE 1	RMP 1982	XIV cent.	FE 8	RM 4097	XV-XVI cent.
A fragment of jug in arcaic majolica					
FE 2	RMP 1982	XIV-XV cent.	FE 9	RM 4097	XV-XVI cent.
Bicombe in arcaic majolica with geometric decorations on altered enamels					A fragment of a small bowl bottom with rinascimental polycromic graffiti painted in "ramina" and "ferraccia"
FE 3	RMP 1982	XIV cent.	FE 10	OA 118 (Colli	XIV-XV cent.
Decorated glass in arcaic majolica with a drowed bird					Second firing sherd of a too much fired bowl bottom with arcaic padana graffiti and decorated in the interior with a leaf within a whirl
FE 4	RMP 1982	XIV cent.	FE 12	OA 154 (Coll.	XIV-XV cent.
Decorated glass in arcaic majolica					First firing sherd of a engobed graffiti and painted-without glaze bowl- in rinascimental polcromy
FE 5	RMP 1982	XIV cent.	FE 13	OA 114 (Coll.	XIII-XIV cent.
A fragment of a bowl wall in arcaic majolica with an anomalous red body					Bowl base with arcaic padana graffiti and internal decoration painted in "ferraccia" and "manganese"
FE 6	RMP 1982	XIV-XV cent.	FE 14		XVI-XVII cent.
Ovoidal bowl of arcaic graffiti padana with fused parts					First firing sherd of a big bowl base with post medieval graffiti representing a flowering tree.
FE 7	RM 4001	XIV cent.			
First firing sherd of a basin fragment with arcaic graffiti padana with flowers decorations					

Table 1c - Samples put at disposal by the "Sovraintendenza per i Beni Artistici e Storici di Venezia", coming from Venice sites (Fusina, Malcontenta).

VE 1	MBCA 1	XIV cent.	VE 8	MBCA 8	XVII cent.
		A fragment of a dish base in engobed and polychromic graffito Fajence with traces of ironish yellow and verdigris			A fragment of dish base in engobed fajence and polychromic graffito with a bird on field, coloured in verdigris and ironish yellow
VE 2	MBCA 2	XV cent.	VE 9	MBCA 9	XVII cent.
		A fragment of bowl having a rounded rim lightly extroflexed in engobed fajence and polychromic graffito with partially glazing also at the exterior. A symbolic animal is reported on the bottom within a medallion with bond meander at the walls			A fragment of invitriated ceramic plate with pale-brown pigments in the interior
VE 3	MBCA 3	XV-XVI cent.	VE 10	MBCA 10	XVII cent.
		A fragment of dish with engobed and polychromic graffito fajence with centered a stylized whirl motif with around a straight band and fillet at meanders			A crockery in pink-ocra invitriated ceramic with a short neck and small tapered drim
VE 4	MBCA 4	XVI cent.	VE 11	MBCA 11	XVII cent.
		A fragment of a dish base in engobed fajence and graffito at "punta a stecca" with writing and typical venetian panada			A fragment of bowl wall in engobed fajence painted and invitriated in the interior and exterior
VE 5	MBCA 5	XVI cent.	VE 12	MBCA 12	XVI cent.
		A fragment of dish base with wide traces of bluish enamel at the interior and exterior			A fragment of majolica plate painted in compendario style with uniform crazing enamel
VE 6	MBCA 6	Late XVI cent.	VZ 13	MBCA 13	XVII-XVIII cent.
		A fragment of calotte bowl in majolica with lobes shaped on the walls and circular decorations in the bottom			A fragment of a conventional bowl in engobed fajence graffito and with pale-brown glazing.
VE 7	MBCA 7	XVI cent.			
		A kiln sherd fragment dish in engobed fajence and graffito, without glazing and uniformly blackened			

Table 1 d - Samples put at disposal by Mr. Angeloni, coming from Gubbio sites (S. Giovanni, Via Vantaggi, Butto of Via Picotti, garden of Benvenuti Palace).

GU 1	Box. n.1	XIV-XV cent.	GU 6	Box. n.6	XVI cent.
		A fragment of arcaic majolica bowl, handled with phytomorphic decoration in green manganese			A fragment of dish with leaf decorations into compartments in monocromic deep-bleu
GU 2	Box n.2	XV cent.	GU 7	Box. n. 8	XVII cent.
		A fragment of majolica jug in severe style with in relief decoration in green manganese			A fragment of jug with geometric decoration at diamond in the central medallion
GU 3	Box n.2	XVI cent.	GU 9	Box. n. 9	XVII cent.?
		A fragment of engobed graffito and painted small basin with phytomorphic decorations enclosed into compartments			A fragment of closed shape with brown painting at the exterior
GU 4	Box n.4	XV cent.	GU 10	Box. n.9	XVI-XVII cent.
		A fragment of small arcaic bowl with cross in manganese at the center			A fragment of dish-drim with decoration in green leaves
GU 5	Box. n.5	XVI cent.	GU 11	Box. n. 10	XV cent.
		A fragment of dish with geometric decorations in the repertory of the flowered style			A fragment of panada decorated with girales motives in bleu and spottiness in manganese

Table 1 e - Samples coming from Faenza's digs (ACLI, Popolare Bank, Portello walls).

FZ 1	AB 4455/2	XV cent.
Second firing sherd of a zaffer jug		
FZ 2	+ 8490-C.231/5	XIV-XV cent.
Second firing sherd of a graffito basin		
FZ 3	+8490-C.633/4	XIV-XV cent.
First firing sherd of a graffito		
FZ 4	17144/1	XIV-XV cent.
Second firing sherd of an arcaic jug.		
FZ 5	20903	XV cent.
Second firing kiln sherd of a zaffer jug base		
FZ 6	20902-C.117	XV cent.
Second firing sherd of a gothic dish "at cold palette"		
FZ 8	20899-C.232	XV-XVI cent.
Saggar		

FZ 10	20899-C.232	Xvi cent.
Bowl stucked to the saggar FZ8 as second firing sherd		
FZ 11	20900	XVI cent.
Kiln brick		
FZ 12	20900	XVI cent.
Saggar		
FZ 14	20897-C.217	XVI-XVII cent.
Second firing sherd of drinking trough		
FZ 16	20904-C.553	XIV-XV cent.
Arcaic jug with encrustments		
FZ 17	11429-C.277	XIV-XV cent.
A fragment of the upper part of an arcaic jug.		
FZ 18	20910-C.205	XV cent.
A fragment of thinner zaffera jug		

FZ 19 11603-C.62 XIV-XV cent.

A fragment of arcaic jug at manganese and verdigris

FZ 20 20913 DID XV cent.

A fragment of arcaic jug at manganese and bleu

FZ 21 20912-C.205 XV cent.

A fraglent of a piece of decorated jug at manganese and thinner zaffer

FZ 22 20905 XV cent.

A fragment of jug, probably sherd of first firing,
coming from the ACLI dig.

FZ 23 20909 XV cent.

A fragment of a dish at manganese at bleu

FZ 24 +20906 XV cent

A fragment of graffito bowl coming from Popolare
Bank dig

FZ 25 20908 XV-XVI cent.

A fragment of graffito bowl with narrow brim coming
from Popolare Bank dig.

FZ 26 20907 XV-XVI cent.

A fragment of engobed and graffito basin coming
from ACLI dig.

Table 1 f - Samples coming from digs in RAVENA.

RA 1	20876-C.554	XVI cent.
A second firing sherd of majolica		
RA 2	20877-C.560	XVI-XVII cent.
A second firing shard od majolica		
RA 3	20881-C.554	XV-XVI cent.
Firing sherd of a majolica biscuit painted with bleu, yellow and orange		
RA 4	20874-C.554	XV-XVI cent.
A first firing sherd of graffito		
RA 5	20875-C.554	XV-XVI cent.
A first firimg sherd of graffito		

RA 6	20880-C.554	XV-XVI cent.
Cock-scrowles on majolica		
RA 7	20879	XV-XVI cent.
Cock-scrowles on graffito coming from dig		
RA 8	29878	XV-XVI cent.
First sherd of a graffito coming from dig		
RA 9	20883	XVI-XVII cent
First firing sherd of rinascimental graffito coming from dig.		
RA 10	20882	XV cent/.
First firing sherd of arcaic majolica coming from dig.		

Table 1 g - Samples coming from digs in Rimini.

RI 1	9132	XV cent.
A fragment of decorated jug at zaffera in relief		
RI 2	8131	XVI cent.
First firing sherd of glazed jug.		
RI 3	8131	XV-XVI cent.
Second firing sherd of jug.		
RI 4	8124	XV-XVI cent
Unfired enamelles plate		

RI 5	8124	XV-XVI cent.
A small jug having traces of unifered		
RI 6	8125	XV-XVI
Cock-scrowle in red-body		
RI 7	8125	XV_XVI cent.
Cock-scrowle in pale-yellow body		

Table 1 h - Samples coming from a like cellar room under the Siena Duomo chapter-house.

SI 10	XVII-XVIII cent.	SI 3	XV-XVI cent.
A fragment of basin with extroflexed rim and flower decoration			A fragment of dish drim with bow-bands and geometric decorations
SI 11	XVII-XVIII cent.	SI 4	XVII cent.
A fragment of basin with extroflexed rim and stylized decorations			A fragment of basin with an extroflex rim with decoration by bleu spots groups
SI 12	XVII-XVIII cent.	SI 5	XVIII cent.
A fragment of cased shape with flowered stylized decorations.			A fragments of dish drim with bouquettes
SI 13	XVII-XVIII cent.	SI 6	XVIII cent.
A fragment of basin with coil decorations and stripes on engobe.			A fragment of dish drim with bouquettes
SI 14	XVII-XVIII cent.	SI 7	XVII-XVIII cent.
A fragment of dish drim with strokes of brush fish-bone			A fragment of dish with stylized decoration enclosed within manganese stripes
SI 1	XV-XVI cent.	SI 8	XVII-XVIII cent.
A fragment of dish drim with porcelain decoratiion and white geometric motives			A fragment of stylized decoration dish with bleu stripes
SI 2	XV-XVI cent.	SI 9	XVII-XVIII
A fragment of an open shaped with writtings			A fragment of an open shape bleu stylizations

SI 17	XVIII cent.	
A fragment of a closed shape in painted terracotta, a handle with rosette in relief		

SI 18	XVIII cent.	
A painted terracotta		

SI 19	XVII-XVIII cent.	
A terracotta with green vernish on engobe		

SI 20	XVII-XVIII cent.	
Closed form base terracotta		

SI 21	XVII-XVIII cent.	
A fragment of close shape terracotta		

SI 22	XVIII cent.	
A fragment of open shape terracotta		

SI 24	XVIII cent..	
A platic fragment of a stoup-tank with face of a winged putto.		

SIR 1	n.1	==
A greyish sample of sand clay coming from an Anciano quarry.		

SIR 2	n.2	==
A citrine-yellow sample of a clay coming from an Anciano quarry		

SIR 3	n.3	==
A "terra di Siena" sample of a clay coming from an Ancaino quarry		

SIR 4	n.4	==
A brownish ocra samples of a clay coming from an Ancaino quarry		

Table 1 i - Samples coming from the ancient dump under the Pompei house in Castelli (Teramo).

CAS 1	CA 1	XV cent.	CAS 8	CA 8	XVI cent.
		A fragment of tricromic dish with lanceolate leaves and graffito			A dish drim of deep bleu majolica
CAS 2	CA 2	XV cent.	CAS 9	CA 9	XVI cent.
		A first firing sherd fragment of a graffito and engobed body			A fragment of majolica jug decotrated with white and bleu
CAS 3	CA 3	XV cent.	CAS 10	CA 10	XVII cent.
		A first firing sherd fragment of a bowl bottom. engobed			A fragment of majolica bowl trichromic decorated in compendiario style
CAS 4	CA 4	XV cent.	CAS 11	CA 11	XVI cent.
		A first firing sherd of engobed jug			A fragment of trichromic closed shape with very bright glaze
CAS 5	CA 5	XV-XVI cent.	CAS 13	CA 13	XVII cent.
		A fragment of majolica bowl			A fragment of plastic shape with majolica
CAS 6	CA 6	XV-XVI cent.	CAS 14	CA 14	XVI cent.
		A fragment of a majolica closed shape with shrinked enamel			A fragment of majolica bowl, white with strong fairing.
CAS 7	CA 7	late XV			
		A fragment of a majolic closed shape with decorations similar to those of the heraldic bearings of the Calabri Duke Alfonso II			

Table 1j - Samples put at disposal by the Roma's Museum, coming from various different sites of the town and proposed in the catalogue "La raccolta delle ceramiche del Museo di Roma" (1968).

ROMA 1	XVI-XVII cent.	ROMA 9	XV cent.
Kilm sherd of a flat plate			A jug of the transition period
ROMA 2	XIII cent.	ROMA 10	XV cent.
Kiln sherd of a jug			Bowl
ROMA 3	XVII cent.	ROMA 11	XVII-XVIII cent.
Kilm sherd of a big plate			A big jar with pipe of roman typology
ROMA 4	XII-XIII cent.	ROMA 12	XVI cent.
A small cap sample			A dish of "landscape master" typology
ROMA 5	XVI cent.	ROMA 13	XV cent.
A dish with a poor enamel 1			A dish with drim
ROMA 6	XV cent.	ROMA 14	XV cent.
A jug with the heraldic-bearings of Colonna's family			A big bowl
ROMA 7	X cent.	ROMA 15	XIII cent.
A jug with heavy glaze			Olla for water
ROMA 8	XV-XVI cent.		
A small dish			

Table 1 k - Samples put at disposal by the Municipality Authorities of Fabriano, coming from the Podestà's Palace and Captain Tower.

FAB 1	V 7	XV cent.	FAB 12	N 351	XV-XVI cent.
		A fragment of closed form with severe style flowering gothic family decorations coming from Podestà Palace :Trabocchetto"			A fragment of an open shape with graffito decoration on engobe and underglaze
FAB 2	V 276	XVI-XVII cent.	FAB14	N 125	XV cent.
		A fragment of an open shape with polychromic phytomorphic decoration on engobe			A fragment with an open form with a pierced heart painted in the center
FAB 3	V 209	XVI cent.	FAB 15	N. 472	XV cent.
		A fragment an hystoriated open shape			A fragment a majolica closed shape with at relief green decorations and manganese in severe style
FAB 7	SN	XV-XVI cent.	FAB 16	NN 640-646+3	XVI cent.
		A fragment of a bisquit close shape of medieval sump			A fragment of an open shap[e with an hystoriated scene
FAB 8	N 512	XV cent.	FAB 17	N 50	XV cent.
		A fragment of an open form with a womanly profile in severe style			A fragment of an arcaic majolica closed form
FAB 9	N 537	XVI cent.	FAB 18	N 360	XV cent.
		A fragment of an open shape with hystoriated decorations			A terracotta samples from Podestà Palace
FAB 11	N 320	XV cent.			
		A fragment of an open form with flowering gothic family in severe style			

Table 11 - Samples given by the Municipality Authorities of Deruta and sprung out during the upkeep of the local aqueduct.

DE 1	XVI cent.	DE 8	XV cent.
A kiln sherd of majolica dish with decoration at peacock-feather eye			Kilns sherds of a majolica dish with bleu, orange and virdgris geometric decorations
DE 2	VXI cent.	DE 9	XV cent.
A kiln sherd of majolica dish with geometric decorations and bleu tiled			A fragment of majolica bowl with flat bottom and with especial reversed graffito
DE 3	XVI cent.	DE 10	XV cent.
A fragment of majolica sherd with bleu and orange decoration at peacock-feather eye			A fragment of flattened bottom majolica bowl, engobed and invitriated with trilobated sharped graffito leaves in virdgris and brownish
DE 4	XVI cent.	DE 13	XV cent.
A fragment of majolica pot with a "berrettino" background and wolf teeth and stylized flowers			First firing sherd of a flattened bottom ceramic bowl, engobed and graffito with trilobated leaves decoration
DE 5	XVI cent.		
Kiln sherd of white decorated majolica dish welded at tripod during firing			
DE 6	XV cent.		
A fragment of majolica rim decorated whit bleu and orange sharp leaves.			
DE 7	XV cent.		
A kiln sherd of a majolica dish decorated on the rim with orange and bleu sharp leaves			

Table 1 m - Samples coming from the neighbourings of Salerno (the castle and S. Pietro a Corte).

SA 1	XIII cent.	SA 8	XIV-XV cent.
A fragment of a little cup in spiral-ware decorated in green and manganese brown			
SA2	XIII cent.	SA 9	XV-XVI cent.
Second firing sherd of an invitriated jug fired in reduced atmosperre with wide bubbles with spiral decoration			A fragment of polichromic graffico bowl decorated with leaves and geometric tracts in green and ocra
SA 4	XIII-XIV cent.	SA 10	XV-XVI cent.
A fragment of cavetto and border of small jug with polycromic glazing of RMR class with geometric decoration, in manganese and red			A fragment of a polychromic graffito bowl with decorations in white, green and ocra
SA 5	XIII-XIV cent.	SA 11	XV-XVI cent.
A fragment of conic shaped basin with polycromic glazed decorations of RMR CLASS in green manganese and red			A fragment of a graffito bowl with bichromic decoration in green and ocra
SA 6	XIII-XIV cent.	SA 12	XV-XVI cent.
A fragment of biconic small jug in majolica with monochromic geometric decoration in manganese			A fragment of a cylindric ggraffito mug decorations in green and ocra
SA 7	XIII-XIV cent.		
A fragment of biconic cavetto of a small cup in majolica with anabstract flowering decoration in green and manganese			

Table 1n - Samples coming from Castel Delfino (Savona) during accurated stratigraphic excavations

GS1	US B1 III	XIII cent.
Invitriated olla		
GS2	US B1 III	XIII cent.
Monocromic graffito		
GS3	US B1 III	XIII cent.
Engobed monocromic terracotta		
GS4	USL, FL R78	XIII cent.
Invitriated saucepan		

GE7	GE7A	XVI cent.
Dish of rare kind of majolica		
GE8	GE108	XVII cent.
Basin of engobed rare kind of majolica		
GS8	US H10 43	XVI cent.
Monochromic graffito terracotta		

Table 1 p - The series of samples coming from Genova town sites (S. Vincenzo and Maragliano street) with GE codes and Genova-Savona area (S. Silvestro and Commenda di Pré: area Q) with GS code.

GS5	USL1, FL R78	XIII cent.
Arcaic graffito		
GS6	USL1, FL R78	XIII cent.
Cobaltmajolica		
GS7	USL1, PL R78	XIII cent.
A majolica imitating approtomajolica		
GE1	GE1	XVI cent.
Jug of fragment ind of majolica		
GE2	GE2	XVI cent.
Dish of fragment kind of majolica		
GS9		XVI cent.
Anomalous graffito lath		

GS10		XVI cent.
Majolica graffito at whire		
GS 11	US E9 IIA/f	XVI cent.
Majolica berrettina at leaves		
GS12	US E9 IIA/f	XVI cent.
Jug in majolica berrettina		
GS13	US G8 1 IIa	XVII cent.
Monochromic graffito jug.		
GS14	US G3 1 IV	XVII cent.
Majolica with vegetable motives in white and bleu		

Table 1 q - Samples coming from Montelupo Fiorentino.

ML2	XV cent.	ML10	XVI cent.
A wide bowl at a flat bottom of "the green family"			A flat plate with decoration at porcelain"
ML3	XV cent.	ML11	XVI cent.
A wide bowl at a flat bottom of "the green family"			A flat plate with decoration at cracked little ribbons
ML4	XV cent.	ML12	XVI cent.
Hemispherical small bowl of "Italo-Moresca" typology			A flat plate with decoration at "ovals and rhombis"
ML5	XV cent.	ML13	XVI cent.
A jug of tricoloured typology			A flat plate with decoration at "graffito bleu"
ML6	XV cent.	ML14	XVI cent.
Big bowl with wide drim and hemispheric cavetto of "Italo-Moresca" typology			A flat plate with decoration at tiles structures
ML7	XV cent.	ML16	XVI cent.
A bowl-shaped plate of "Italo-Moresca" typology			A flat plate with decorations at "spirals in orange"
ML9	XV-XVI cent.	ML17	XVI late
A small bowl with a wide drim of "persian palmetto" style			A jug with decoration at the "polycromic stripes"

ML18 XVII cent.
A jug in "Compendiario Toscano"

ML19 XVI cent. late
A flat plate in "Compendiario a paesi"

ML21 XVII cent.
A flat plate with decorations with leaves and fruits

ML22 XVIII cent.
A flat plate with decoration in green leaf in "cabbage leaf style"

CONTENT OF THE REPORTED ELEMENTS IN p.p.m. (except the Fe, Na, K and Ca in %)																		
Sample Code	Attribution of Provenience	Sm Ce	Lu Yb	U Cr	Ba Cs	As Tb	Rb Sc	Na Fe	La Ta	Co Ni	Eu Ni	Sb Se	Cd Au	Sr Zn	Hg Ag	Br Hf	Th Zr	K Ca
P11	6.7155 58.077	0.6014 2.3366	3.4706 149.21	483.08 6.9084	8.0987 1.7713	123.71 15.839	1.2148 4.1905	37.328 1.2773	26.834 92.543	0.6664 47.939	14.650 2.0735	199.73 0.0420	0.8685 184.61	3.6362 59.248	4.6979	—	11.013	
P12	7.1106 66.098	0.6282 2.3132	4.1544 172.97	563.98 8.8699	19.5544 1.6352	137.41 18.725	0.9011 4.8942	42.779 1.4653	36.362 127.75	1.6200 45.354	13.180 2.80668	298.28 0.0394	1.1123 206.74	2.0911 2.2026	3.7185	—	12.389	
P13	7.3776 66.211	0.6307 2.4514	3.3828 172.45	485.11 8.7723	7.5622 1.5389	150.73 18.540	0.8383 4.9205	42.650 1.4607	28.978 77.412	1.5272 51.143	0.8787 2.4349	11.756 0.0338	159.99 185.23	0.9637 20.071	2.4410 3.6652	—	12.442	
P14	7.4321 67.818	0.6614 2.5261	3.2588 160.47	537.78 7.8991	133.49 1.8116	0.9707 18.068	41.770 4.7208	27.469 1.5431	1.5155 65.136	1.2617 40.975	7.9905 2.3870	203.34 0.0319	0.9517 177.29	2.4728 1.9395	3.9949	—	12.735	
P15	7.2550 63.911	0.6644 2.3343	3.1064 170.06	517.18 10.196	8.6922 1.0244	148.91 19.331	0.6445 4.9679	42.843 1.3635	26.647 85.714	0.6515 42.177	0.4206 2.2697	139.09 0.0310	0.9564 151.50	1.6588 1.9451	2.9492	—	11.812	
P17	7.6455 89.621	0.5403 3.4850	3.8987 178.49	673.76 8.2971	9.5695 1.1335	168.21 17.899	1.0086 5.0909	43.2226 1.4054	22.606 51.325	1.4919 32.077	0.4047 2.4796	6.1860 0.0050	265.74 113.05	1.1199 1.3067	1.7734 1.3067	5.5836	—	
P18	7.1833 84.545	0.4552 3.6047	40.0466 175.35	553.08 8.1458	10.0091 1.0381	187.74 17.293	1.0057 4.9515	40.078 1.3759	21.048 70.535	1.4264 29.460	9.2383 2.5300	6.3065 0.0071	139.09 59.798	0.0800 1.6432	1.7060 4.7366	—	14.855	
P19	7.8915 92.192	0.4602 3.5235	4.1323 198.36	556.16 9.5013	12.4115 0.5940	187.90 18.636	0.9983 5.1944	44.745 1.3241	24.959 67.485	1.5018 32.970	0.5947 2.5222	7.6048 0.0061	267.69 62.951	1.1363 1.7295	3.8302 5.0029	—	15.399	
P110	7.8992 94.578	0.4844 3.1052	4.3407 550.35	550.35 8.5251	1.7157 0.8359	1.7617 45.433	1.0697 5.4533	25.202 1.2562	1.4985 37.939	0.7185 42.024	6.5218 2.6694	284.26 0.0260	66.197 1.6225	1.2011 1.6432	2.3427 4.7366	—	15.736	
P111	7.7503 94.016	0.4870 3.6098	4.1102 201.00	502.84 9.7384	11.124 1.1459	167.71 19.387	0.7854 5.4548	44.217 1.2986	23.552 76.117	1.4779 38.662	2.1012 2.4308	293.94 0.0141	1.2414 68.886	3.0957 1.9054	4.8388	—	15.768	
P112	7.7180 89.681	0.4579 4.4224	4.3407 180.46	570.70 8.2069	167.01 0.7658	1.0697 17.616	42.455 5.1462	24.856 1.3087	1.5156 67.053	0.4890 36.401	0.4957 2.6060	200.2 0.0102	1.1734 64.060	2.9597 1.7873	5.7882	—	15.298	
P113	7.5389 92.329	0.4605 3.2730	4.3074 178.50	489.41 8.5950	9.7636 1.6855	165.21 18.829	0.7036 5.2927	43.754 1.3085	21.942 60.664	1.4033 48.553	1.4233 2.2300	257.03 0.0109	1.1352 62.461	2.2006 1.7401	4.1840	—	15.031	

Table 2a - Concentration value of the trace elements achieved by neutrons activation analysis of the samples coming from Pisa

CONTENT OF THE REPORTED ELEMENTS IN p.p.m. (except the Fe, Na, K and Ca in %)																	
Sample Attribution of Provenience	Sm	Lu	U	Ba	As	Rb	Na	La	Co	Eu	Sb	Cd	Sr	Hg	Br	Th	K
Code	Ce	Yb	C _r	C _s	Tb	S _c	Fe	T _a	Ni	Nd	S _e	Au	Zn	A _R	Hf	Zr	C _a
VE1	8.65 95.7	0.58 3.68	3.20 173.0	649 10.2	67.92 1.03	238.2 17.3	1.449 4.42	56.6 1.58	21.4 34.8	1.55 2.49	— —	— —	162.9 162.9	— —	6.44 6.44	— —	18.0 2.618
VE2	6.4624 55.945	0.6147 2.1860	2.4438 8.3150	453.47 1.9807	17.501 16.382	134.77 4.2654	0.8367 1.1870	37.431 84.234	35.144 41.243	1.2847 2.0447	1.3521 0.0378	6.1358 422.73	0.7568 138.94	2.3275 4.6382	3.0765 3.0765	— —	10.722 18.7
VE3	8.53 96.4	0.50 3.42	2.47 96.8	618.0 9.9	228.0 1.26	26.12 17.2	1.030 4.78	56.5 1.30	17.2 45.1	1.57 1.65	— —	— —	— 157.0	— —	4.70 4.70	— —	7.723 7.36
VE4	7.1563 73.356	0.6158 2.4009	2.4933 90.2116	577.88 9.8699	24.157 1.9633	159.80 16.138	0.9083 3.6458	43.086 37.825	18.660 38.780	1.4581 2.67448	4.8791 0.0407	6.5146 154.43	234.03 234.03	0.8726 11.263	2.6121 2.9357	— —	13.564 13.564
VE5	7.26 84.5	0.47 2.92	3.07 90.2	473 7.4	48.75 1.07	86.1 15.7	1.770 3.87	48.9 1.17	23.6 42.2	1.32 4.76	— —	— —	— 144.9	— —	— 4.37	— —	16.2 14.00
VE6	6.00 68.9	0.44 2.72	1.95 190.1	458.0 8.0	9.16 0.81	157.0 15.7	0.693 4.15	38.9 1.27	19.7 25.8	1.17 —	1.65 —	— —	504.0 110.9	— —	— —	— 4.16	— 10.40
VE7	8.3748 84.808	0.8297 2.9781	2.7768 79.321	559.70 7.9704	19.417 1.5508	188.40 15.562	1.7762 3.9305	50.066 1.4451	15.470 42.890	1.6051 38.677	1.0297 2.1626	7.0244 0.0355	181.96 142.78	0.8584 1.4035	6.9221 6.0797	— —	14.201 14.201
VE8	10.027 102.49	0.8986 3.5169	3.4715 100.47	809.19 10.663	30.423 2.6381	205.38 18.430	1.3821 4.4303	59.132 1.6547	23.289 47.532	1.8878 52.706	1.3672 2.5541	9.0075 0.0449	203.10 177.13	0.9620 1.9443	5.9666 5.7516	— —	16.806 16.806
VE9	7.64 90.2	0.52 3.37	2.32 136.1	522.0 8.7	30.83 1.10	216.8 16.1	1.690 4.59	50.2 1.34	22.2 35.5	1.38 3.16	— —	201 201	— 107.9	— —	— 5.56	— —	12.5 12.5
VE10	8.22 95.5	0.37 3.73	3.72 93.1	361.0 9.1	33.04 1.22	222.8 15.3	1.600 3.85	53.2 1.33	20.8 26.7	1.47 —	3.80 —	— —	— 132.1	— —	10.1 6.62	— 0.02	16.7 —
VE11	10.79 121.1	0.61 4.20	— 105.0	516.0 12.1	76.74 1.47	289.7 18.5	1.671 6.58	65.5 1.35	29.3 59.2	1.93 —	3.66 —	— —	141.9 —	— 5.78	— —	— —	21.7 21.7
VE12	5.61 62.2	0.31 2.70	2.46 115.1	509 4.8	12.91 0.80	80.4 13.3	1.194 1.04	34.4 17.8	15.7 —	1.08 —	3.18 —	— 478	— —	10.2 10.2	— 4.21	10.7 0.01	17.730 14.09
VE13	7.3265 76.180	0.5910 2.3500	3.4612 90.591	603.42 10.204	9.8877 0.9958	176.66 16.555	44.1669 3.4500	1.4052 1.0603	18.654 31.955	1.4163 2.2518	8.5008 0.0368	194.52 211.65	0.8955 1.9678	17.560 3.6627	— —	13.800 13.800	— —

Table 2c - Concentration value of the trace elements achieved by neutrons activation analysis of the samples coming from Venezia

CONTENT OF THE REPORTED ELEMENTS IN p.p.m. (except the Fe, Na, K and Ca in %)

Sample	Attribu- tion of Prove- nience	S _m Ce	L _u Y _b	U Cr	B _a C _s	A _s T _b	R _b S _c	N _a F _e	La T _a	C _o N _i	Eu Nd	S _b S _e	Cd A _u	S _r Z _n	Hg A _g	Br Hf	Th Z _r	K Ca
GU1	5.5576 49.990	0.6803 1.9469	1.9720 90.878	325.14 5.3926	4.7877 1.3259	122.21 14.275	0.4939 3.9108	31.837 1.0052	17.568 32.986	1.1107 27.270	0.5319 1.5123	4.7242 0.0074	480.28 121.39	0.7976 1.4912	1.6624 2.5340	9.2012		
GU2	6.1410 53.331	0.6997 2.1860	2.0316 104.58	525.26 6.4435	4.6640 1.3735	130.50 15.291	0.6209 4.0353	35.489 1.1865	19.463 41.325	1.2478 36.744	0.5478 1.2581	4.6303 0.0069	654.62 139.41	0.8559 3.5522	2.7061 2.8998	10.022		
GU3	7.1676 62.761	0.8496 2.5743	1.9778 139.97	552.39 6.9714	6.0818 1.7675	150.57 17.854	0.7106 41.578	41.578 1.3556	151.16 62.654	0.9274 26.868	8.6200 1.7610	501.33 0.0074	0.9280 122.32	2.5221 5.9044	11.341			
GU4	5.9679 52.567	0.6905 2.1068	2.2090 112.98	395.93 1.2943	5.2215 15.364	126.65 3.7581	0.8160 1.1279	34.167 44.162	19.686 29.765	1.2183 1.5459	1.7079 0.0083	512.53 136.77	0.8558 1.3396	1.9588 2.5980	9.6070			
GU5	6.0299 50.976	0.7532 2.1115	2.0989 109.99	148.82 6.1612	7.8671 1.8800	133.73 15.135	0.5930 3.9761	34.034 1.2534	21.207 58.808	1.2125 24.949	1.0695 1.4573	7.3983 0.0063	287.25 117.02	0.8590 1.6717	2.2091 2.7579	9.4565		
GU6	4.95 52.1	0.39 2.47	2.40 11.09	535 5.8	8.95 8.68	121.1 12.1	0.647 3.41	30.5 0.97	14.9 21.0	0.94 0.90	0.82 0.89	656.0 94.6			9.9	1.622		
GU7	4.81 52.2	0.33 2.32	1.86 11.09	604.0 5.5	6.62 0.66	132.1 12.0	0.485 4.38	30.0 0.94	46.2 21.4	0.90 0.89	0.90 622.0	622.0 99.8		3.55	21.58			
GU9	5.24 56.4	0.36 2.39	2.35 132.1	359.0 4.6	6.58 0.88	99.5 13.9	0.973 4.01	33.8 1.15	15.9 23.7	1.01 1.03	0.77 1.56	618.0 564.0		10.4 3.44	1.941			
GU10	5.31 57.4	0.39 2.70	2.92 143.9	407 6.4	6.75 0.83	125.9 13.6	0.910 3.98	33.2 1.04	18.0 23.6	1.03 1.425	1.56 0.98	105.0 105.9		10.0 3.61	1.641			
GU11	5.0250 54.3	0.3350 2.2350	2.57 119.5	231.0 7.0	5.725 0.6750	167.55 12.8500	0.6315 3.47	31.5 0.89	0.775 24.0	711.0 96.95		16635 3.1450		9.95	1.8685			

Table 2d - Concentration value of the trace elements achieved by neutrons activation analysis of the samples coming from Gubbio

CONTENT OF THE REPORTED ELEMENTS IN p.p.m. (except the Fe, Na, K and Ca in %)																		
Code	Attribu-tion of Prove-nience		Sm	Lu	U	Ba	As	Rb	Na	Co	Eu	Sb	Cd	Sr	Hg	Br	Th	
	Ce	Yb	Cr	Cs	Tb	Sc	Fe	Ta	Nd	Ni	Ta	Se	Au	Zn	Ag	Hf	Zr	Ca
RA1	Ravenna	6.2194	0.5775	2.8072	444.80	26.488	128.03	0.8203	33.805	21.238	1.1779	13.342	6.4321	447.25	0.8052	3.6895	9.6787	2.239
RA2	Ravenna	51.401	2.0393	120.22	6.2881	1.5151	14.403	3.7471	1.0519	45.718	32.105	2.0201	0.0636	123.52	2.0872	3.1659		14.89
RA3	Ravenna	5.78	0.32	2.51	447.0	10.79	150.0	0.794	36.7	18.6	1.05	1.72		598.0			11.08	2.421
RA4	Ravenna	63.5	2.54	238.2	4.5	0.85	15.3	4.12	1.03		20.7		238.8			3.10		11.40
RA5	Ravenna	4.1671	0.4212	2.1913	245.19	17.294	87.559	0.3936	23.428	15.300	0.8021	10.513	6.0150	446.09	0.7205	2.7040	6.4993	1.770
RA6	Ravenna	36.415	1.6017	81.410	6.2748	0.5686	10.231	2.5904	81.23	36.076	39.605	1.7043	0.2314	83.854	1.4165	2.0479		22.28
RA7	Ravenna	5.22	0.33	2.36	406.0	10.09	125.0	0.6664	33.4	16.2	0.97	0.99		542.0			10.6	2.388
RA8	Ravenna	59.2	2.38	134.9	7.3	0.62	14.1	3.87	0.97		24.7		114.0			3.18		13.40
RA9	Ravenna	6.0318	0.5448	2.9947	429.64	6.5901	138.81	0.8004	33.365	19.012	1.2164	0.7288	9.5382	642.19	0.8321	2.5014	9.9845	2.070
RA10	Ravenna	51.140	2.0439	123.58	8.5287	1.0585	14.861	3.8433	1.1890	55.031	42.617	1.9843	0.0401	127.07	1.6824	3.1142		14.59

Table 2f - Concentration value of the trace elements achieved by neutrons activation analysis of the samples coming from Ravenna

CONTENT OF THE REPORTED ELEMENTS IN p.p.m. (except the Fe, Na, K and Ca in %)																			
Sample Attribution of Provenience	Code	S _m	L _u	U	B _a	R _b	A _s	R _b	N _a	L _a	C _o	E _u	S _b	C _d	S _r	H _g	Br	T _h	K _a
		C _e	Y _b	C _r	C _s	T _b	S _c	F _e		T _a	N _i	N _d	S _e	A _u	Z _n	A _g	Hf	Zr	
RI1		5.8025	0.6893	2.0806	220.38	16.052	128.90	1.2888	36.3	18.572	1.2396	4.9156	5.2072	350.28	0.8497	3.2700	9.0577	1.300	
		52.647	1.7584	113.23	5.1579	1.6027	14.516	3.9491	1.3321	45.793	23.550	1.5270	0.069	119.87	1.6859	3.4088		11.30	
RI2		6.0967	0.7094	2.7088	417.60	50.283	101.96	0.8193	33.893	27.420	1.2137	3.9111	8.7234	396.96	0.7985	8.0221	9.4865	1.932	
		55.696	2.1541	113.88	5.3491	2.1761	14.994	4.0111	1.3015	44.111	33.184	2.5611	0.0259	123.21	1.7886	3.5975		11.80	
RI3		5.35	0.36	2.25	388.0	56.89	114.0	0.838	36.1	19.5	1.01	5.42		643.0			10.9	1.849	
		61.7	2.54	218.8	8.2	0.62	14.4	3.94	1.01	30.3				110.9			3.35	10.30	
RI4		5.25	0.27	2.30	282.0	18.79	137.1	0.745	33.7	16.0	1.00	34.43		689.0			9.9	2.198	
		58.2	2.48	171.0	5.9	0.56	12.6	3.59	0.99		20.4			279.9			3.85	11.80	
RI5		4.95	0.32	2.12	507.0	10.50	152.1	0.766	31.0	13.8	0.93	1.80		564			9.1	2.028	
		53.5	2.22	106.9	5.4	0.70	12.1	3.37	0.97		29.6			99.3			3.52	12.50	
RI6		5.3778	0.5755	2.2552	382.92	10.370	93.047	4.4802	30.141	16.756	1.0981	1.3189	4.7255	185.38	0.7775	1.7879	7.9127	2.259	
		46.191	1.8735	74.488	4.6761	1.0995	12.793	3.4503	1.0600	44.180	24.008	1.4765	0.0073	105.67	1.4532	2.6295		9.73	
RI7		5.50	0.46	1.77	324.0	11.30	174.2	0.675	35.4	16.5	1.06	1.83		501.0			2.1	10.5	2.080
		61.9	2.58	169.0	7.4	0.57	14.2	4.01	1.08		22.0			109.9			3.99	17.70	

Table 2g - Concentration value of the trace elements achieved by neutrons activation analysis of the samples coming from Rimini

Sample	Attribu- tion of Prov- enience	CONTENT OF THE REPORTED ELEMENTS IN p.p.m. (except the Fe, Na, K and Ca in %)																	
		Sm Ce	Lu Yb	U Cr	Ba Cs	As Tb	Rb Sc	Na Fe	La Ta	Co Ni	Eu Nd	Sb Se	Cd Au	Sr Zn	Hg Ag	Br Hf	Th Zr	K Ca	
CAS1	5.9470	0.6716	1.9208	369.25	8.0374	122.01	0.6402	34.548	18.652	1.2317	4.4472	5.6979	474.75	0.8269	1.4211	9.0132			
CAS2	53.273	1.9778	103.52	6.6108	1.2379	15.163	3.8081	1.1980	43.269	43.158	1.8094	0.0059	97.021	1.5413	3.3160				
CAS3	5.8348	0.6916	2.2283	508.65	7.6274	118.71	0.6226	32.824	19.349	1.1409	1.1013	5.7790	673.52	0.8477	2.0391	8.8472			
CAS4	52.730	2.0310	75.081	7.2853	1.4266	14.633	3.5978	1.1642	26.697	32.977	1.8335	0.0067	105.90	1.5621	3.2349				
CAS5	5.6111	0.6706	2.5660	444.41	7.5966	101.03	0.5494	33.201	17.245	1.1836	1.1757	5.3921	877.70	0.7949	2.0450	8.9599			
CAS6	49.659	1.9054	71.936	5.0484	1.1591	14.352	3.6252	1.1512	33.031	30.932	1.4272	0.0060	120.35	1.2619	2.9208				
CAS7	5.7660	0.6816	1.9030	405.76	8.9213	115.82	0.6086	33.363	18.089	1.2649	1.3690	4.2490	703.76	0.7923	1.6855	8.4097			
CAS8	50.835	1.8747	75.567	6.7733	0.7996	14.480	3.6437	1.1476	35.811	29.192	1.4193	0.0057	112.13	1.0659	3.0293				
CAS9	6.0781	0.7016	2.4489	384.48	7.2396	110.19	1.2614	35.405	18.750	1.2847	1.1939	5.6223	338.79	0.8553	2.3244	9.6717			
CAS10	56.278	2.0650	108.90	7.9079	1.3820	15.18	3.8294	1.2411	20.975	25.723	1.5408	0.0082	119.97	1.2312	3.0660				
CAS11	5.25	0.38	1.52	284.0	7.06	144.9	0.564	34.2	15.9	1.02	1.17	817.0			10.0	2.328			
CAS12	59.2	2.51	121.9	7.6	0.58	13.5	3.60	1.07	23.9			83.4		3.77		15.49			
CAS13	5.51	0.39	3.02	393.0	8.43	119.1	1.119	35.1	15.3	1.04	1.24	647.0			10.4	1.180			
CAS14	62.4	2.55	136.1	8.3	0.46	14.2	3.72	0.90	19.6			92.5		3.87		1690			
CAS15	5.93	0.41	1.56	3.87	15.89	147.9	1.321	38.0	18.8	1.15	1.02	615.0			11.5	1.291			
CAS16	67.0	2.82	136.1	8.6	0.77	15.1	4.11	1.09	36.0			89.7		4.22		14.00			
CAS17	6.18	0.39	2.17	198.0	9.64	74.6	1.361	39.8	18.0	1.21	1.10	723.0			11.7	1.409			
CAS18	70.1	2.61	141.9	10.2	0.79	15.7	4.24	1.21	15.1			105.9		4.69		0.01	15.89		
CAS19	5.92	0.42	1.26	7.46	141.9	1.079	37.9	17.5	1.13	1.29		701.0			10.9	1.371			
CAS20	67.3	2.44	134.0	8.3	0.64	14.8	3.99	1.05	30.8			94.0		4.26		0.01	15.00		
CAS21	5.98	0.41	1.14	429.0	11.19	129.1	1.191	39.4	16.8	1.17	1.81	748.0		0.8		11.6	1.698		
CAS22	68.4	2.67	243.9	9.5	0.75	15.3	4.17	1.10	28.7			104.0		4.54		0.01	12.39		
CAS23	5.43	0.43	1.44	348	6.43	293.8	0.873	35.1	16.0	1.10	2.44	787		4.3		10.3	1.950		
CAS24	62.4	2.37	130.0	9.3	0.64	14.1	3.85	1.04	19.8			95.9		4.04		0.01	14.69		
CAS25	5.52	0.47	1.57	210	8.18	181.1	0.614	35.9	15.5	1.05	1.55	679.0		1.0		10.4	2.070		
CAS26	63.1	2.45	123.9	8.5	0.70	14.0	3.76	1.04	22.5			93.8		4.06		16.71			

Table 2i - Concentration value of the trace elements achieved by neutrons activation analysis of the samples coming from Castelli

CONTENT OF THE REPORTED ELEMENTS IN p.p.m. (except the Fe, Na, K and Ca in %)																
Sample Attribution of Code	Provenience	S _m	L _u	U	B _a	R _b	N _a	L _a	C _o	E _u	S _b	S _r	H _g	Br	T _h	K _{c_a}
		C _e	Y _b	C _r	C _s	T _b	S _c	F _e	T _a	N ₁	N _d	S _e	A _u	Z _n	H _f	Z _r
FAB1	6.7517	0.4012	3.4134	380.48	15.4466	157.02	0.8651	38.827	19.863	1.5311	4.9114	0.7959	1115.0	0.8094	4.1342	11.851
	86.5558	2.8008	143.79	10.490	0.9392	17.500	5.0892	1.1990	38.884	32.356	2.0823	0.0066	202.49	1.1974	4.5423	
FAB2	6.5141	5.5150	3.1183	397.84	10.526	130.14	0.6253	38.156	20.893	1.3815	1.2188	5.5620	451.08	0.8706	2.2266	9.6641
	57.9355	2.0619	135.73	9.8721	1.4273	16.798	4.5351	1.1219	64.472	34.120	1.9359	0.0302	164.08	1.4273	3.1508	
FAB3	5.6338	0.5400	3.3312	808.32	14.862	142.09	0.7175	30.659	20.172	1.1418	1.8450	5.7608	483.12	0.7645	2.0028	8.9096
	46.575	1.9143	101.84	7.2421	1.6579	12.903	3.3940	1.0129	52.960	37.509	1.9412	0.0297	126.08	1.5393	2.6992	
FAB7	6.1354	0.3936	3.5221	617.70	8.7015	151.75	0.4369	35.711	19.046	1.3137	0.8008	0.6709	451.38	0.7496	8.0395	11.251
	79.399	2.5344	137.23	8.0105	0.4792	16.061	4.5655	1.0328	26.145	26.083	1.8154	0.0064	185.15	1.4435	4.4642	
FAB8	6.6718	0.3869	2.9067	357.06	14.620	193.27	0.7803	38.641	21.675	1.4086	4.5067	0.8106	517.74	1.2309	1.9317	11.989
	85.913	3.0494	159.15	11.194	1.1972	17.830	5.1032	1.1426	46.790	31.082	2.1100	0.0058	252.73	1.4837	4.6922	
FAB9	6.8604	0.4153	3.3759	380.75	12.417	187.37	0.5589	39.882	20.419	1.6462	1.3823	0.6792	435.00	0.8108	3.2824	12.576
	89.622	3.1922	156.63	11.439	0.8456	18.054	5.2300	1.0905	36.660	22.676	2.0924	0.0060	275.83	1.5622	4.5515	
FAB11	6.9013	0.7005	3.8664	350.78	14.913	132.73	0.7492	39.385	21.606	1.4323	0.7598	6.3396	327.53	0.9241	2.4421	10.326
	60.621	2.1530	140.28	10.049	2.1745	17.594	4.6427	1.3339	51.741	44.223	2.3264	0.0402	163.17	1.8889	3.4551	
FAB12	7.0089	0.7183	3.2419	432.58	7.1264	139.58	0.6856	40.629	24.078	1.4576	1.1666	6.8290	396.28	0.9569	2.50099	10.390
	62.100	2.3118	150.70	11.136	2.7559	17.946	4.8262	1.3880	53.283	43.971	2.4297	0.0316	166.85	7.9250	3.6566	
FAB14	6.7236	0.3889	3.5231	417.15	11.129	190.78	0.7684	38.938	20.868	1.3787	1.1034	0.6792	697.60	0.8269	3.2211	12.151
	86.621	2.9374	154.57	11.530	0.8022	17.844	5.1516	1.2451	38.892	30.427	2.0052	0.0077	198.35	1.5894	4.5581	
FAB15	6.9162	0.6537	3.1085	395.33	11.174	141.93	0.5868	40.613	23.879	1.4715	0.9695	6.2136	450.36	0.8987	2.3710	10.146
	59.993	2.0417	246.30	10.083	1.5453	17.710	4.8039	1.3153	44.253	52.817	2.2539	0.0388	175.02	1.8219	3.3446	
FAB16	6.8785	0.3735	2.9152	386.56	10.770	174.64	0.7330	38.724	29.526	1.4141	1.6057	0.7116	555.12	0.8043	1.6751	12.520
	88.741	2.5509	155.72	11.118	0.8066	17.590	5.0497	1.1489	38.519	20.403	2.1724	0.0086	179.18	1.5464	4.6632	
FAB17	6.8364	0.3803	3.4670	549.48	10.241	173.93	0.4065	18.672	20.512	1.4157	0.6896	0.7669	453.69	0.8193	1.8952	12.451
	85.462	3.0645	153.78	11.832	0.9312	17.559	5.0199	1.2347	40.112	36.334	1.9840	0.0052	190.15	1.5779	4.4129	
FAB18	6.8483	0.3731	3.2774	352.85	8.8910	177.90	0.4538	39.403	19.629	1.4131	0.8615	0.6948	600.99	0.8061	1.6154	12.132
	86.920	2.8086	156.11	11.704	0.9772	17.896	5.2377	1.0998	39.693	26.172	2.0645	0.0051	235.42	1.5576	5.0232	

Table 2k - Concentration value of the trace elements achieved by neutrons activation analysis of the samples coming from Fabriano

CONTENT OF THE REPORTED ELEMENTS IN p.p.m. (except the Fe, Na, K and Ca In %)																
Sample	Attribu-	Code	Prove-	Sm	Lu	U	Ba	As	Rb	Na	La	C _o	Sr	K		
	tion of		nience	C _e	Y _b	C _r	C _s	T _b	S _c	Fe	T _a	Nd	Z _n	Z _x	C _a	
DE1		5.26	0.34	—	9.25	134.0	0.713	32.0	17.4	1.05	1.39	—	422.0	1.8	9.6	
		56.5	2.59	115.1	5.2	0.93	13.0	3.62	0.94	—	—	99.1	—	3.93	2.000	
DE2		5.7028	0.6963	1.7433	432.31	10.771	100.48	0.7432	33.696	24.033	1.0538	4.8934	141.67	377.08	1.2567	14.206
		47.624	1.5376	87.145	4.3523	1.4067	12.476	3.5475	0.9317	168.34	48.435	2.7246	0.0313	307.56	640.05	3.1906
DE3		6.3008	0.7198	2.5725	399.18	9.5495	111.73	0.7562	34.575	19.189	1.3373	14.233	6.7201	454.90	0.8764	2.4486
		54.067	2.1277	101.26	4.5887	1.2506	14.682	3.8308	1.1822	38.197	34.862	1.3834	0.0072	121.36	5.8847	3.6185
DE4		6.0464	0.7002	2.2059	368.48	5.258	107.56	0.6504	35.229	21.180	1.2673	2.3161	4.9871	243.37	0.8248	1.8495
		53.522	2.0139	101.18	4.7146	1.5450	14.686	3.7668	1.0999	37.420	34.098	1.4867	0.0068	115.08	2.3010	3.1145
DE5		6.0931	0.7578	2.5283	522.81	13.697	116.89	0.6964	33.624	20.384	1.2787	4.7927	4.9845	288.86	0.8184	2.3572
		53.402	2.2249	97.672	5.3412	1.0959	14.186	3.7744	1.1891	41.084	29.701	1.4617	0.0080	122.39	1.2288	3.2585
DE6		5.6914	0.7117	1.6774	362.36	3.8438	122.69	0.6621	31.052	18.593	1.1752	1.2410	7.0554	230.73	0.7989	2.3544
		48.535	1.9953	92.819	4.6423	1.2873	13.643	3.8304	1.0848	40.661	33.165	1.3530	0.0069	147.06	3.5060	3.0290
DE7		5.56	0.43	3.33	453	6.34	136.1	0.820	34.1	18.5	1.09	21.28	—	356	—	10.3
		60.0	2.62	132.1	6.3	0.79	13.4	3.50	1.18	—	23.6	—	—	115.9	—	4.30
DE8		4.98	0.40	2.58	361.0	5.64	125.0	0.590	30.5	14.3	0.97	4.76	—	495.0	—	9.2
		53.2	2.22	104.0	5.2	0.57	11.7	3.18	0.99	—	21.1	—	—	94.8	—	17.99
DE9		5.05	0.37	2.49	401.0	4.65	130.0	0.593	30.8	13.8	0.97	1.89	—	575	—	9.3
		54.3	2.30	96.6	5.3	0.63	12.0	3.48	0.97	—	22.2	—	—	104.0	—	3.47
DE10		5.41	0.88	2.84	437.0	4.61	125.0	0.670	34.0	15.8	1.09	3.61	—	513.0	—	10.1
		58.3	2.45	121.9	5.7	0.60	13.1	3.66	1.07	—	31.8	—	—	119.9	—	4.04
DE13		5.56	0.37	2.78	390.0	5.78	134.9	0.705	34.0	15.5	1.07	2.81	—	365.0	—	10.5
		60.4	2.84	118.0	6.1	0.66	13.4	3.73	1.24	—	20.3	—	—	103.0	—	4.11
														—	—	15.00

Table 21 - Concentration value of the trace elements achieved by neutrons activation analysis of the samples coming from Deruta

Sample Code	Attribu-tion of Prove-nience	CONTENT OF THE REPORTED ELEMENTS IN p.p.m. (except the Fe, Na, K and Ca in %)																	
		S m Ce	L u Y b	U Cr	B a C s	A s T b	R b S c	N a F e	L a T a	C o N i	E u N d	S b S e	C d A u	S r Z n	H g A g	B r H f	T h Z r	K C a	
SA1	8.02 104.0	0.40 2.95	2.55 97.9	364.0 12.2	17.50 0.90	187.1 13.8	1.050 4.03	59.7 1.61	14.7 —	1.46 30.1	1.04 —	285.0 —	—	—	1.8 6.61	20.2 0.02	2.438 6.90		
SA2	7.80 100.9	0.37 3.05	2.32 93.3	398.0 11.6	20.18 0.95	182.0 12.5	1.250 3.93	59.8 1.81	13.5 —	1.40 48.0	1.10 —	365.0 140.0	—	—	8.3 5.89	19.1 0.02	2.382 9.38		
SA4	5.60 64.7	0.35 2.69	1.26 91.2	366.0 5.8	6.68 0.82	133.0 12.8	0.619 3.51	37.4 0.96	15.6 28.1	1.08 —	1.49 —	—	977.0 102.1	—	—	3.4 3.55	10.3 0.01	2.541 16.41	
SA5	5.87 68.1	0.39 2.77	2.46 105.9	556.0 7.1	3.52 0.80	132.1 12.6	1.170 3.52	38.3 1.08	12.4 20.0	1.02 —	0.69 —	—	459.0 96.2	—	—	— 5.20	— —	12.4 8.81	
SA6	5.61 66.7	0.36 2.54	1.78 115.9	347 6.1	8.05 0.58	147.9 13.3	0.789 3.74	36.6 1.10	13.8 25.8	1.09 —	0.71 —	—	516.0 110.9	—	—	1.7 4.09	10.7 —	2.280 11.40	
SA7	5.19 56.8	0.29 2.13	2.28 109.9	233.0 8.0	6.22 0.83	125.0 12.1	0.979 3.49	32.7 0.95	12.7 20.9	1.00 —	0.62 —	—	459.0 94.8	—	—	— 3.91	— —	9.2 12.00	
SA8	5.32 60.1	0.43 2.59	2.47 103.0	161.0 6.6	9.4 0.59	141.9 13.4	0.857 3.81	34.9 1.05	13.5 11.4	1.01 —	1.01 —	—	318.0 92.0	—	—	9.5 3.58	10.5 0.01	2.673 10.30	
SA9	6.64 75.9	0.48 3.07	1.61 133.0	209.0 6.6	6.71 0.85	129.1 16.6	0.632 4.61	42.8 1.36	21.7 —	1.33 —	0.98 —	—	107.0 136.1	—	—	0.5 5.14	12.0 0.01	2.317 7.10	
SA10	5.21 59.2	0.37 2.62	1.23 109.9	330 6.5	10.79 0.71	136.1 13.7	0.600 4.03	34.4 1.12	14.0 —	1.01 25.4	0.99 —	—	575.0 106.9	—	—	2.60 3.70	9.8 0.01	2.178 10.69	
SA11	5.41 61.1	0.42 2.36	1.40 111.9	282.0 6.8	5.18 0.76	160.0 14.0	0.561 3.91	36.4 0.99	13.6 —	1.01 29.0	1.12 —	—	427.0 107.9	—	—	1.4 3.71	10.4 —	2.291 72.50	
SA12	6.27 70.1	0.46 2.78	1.48 119.9	366 8.5	8.83 0.85	201.8 15.3	0.601 4.31	41.2 1.11	14.2 24.5	1.21 —	0.85 —	—	375.0 119.9	—	—	4.00 4.00	11.7 —	2.168 8.83	

Table 2m - Concentration value of the trace elements achieved by neutrons activation analysis of the samples coming from Salerno

CONTENT OF THE REPORTED ELEMENTS IN p.p.m. (except the Fe, Na, K and Ca in %)																	
Sample Attribution of Provenience	Sm	Lu	U	Ba	As	Rb	Na	La	Co	Eu	Sb	Sr	Hg	Br	Th	K	Ca
Code	Ce	Yb	Cr	Cs	Tb	Sc	Fe	Ta	Ni	Nd	Se	Au	Zn	Hf	Zr		
GE1	5.4389	0.3459	3.1312	353.53	10.415	168.59	0.6821	30.240	13.589	1.1548	1.1034	0.6854	1464.0	0.6965	1.8145	10.950	
	69.185	2.4341	189.26	9.6360	0.9613	14.578	3.9258	1.0734	58.266	18.748	1.6708	0.0056	132.19	1.3124	4.3872		
GE2	4.9650	0.3659	2.8016	413.30	15.308	141.58	0.6393	25.942	14.665	1.0586	1.1222	0.6467	1331.8	0.6572	2.4130	9.6329	
	59.286	2.8032	150.71	7.6278	1.0933	12.612	3.4558	0.8434	44.997	16.343	1.6711	0.0203	138.68	0.8935	4.1950		
GE7	4.2997	0.2796	3.0335	324.99	9.4176	100.58	0.4109	23.152	15.218	0.8621	3.2128	0.6992	1259.0	0.7042	3.7963	8.7832	
	53.981	2.1301	109.77	6.5957	0.6729	11.545	3.2259	0.8731	55.689	22.152	1.7945	0.0054	162.69	1.3231	3.6399		
GE8	7.0061	0.4143	3.2776	400.38	9.9327	148.20	0.8697	35.105	20.645	1.4357	1.3612	0.8147	671.46	0.7991	2.9605	10.054	
	81.717	3.1232	319.77	7.4679	1.3007	16.682	4.6667	0.8895	113.99	35.602	1.7820	0.074	134.66	1.5082	5.7701		
GS8	5.2585	0.6002	1.8566	272.50	10.435	110.00	0.8918	27.633	24.947	1.0301	1.3406	5.1245	441.32	0.8149	1.9746	7.4281	
	44.350	1.9396	307.82	5.5474	0.5779	14.755	3.8338	0.9569	133.53	22.460	1.4628	0.0061	102.07	1.7208	3.2231		
GS9	6.1266	0.4427	3.5550	454.47	6.7916	165.88	0.7368	34.701	21.487	1.1559	1.3574	6.0390	1078.8	1.0876	2.8163	12.708	
	74.124	3.3677	225.26	8.9239	0.9594	15.541	4.3725	1.3424	81.563	37.392	2.5173	0.0046	179.99	1.6046	4.2063		
GS10	6.6740	0.8536	2.8863	538.37	8.7069	135.83	1.0470	37.514	23.601	1.3438	0.5723	5.7494	149.39	0.8892	2.1075	11.250	
	68.052	2.3899	127.36	6.1202	1.2486	15.487	3.7374	1.3843	74.914	24.822	1.5087	0.0072	159.27	4.5647	4.5235		
GS11	4.7906	0.3223	3.0383	256.76	13.737	78.105	0.6565	24.927	12.708	0.9493	0.8919	5.1971	825.46	0.9525	2.6672	9.4019	
	55.184	2.2053	158.49	3.6676	0.8178	11.515	3.1617	0.8620	49.135	24.417	2.2098	0.0068	87.498	2.2167	4.1259		
GS12	6.4394	0.4439	2.6283	375.71	10.679	53.645	0.9310	31.702	23.011	0.5093	1.1287	7.0028	786.75	1.1909	2.0393	10.102	
	66.830	3.3305	413.99	4.0666	1.8057	17.913	4.8696	0.9438	148.78	28.532	2.7813	0.0057	62.135	1.3150	3.9102		
GS13	7.4125	0.5168	3.5375	469.63	9.3782	105.63	1.1274	40.842	23.599	1.4126	2.2678	6.6200	219.60	1.1476	4.3210	13.379	
	84.283	4.0647	320.49	6.8538	1.4487	18.010	4.6538	1.0152	112.02	31.191	2.3811	0.0080	59.478	1.4254	6.9876		
GS14	5.2078	0.3758	3.5888	368.99	10.972	105.70	0.9628	27.305	17.972	0.9807	3.2554	5.7065	358.18	1.0308	1.8279	0.1075	
	58.852	3.1447	297.05	4.9443	0.9205	14.127	4.2594	0.8245	122.34	24.413	2.2811	0.0073	52.816	1.6920	4.5301		

Table 2n - Concentration value of the trace elements achieved by neutrons activation analysis of the samples coming from Savona

Sample	Attribu- tion of Prov- erience	CONTENT OF THE REPORTED ELEMENTS IN p.p.m. (except the Fe, Na, K and Ca in %)														
		S _m	L _u	U	B _a	A _s	R _b	N _a	La	C _o	E _u	S _b	C _d	S _r	Hg	Br
Code	C _e	Y _b	Cr	C _s	T _b	S _c	F _e	N _i	N _I	N _d	S _e	A _u	Z _n	A _g	Hf	Zr
GS1	7.4664	0.9999	2.5758	418.24	7.62279	106.11	1.3466	39.246	27.15	1.4579	0.8534	5.5936	188.42	0.9081	2.9247	12.214
	78.303	2.8407	284.42	3.9457	1.0699	16.522	4.2108	1.4492	201.58	39.136	1.5371	0.0073	120.36	1.6729	6.6236	
GS2	3.4207	0.2400	2.2498	204.93	2.4332	68.177	0.3255	21.182	9.2986	0.2600	0.5202	4.4701	195.27	0.8080	3.6900	7.6935
	45.661	2.0505	189.98	4.9703	0.9666	9.0889	2.8435	0.6903	54.301	17.216	1.4620	0.4445	39.833	1.1953	3.0950	
GS3	5.3742	0.3535	3.6934	303.85	2.5347	132.62	0.5760	35.601	7.7351	0.7034	0.6729	5.6702	655.66	1.0100	5.1598	13.648
	72.711	2.6561	226.07	9.2122	0.9896	13.115	4.3586	1.2621	47.243	31.270	2.0991	0.00888	49.507	1.2097	5.0582	
GS4	7.6250	0.9922	1.5462	412.29	5.5308	130.81	1.2997	39.946	26.790	1.5485	1.4913	5.3639	148.83	0.9354	5.3101	9.8104
	60.644	2.9266	304.70	6.6293	2.4570	17.748	4.6512	1.0539	149.00	34.460	2.0236	0.0075	125.63	1.7147	4.2575	
GS5	5.9872	0.7637	3.5030	448.77	3.6021	116.18	0.5490	36.692	14.696	1.1835	2.7142	5.2423	177.30	0.9194	8.7098	11.208
	58.047	0.3938	152.43	6.2588	1.1476	18.247	3.9775	1.2774	80.805	37.249	1.5564	0.0074	127.96	1.2526	3.3163	
GS6	7.3895	0.4430	5.8321	445.48	17.456	126.53	0.8029	39.995	28.275	1.4187	0.9623	9.0080	195.76	1.1577	4.7577	13.294
	88.279	3.5678	131.52	6.2522	1.2900	19.145	4.6869	1.2223	56.744	44.992	2.2652	0.0149	59.766	1.5091	6.5920	
GS7	6.2140	0.3687	4.5649	469.00	1.3459	131.31	0.6041	37.616	12.620	1.0972	0.5869	6.4604	317.89	1.0662	4.0842	12.740
	70.797	2.8509	175.00	9.2366	0.7580	15.383	3.9362	1.1621	60.876	19.028	2.2283	0.0059	54.898	1.6179	4.3584	
BG	9.8815	0.6179	2.8190	486.26	7.4129	194.61	0.1545	55.438	26.759	1.8212	1.2918	7.4699	316.73	1.3445	2.4185	14.857
	18.63	4.2932	103.41	10.062	0.6051	23.900	9.5189	1.4137	41.896	44.619	2.9899	0.0069	73.415	2.0713	4.9792	

Table 2p - Concentration value of the trace elements achieved by neutrons activation analysis of the samples coming from Genova

CONTENT OF THE REPORTED ELEMENTS IN p.p.m. (except the Fe, Na, K and Ca in %)																
Sample Attribution of Provenance	Code	S _m	L _u	U	B _a	R _b	N _a	C _o	E _u	S _b	C _d	S _r	H _g	Br	Th	
		C _e	Y _b	C _r	C _s	T _b	S _c	F _e	T _a	N ₁	N _d	S _e	A _u	Hf	Zr	K _{C_a}
ML2	7.11	0.512	2.29	546.0	6.08	148.9	0.506	45.6	25.9	1.43	5.83	—	583.0	—	3.11	12.11
ML3	73.3	3.30	156.0	7.50	1.151	17.1	4.45	1.380	—	30.4	—	—	133.0	—	4.11	—
ML4	6.49	0.445	2.23	630.0	5.89	136.1	0.467	40.4	25.3	1.30	1.93	—	452.0	—	1.26	11.40
ML5	69.5	2.82	149.0	662	0.962	15.8	4.33	1.191	—	27.7	—	—	110.0	—	3.78	—
ML6	4.4329	0.2786	1.7914	391.20	4.5898	60.830	0.2081	25.024	13.920	0.8660	2.3702	4.9830	796.81	0.8711	4.1615	7.0044
ML7	5.18	0.377	1.64	472.0	5.55	105.9	0.318	33.3	17.6	1.01	1.02	—	796.0	—	1.64	8.38
ML8	51.1	2.35	113.0	5.37	0.607	11.9	3.13	0.916	—	26.0	—	—	102.0	—	2.92	—
ML9	5.2332	0.3189	2.2595	448.59	5.2051	93.404	0.2064	30.216	16.097	1.0291	24621	5.3632	651.06	0.9353	2.0946	8.2644
ML10	54.379	2.6030	97.026	5.3670	0.8361	11.044	3.0027	0.7434	46.888	30.164	1.8349	0.0043	51.740	1.4162	2.7102	—
ML11	6.56	0.411	2.70	598.0	11.40	69.2	0.344	43.2	24.5	1.33	3.90	—	869.0	—	1.47	7.50
ML12	64.6	3.00	142.0	3.30	0.940	15.2	3.92	1.291	—	28.4	—	—	87.0	—	2.59	—
ML13	6.05	0.448	2.4247	381.98	10.354	101.02	0.2705	30.329	16.560	1.0619	4.7008	679.86	0.8875	1.3574	8.2898	1.1345
ML14	60.5	2.58	130.0	5.68	0.953	14.2	3.61	1.059	—	19.5	—	—	1259.0	—	12.91	—
ML15	4.61	0.3226	0.90	474.0	6.19	68.7	0.343	30.8	15.6	0.93	2.65	—	138.0	—	3.31	—
ML16	46.5	2.06	99.0	3.16	0.667	10.8	2.82	0.849	—	18.10	—	—	1059.0	—	2.40	—
ML17	5.77	0.372	1.38	406.0	8.24	99.3	0.481	38.5	20.1	1.21	6.04	—	134.0	—	14.49	9.93
ML18	57.3	2.41	117.0	5.04	0.839	13.5	3.51	1.089	—	28.4	—	—	828.0	—	1.00	—
ML19	4.94	0.332	1.50	351.0	5.50	74.0	0.428	31.7	16.6	0.97	2.42	—	948.0	—	3.34	9.31
ML20	51.1	2.15	104.0	3.26	0.706	11.6	3.03	0.914	—	20.1	—	—	123.0	—	2.96	—
ML21	6.14	0.478	1.43	448.0	7.91	118.0	0.560	39.6	24.5	1.19	3.66	—	798.0	—	1.64	7.91
ML22	64.3	2.96	127.0	5.74	0.968	15.0	3.98	1.211	—	19.8	—	—	97.0	—	2.44	—
ML23	5.08	0.344	1.50	381.0	9.71	75.0	0.315	33.5	18.2	1.04	1.23	—	824.0	—	1.13	8.36
ML24	51.8	2.31	110.0	3.11	0.682	11.8	3.04	0.857	—	22.0	—	—	96.0	—	2.96	—

Table 2q - Concentration value of the trace elements achieved by neutrons activation analysis of the samples coming from Montelupo

Element	Average instrumental % Standard deviation (absolute % counting error)	Orientative limit value of the threshold of sensitivity. (p.p.m.)	%Number of times below the threshold of sensitivity.	Mean % standard deviation of the whole method of the samples treatment.
Sm	0.38	-	0.	11.76
Lu	10.00	-	0.	55.62
U	7.44	-	0.8	31.73
Cd	27.42	6.50	67.7	>100
Au	19.75	0.0006	58.3	>100
Ba	9.37	151.	1.6	30.50
Nd	23.03	15.	25.	>100
As	6.04	-	0.8	6.90
Br	16.11	2.	46.5	65.80
Na	0.92	-	0.	5.97
La	0.60	-	0.	4.90
Ce	1.13	-	0.	14.15
Yb	5.78	-	0.8	19.08
Se	6.80	2.	99.2	12.58
Hg	15.00	1.	96.1	20.78
Th	1.64	-	0.	9.86
Cr	1.30	-	0.8	16.62
Hf	3.37	-	0.8	19.90
Sr	13.53	200.	3.8	35.53
Ag	17.92	1.	75.4	>100
Cs	2.29	-	0.	10.64
Ni	18.46	40.	20.8	20.22
Tb	10.38	0.25	2.3	92.95
Sc	0.25	-	0.	9.33
Rb	7.28	-	0.	16.80
Fe	0.50	-	0.	6.00
Zn	2.49	60.	36.9	26.50
Ta	5.39	-	0.8	17.95
Co	1.03	-	0.8	20.75
Eu	2.97	-	0.8	16.29
Sb	17.32	0.7	4.6	99.99
Ca	-	-	0.	2.02
K	-	-	0.	23.25

TABLE 3 - A summarized picture of the % error of the concentration value of the different reported elements. The first column gives the average % error only for the counting device (e.g. coming from the only counting error of the Y impulses). The second column represents the orientative limit values of concentration under which the measure could not be reliable (sensitivity threshold). The third column reports the number of times in which the measures fell beyond such sensitivity threshold. The fourth column reports the average error calculated on different specimens (3-6) taken from the same samples (25) on which parallel tests by various operators in different days were carried out. It gives so the measure of the % error of the overall process of analysis for every elements. The fifth column would like to demonstrate that in the most cases, at high errors of overall method (+) it corresponds a combination of high instrumental error (o) with an high number of cases in which the threshold sensitivity is overpassed (x). This permits to evidence that the overall % error is comming from the operating in the neighbouring of the sensitivity threshold for some elements, while for other elements it depends from other reasons (chemical treatments, radiation times, sample granulometry, and so on).