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TECHNICIAN TRAINING FOR THE CONSERVATION OF MOSAICS

PART 1
THE CONSERVATION OF IN SITU MOSAICS

Conservation mortars for in situ mosaics:
their components

Livia Alberti, Ermanno Carbonara, Thomas Roby

Mortars

A mortar is the combination of a binder (lime, etc.), aggregates (sand, gravel, etc.) and the appropriate quantity of water.

This mixture is used while still soft and malleable, and fulfills its structural function when it sets and becomes hard.

Binders

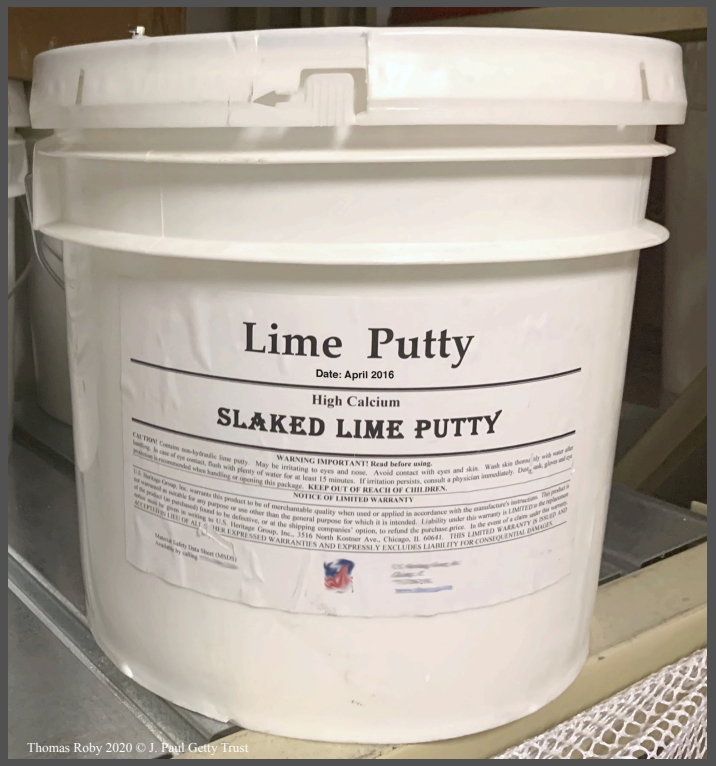
A binder is a material that keeps aggregates together when the mortar is set and has become hard.
Binders can be divided in two categories:

- NON-HYDRAULIC binders
- HYDRAULIC binders

A non-hydraulic binder needs to be in contact with air to set, whereas a hydraulic binder sets predominantly when in contact with water.

Binders

NON-HYDRAULIC	HYDRAULIC
• Lime putty (paste) • Hydrated lime (powder)	• Natural hydraulic lime (powder) • Cements and artificial hydraulic limes (powder)



Thomas Roby 2020 © J. Paul Getty Trust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Binders

NON-HYDRAULIC	HYDRAULIC
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NON-HYDRAULIC

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- Hydrated lime (powder)

HYDRAULIC

- Natural hydraulic lime (powder)
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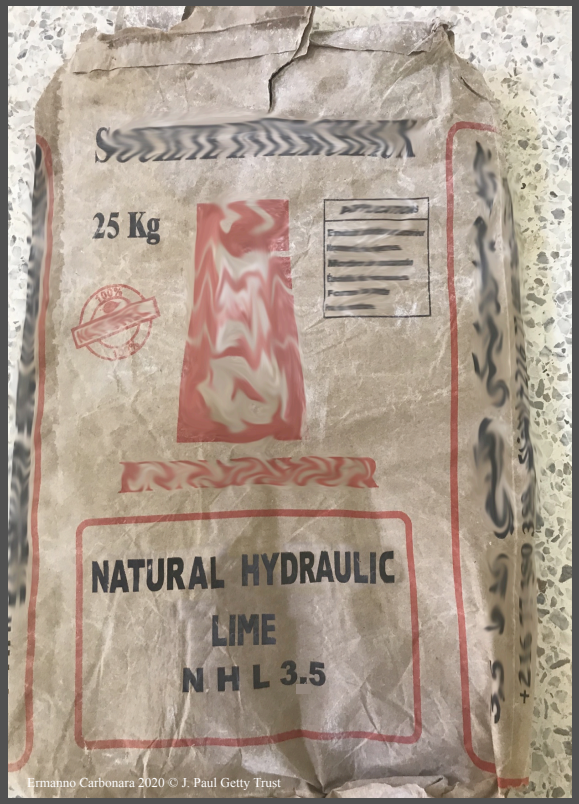
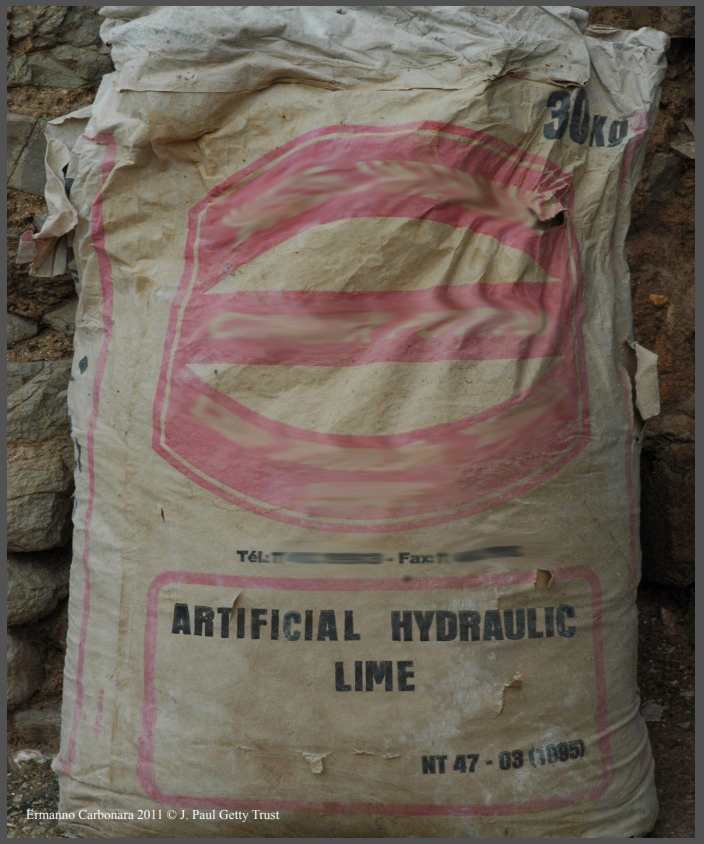


NHL 3.5

NHL 6

Binders

NON-HYDRAULIC	HYDRAULIC
• Lime putty (paste) • Hydrated lime (powder)	• Natural hydraulic lime (powder) • Cements and artificial hydraulic limes (powder)



Artificial hydraulic lime

Binders

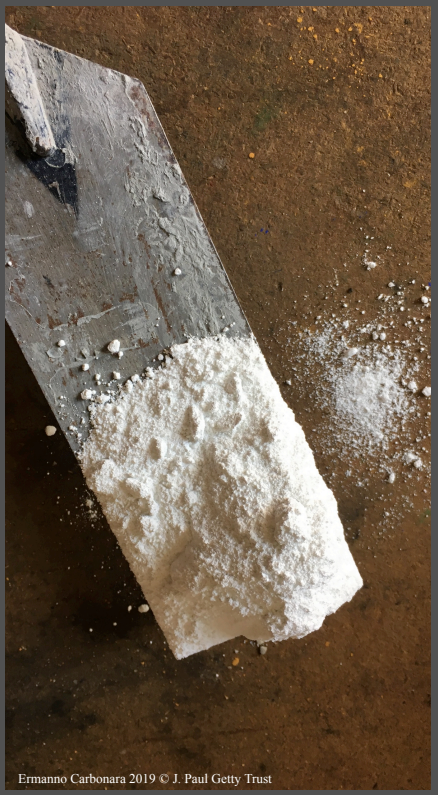
NON-HYDRAULIC

- Lime putty (paste)
- Hydrated lime (powder)

HYDRAULIC

- Natural hydraulic lime (powder)
- Cements and artificial hydraulic limes (powder)

Black cement

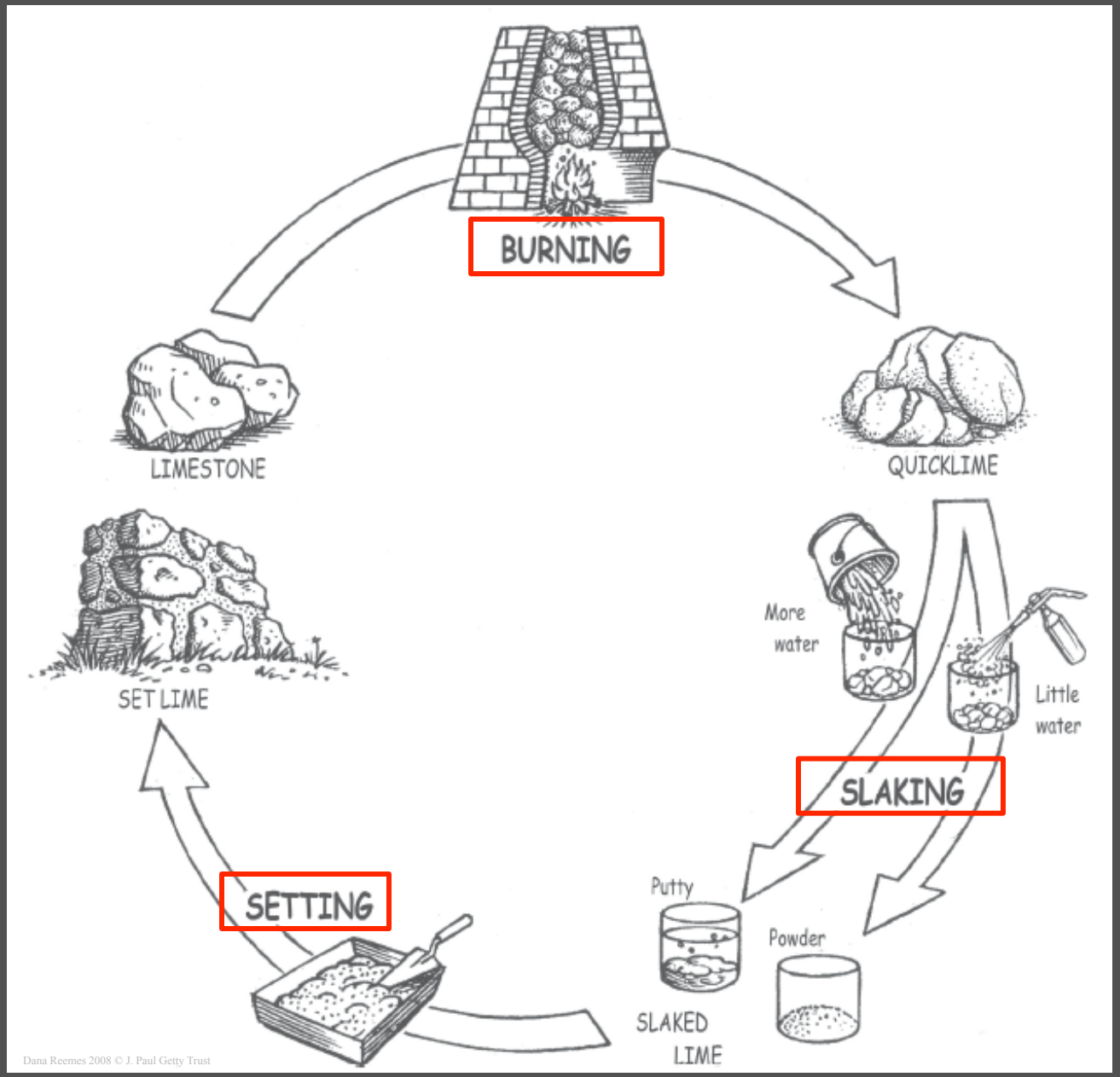


White cement

NON-HYDRAULIC binders

Lime putty (paste)

Lime cycle



BURNING → SLAKING → SETTING

Basin for slaking and aging the lime putty

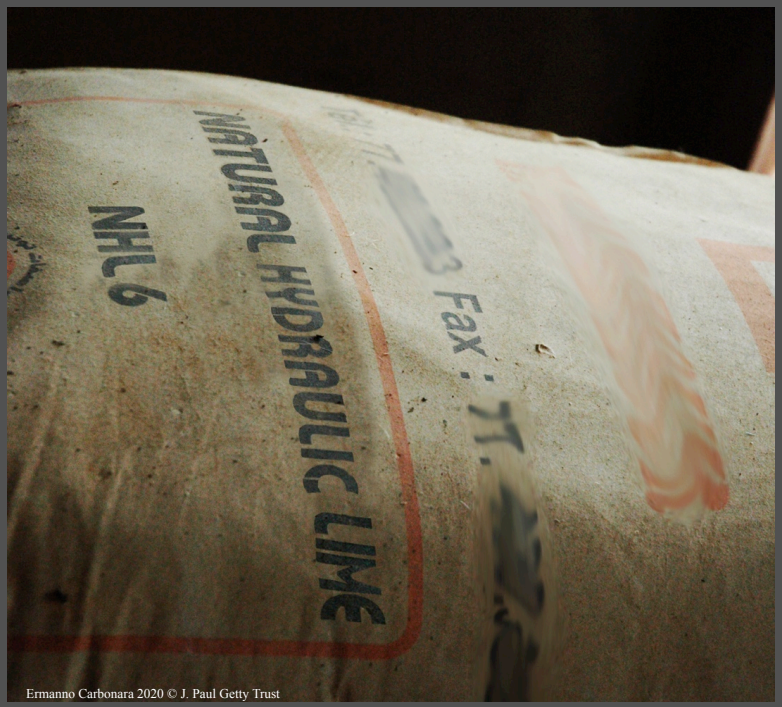
HYDRAULIC binders

Natural hydraulic lime (NHL) (powder)

STONE → BURNING → HYDRAULIC BINDER

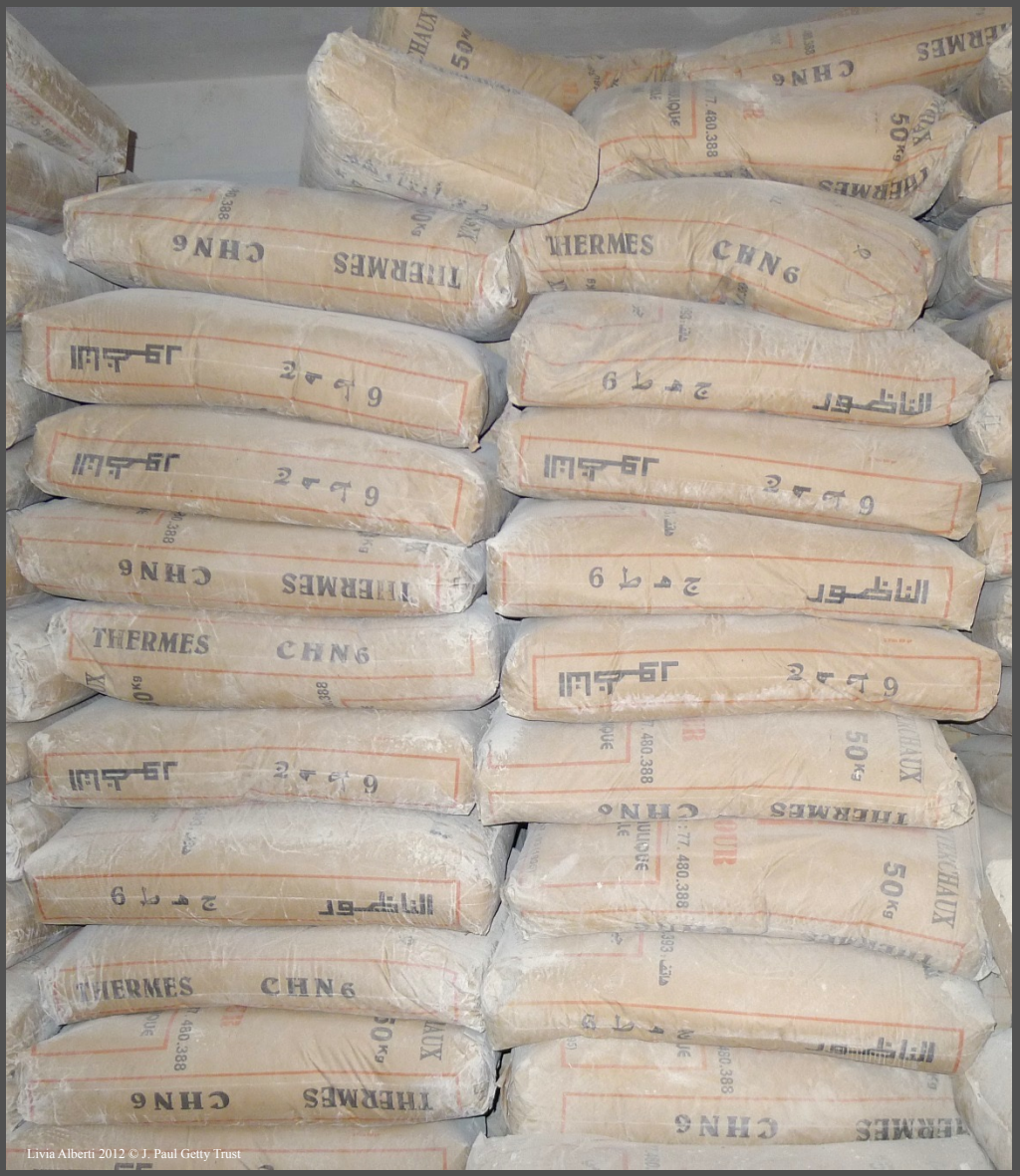
Limestone containing siliceous components

Burning in industrial kilns



Natural hydraulic lime (NHL)

Storage of natural hydraulic lime



Aggregates

Aggregates make up the skeleton of the mortar; their hardness contributes to its strength, and they help decrease mortar shrinkage during setting. Aggregates can be divided into two main categories:

- INERT aggregates
- aggregates giving HYDRAULIC properties to the mortar

Inert aggregates do not react chemically with the binder.
Aggregates giving hydraulic properties to the mortar have the capacity to react chemically with the binder and can significantly improve the hydraulic setting of the mortar.

Aggregates

INERT aggregates	Aggregates giving HYDRAULIC properties to a mortar
• Sand	• Fired clay
• Gravel	• Volcanic earths and rocks

Quarries

Aggregates

INERT aggregates	Aggregates giving HYDRAULIC properties to a mortar
• Sand • Gravel	• Fired clay • Volcanic earths and rocks

Quarries

Aggregates

INERT aggregates	Aggregates giving HYDRAULIC properties to a mortar
• Sand • Gravel	• Fired clay • Volcanic earths and rocks

Preparation and firing of bricks

Aggregates

INERT aggregates	Aggregates giving HYDRAULIC properties to a mortar
• Sand • Gravel	• Fired clay • Volcanic earths and rocks

Formation

Quarry

Aggregates

Preparation and storage of aggregates

Storage

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Ermanno Carbonara 2012 © J. Paul Getty Trust

Aggregate depot

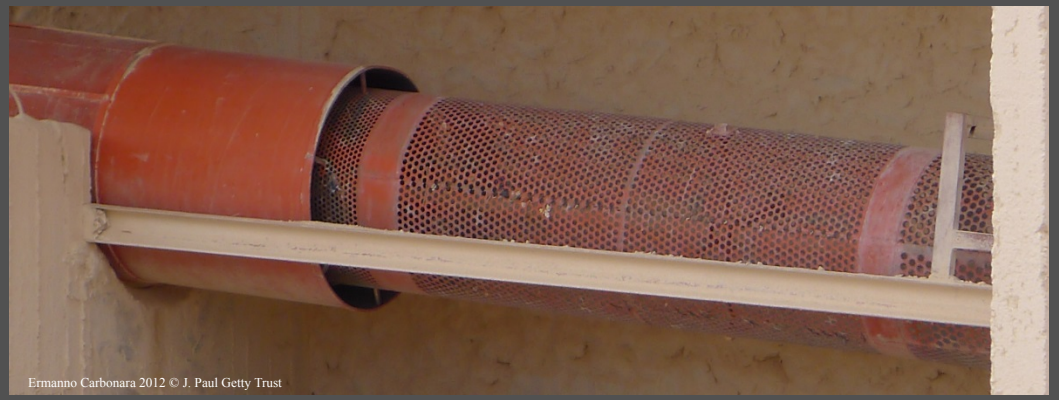
Crushing

Mechanical crushing

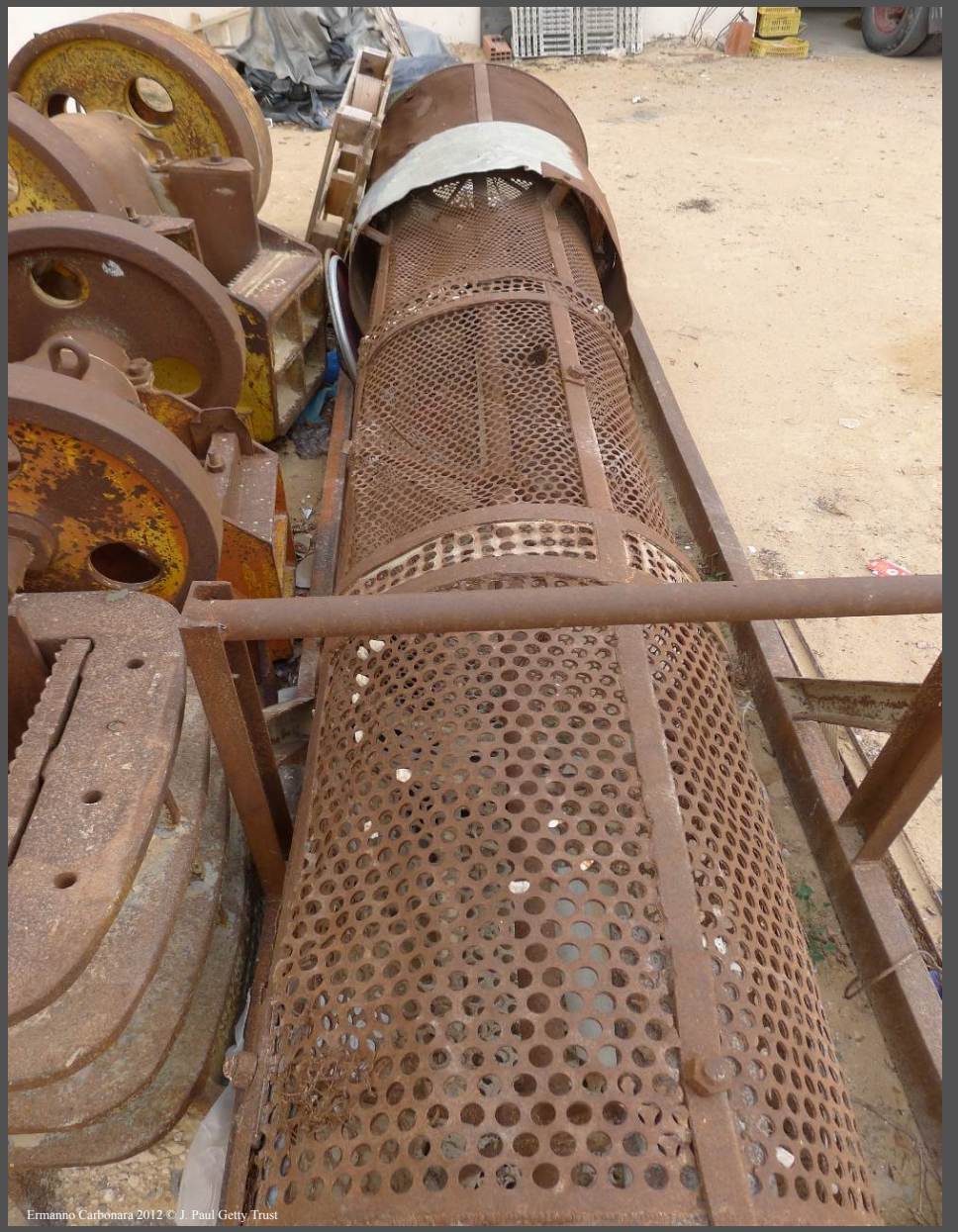
Crushing

Manual crushing

Sieving



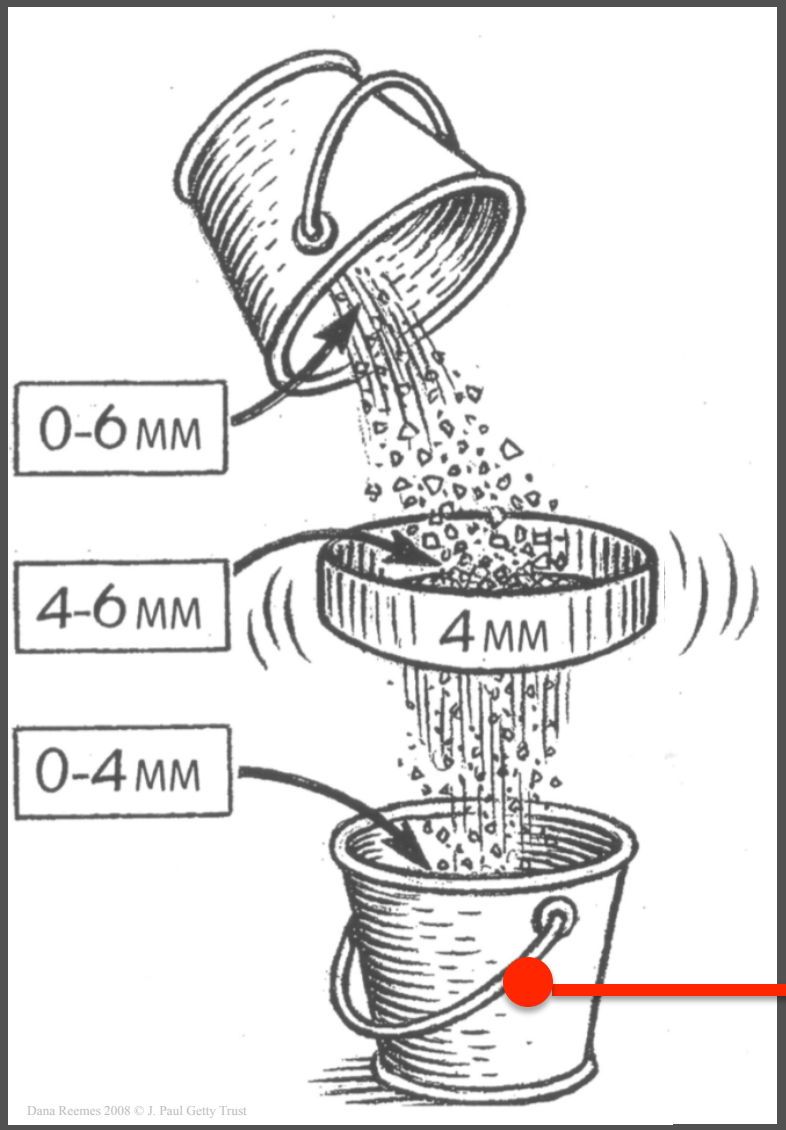
Mechanical sieving

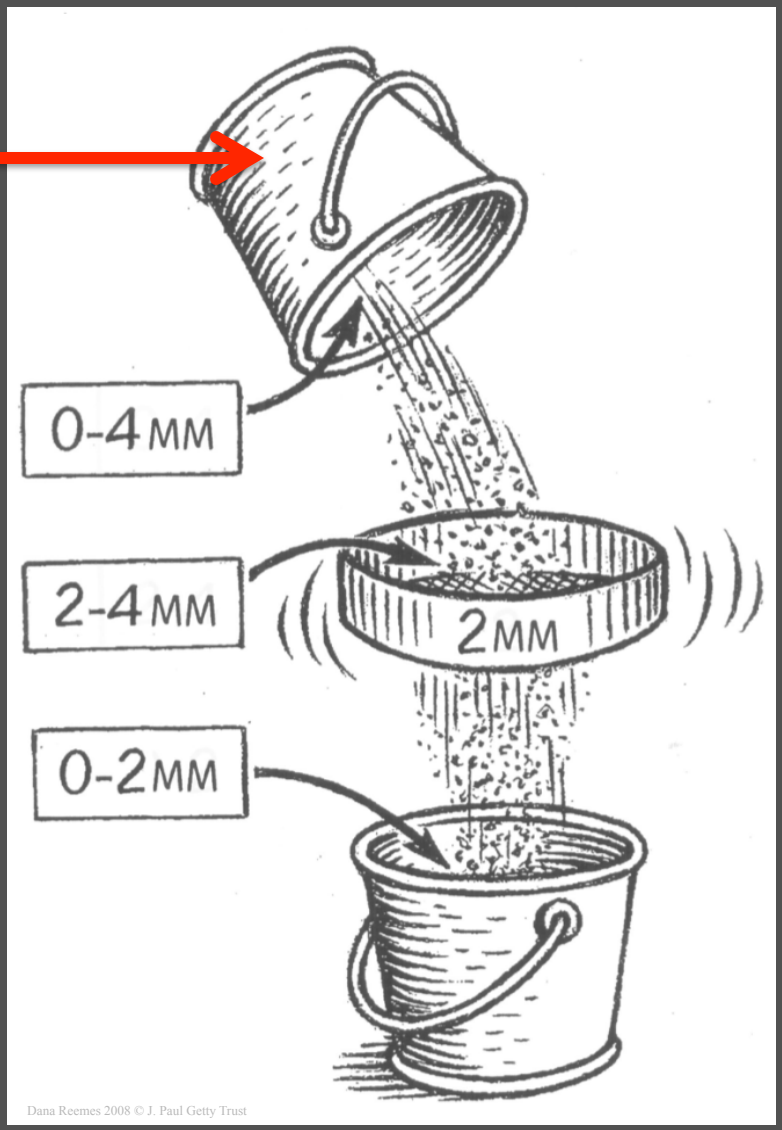


Sieving

Manual sieving

Sieving





Sieving of aggregates in several fractions

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Livia Alberti 2007 © J. Paul Getty Trust

Cleaning

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MOSAIKON is a partnership of four institutions: the Getty Conservation Institute, the Getty Foundation, ICCROM, and ICCM. The aims of the project are to strengthen the network of professionals concerned with the conservation, restoration, maintenance, and management of mosaic heritage in the southern and eastern Mediterranean region; provide training to a variety of individuals involved in mosaics conservation and, more generally, with the management of archaeological sites and museums with mosaics; work with national and international bodies to provide a more favorable legislative, regulatory, and economic environment for the conservation of mosaics in the Mediterranean; and promote the dissemination and exchange of information.