Outline for Lime Seminar Including Burning and Slaking of Lime

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LIME SEMINAR

Part 1 Introduction to lime

Basic Mortar:

- Binder
- Aggregate
- Water

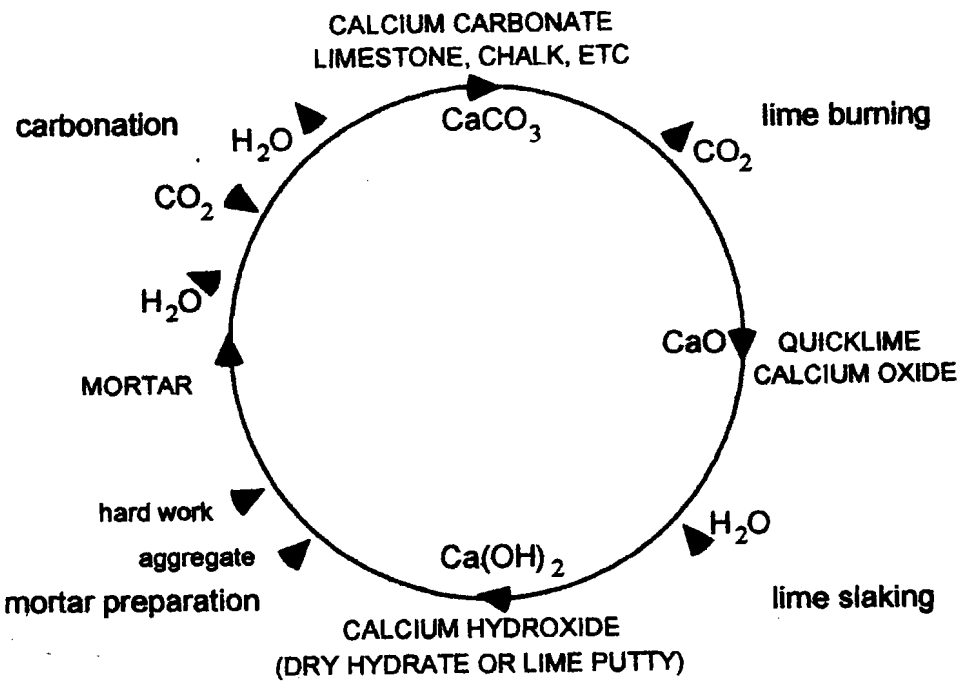
Binders:

Hydraulic	Non-Hydraulic
Gypsum	Mud
Hydraulic lime	Clay
Portland cement	Lime
Natural cement	

Concentrate on lime – why use lime?

A tale of two limes - what makes hydraulic hydraulic?
- what makes non hydraulic?

Introduction to Lime Cycle



1. Calcium carbonate heated gives off carbon dioxide to form calcium oxide $CaCO_3+\downarrow heat=\uparrow CaO+CO_2$.

2. Calcium oxide slaked (water added) give off heat and forms calcium hydroxide (slaked in one of four ways explained) $Ca(OH)_2$

3. Lime putty produced with excess of water – allowed to mature – forever – beaten with aggregate to form coarse stuff and used as mortar

Pot Kiln like pot whisky still

4. Calcium hydroxide (mortar putty) combines with carbon dioxide in air to form $CaCO_3$ – calcite – as water evaporates same as limestone but different crystal structure

Part 2

Kiln technical requirements for building and firing kiln, and building and firing it. Must burn and sustain temperature for 12-16 hours.

Part 3

Slaking lime to make lime putty, and beating lime putty into mortar and setting a few bricks to demonstrate workability and stickiness of putty.

Part 4

Summary:

- Advantages of lime (recap)
- Disadvantages of lime
- Advantages of Portland cement
- Disadvantages of Portland cement

Requirements

Part 1 Blackboard and/or large easel and coloured markers/chalk

Part 2 Build kiln – minimum requirements:

⇒ 400 refractory bricks ~ 8x4x2 or so
⇒ two yards of high clay/sand mix
⇒ heavy grill to burn on
⇒ face cord dry hardwood cut to 12" lengths

⇒ 500 lbs limestone to burn – high calcium low magnesium
⇒ shop vac with blower capacity
⇒ concrete or gravel pad
⇒ chimney ~ ±3' stovepipe ±8" diameter fastened to steel plate
⇒ **some short pieces of rebar and grinder/chop saw
⇒ **it's possible that I can borrow some of this from Algonquin College as I will be doing a similar seminar with my class in November this year

Part 3

⇒ Source of hot water
⇒ Wheel barrow(s)
⇒ Hand trowels
⇒ Spray bottle
⇒ Mortar hoe
⇒ Rubber buckets and pick handles
⇒ Bricks to set

Part 4 Bag of Quicklime in case Part 3 doesn't work

Part 5 **Timeline**

⇒	Initial talk, with questions	1-2 hours
⇒	Assembly and charging kiln assuming all materials on hand	3-4 hours
⇒	Burn lime	12-16 hours
⇒	Cool down	4-6 hours
⇒	Slake and make putty, beat in sand to make mortar	2 hours

[i] Lime cycle reproduced from TAN#1, Historic Scotland