LA MERIDIANA

INTERNATIONAL SCHOOL OF CERAMIC ART IN TUSCANY

Notes on ash glazes

ASH GLAZES

Wood or vegetable ashes have been used as glaze materials since antiquity, and they may lend a quality to glazes which it is difficult to obtain with other materials. The discovery of ash as a glaze material undoubtedly came about when the early Chinese potters noted that the ware in their open-fired, wood-burning kilns was being partially glazed by the ashes which were carried through the kiln by the draft. Some of the earliest glazes made in China were probably combinations of ash from the fires of the kilns together with some red clay, and very practical high-temperature glazes can be made from ash, feldspar, limestone, and clay.

The chemical analysis of wood and vegetable ashes shows that they contain 10 to 15 percent alumina, 30 to 70 percent silica, up to 15 percent potash, up to 30 percent lime, together with some iron oxide, phosphorus, magnesia, and other elements. These oxides are all useful in glazes, and potash is a valuable flux.

Most ashes will melt to a fluid glass at around cone 10. When ash is used alone as a glaze, it will usually result in a rather thin, watery-looking glaze. Ashes vary rather widely in composition, and even the ash of a given variety of tree will vary, depending on the soil in which it grew. The use of ash in glazes depends, therefore, on testing and experimentation with the material at hand. It may be difficult to locate a reliable source of ash which will be uniform in composition, but some potters have successfully used the ashes from the burning of waste in sawmills or fireplaces. The ashes from burned corncobs, rice hulls, or other agricultural wastes such as fruit pits offer possible sources. Volcanic ash has been successfully used as a glaze material.

In small quantities , of say 10% or less, it is not a dominant ingredient and can usually be replaced with feldspar or even omitted without noticeable effect. But in amounts over about 25% it usually contributes distinct colour and texture.

Recipes which simply specify ‘wood ash’ usually mean from a general mixture of woods.

The particular qualities of ash are better exploited in reduction than in oxidation, although interesting results can be achieved in electric kilns.

PREPARATION

To prepare plant ash for use one must first ensure that it is well-burnt. For practical work the ash must also be available in sufficient quantity, at least half a dustbin, and preferably more.

A careful initial sieving through a garden sieve will remove the rough stuff. It is then soaked in plenty of water and passed through a 30 mesh. As the ash settles, the surface water will contain a considerable concentration of soluble alkalis and will be caustic. This liquid can be poured or

siphoned away and replaced with clean water. The ash is well-stirred and again left to settle then passed through a 80 mesh.
It is advisable to carry out these operations wearing rubber gloves. The 'washing' process can be repeated two or three times, during which fluxes will be removed and the ash will become progressively more refractory. Reasonable washing is essential for ash which is to be added to tableware glazes, but for purely decorative purposes a totally unwashed ash can give entertaining results.
After the final settling and decanting, the sludge is spread out to dry (beware of ash on plaster slabs, the alkalis will attack the surface). When dry it is stored and weighed like any other ingredient, care being taken not to raise too much dust.

Testing. As a start in working out ash glazes, a simple combination of two parts of ash, two parts of feldspar, and one part of clay may be tried. If the glaze resulting from such a proportion is too fluid, more clay may be added, and if the glaze is too stiff, more ash or some other flux such as whiting may be added. Ash glazes will need high firing to fuse, and cone 8 to cone 11 is the usual temperature range. The following gives the probable limits of the various materials usual to ash glazes:

Ash	20 to 70%
Feldspar	20 to 70%
Whiting	5 to 20%
Flint	15 to 25%
Clay	5 to 20%

Other materials , such as colemanite, talc, red clay, slip clay, or nepheline syenite may be used to make up the glaze. One way to incorporate ash into a glaze composition is to take any stiff stoneware glaze and add progressively larger amounts of ash to it until it shows the marked influence of the added material. Ash glazes, particularly those which are fired in reduction, have a peculiarly broken surface texture which may be very attractive. High fired reduction glazes which have some ash in their composition, together with rutile and a small amount of colouring oxide, can yield very soft, beautifully mottled and coloured surfaces.

A final word of warning about ash should be noted. Dry wood ash, whether in the raw or prepared state, is a potentially hazardous material. It contains light particles of silica and, in the raw state, caustic material. When ash is handled in the dry state this should be with due care, avoiding the creation of airborne dust.

A SUGGESTION FOR A SERIES OF TESTS

Available ashes:
- Mixed
- Mixed unwashed
- Olive
- Oak
- Cypress
- Grape-stalk
- Blackberry

Linear tests

Test n°1 Test each ash separately.

Test n°2 For hard ashes (high silica) make line blends with feldspar.

Feldspar ($K_2O.Al_2O_3.6SiO_2$) is a major flux at high temperature. Is has a high viscosity.

A	20	40	60	80	100	**Ash**
B	80	60	40	20	0	**Feldspar**

Test n°3, 4, 5, 6 Make line blends with mixed ashes and Caolin, Ball clay(HVAR), Stoneware clay, Earthenware clay (Montelupo grigia).

A	20	40	60	80	**Ash**
B	80	60	40	20	**Caolin**

Test n°7. Make a line blend of mixed ashes with B as two parts of feldspar and one part of caolin.

A	20	40	60	80	**Ash**
B	80	60	40	20	**Feldspar** (2) / **Caolin** (1)

Test n°8. For soft ashes (low silica) make line blends with B as two parts of feldspar and one part of HVAR We use it in order to introduce silica and alumina in the glaze.

A	20	40	60	80	**Ash**
B	80	60	40	20	**Feldspar**(2) / **Ball Clay** (1)

Test n°9. Take any of the above glazes and make a line blend with whiting.

Whiting (calcium carbonate, $CaCO_3$) is a major flux for high temperature. It makes the glaze more watery, hard and durable.

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A	50	60	70	80	90	**Glaze**
B	50	40	30	20	10	**Whiting**

Test n°10.Where necessary (e.i. too much crazing) add flint.

A	75	80	85	90	95	**Glaze**
B	25	20	15	10	5	**Flint**

Test n°11.Take a hard glaze and add colemanite.

Colemanite (calcium borate,$2CaO.3B_2O_3$) is a powerful flux.

A	90	92	94	96	98	**Glaze**
B	10	8	6	4	2	**Colemanite**

Test n°12.Take any glaze and introduce dolomite.

Dolomite (a double carbonate of calcium and magnesium, $CaCO_3.MgCO_3$). Flux up to 5-6%.For special effects up to 20%.

A	75	80	85	90	95	**Glaze**
B	25	20	15	10	5	**Dolomite**

Test n°13.Take any glaze and introduce red clay (earthenware).With the alumina and silica it will take some iron into the glaze.

A	50	60	70	80	90	Glaze
B	50	40	30	20	10	Red clay

Tests from glazes

A matt glaze modified with ash.

n°1	Feldspar	40
	Whiting	20
	China clay	40

n°2 n°1 + 10 ash
n°3 n°1 + 20 ash
n°4 n°1 + 30 ash
n°5 n°1 + 40 ash

We take a common ash glaze and change the ash.

n°6	Feldspar	40
	Ash	40
	China clay	20

n°7 n°6 but with olive ash
n°8 n°6 but with oak ash
n°9 n°6 but with cypress ash
n°10 n°6 but with grape-stalk ash
n°11 n°6 but with blackberry ash

Test and modify as you wish the following glaze recepies:

n°12	Feldspar	40
	Ash	40
	Flint	20
n°13	Feldspar	33
	Ash	33
	Flint	33

n°14	Feldspar	40
	Ash	40
	Montelupo g.	20
n°15	Feldspar	33
	Ash	33
	Montelupo g.	33
n°16	Feldspar	30
	Ash	40
	China clay	15

	Flint	15
n°17	Feldspar	20
	Ash	35
	China clay	15
	Montelupo g.	30

Colour

Modify with colouring oxides the following dry ash glaze.

n°18	Ash	50
	China clay	50

iron oxide	2
iron oxide	6
iron oxide	10
manganese oxide	3
cobalt oxide	1
rutile	4