GLASEZ AND PIGMENTS

Possible source of red ochre

On Camp Creek Road at M.P. 6.2, Lane County (between Marcola Road and McKenzie Hwy., near tail race of EWEB power plant at end of ditch, Walterville. Roadcut on East side of road shows at least 8 feet of dark red-purple ochre. Not sampled or tested.

Possible source of red ochre, Lane County

On Horsepasture road (USFS) off of Horse Creek road. Burnt contqct in volcanics in roadcut, 8 to 10 inches thick. On steep portion abotout halfway up grade to pass leading to Horsepasture Mtn. Visible along road for several hundred yards. Other contacts of similar nature likely in vicinity.
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*In Arsem furnace at 600°C per hr.*
Art professor says ash has great value as ceramic glaze

ASH WORKS WONDERS — Zeljko Kujundzic, Penn State University art professor, says volcanic ash has great potential as ceramic glaze. Kujundzic is conducting ash experiments at his Entiat, Wash., home.

BY TERRI MINTZER

ENTIAT, Wash. (AP) — The results of a recent experiment with volcanic ash in ceramic glazes are so positive that he's convinced the stuff has a future in the pottery world.

"If you put this ash in a ceramic glaze it will not only make it whiter but will add a lot of strength to it," said Kujundzic, a Yugoslavian native who works at the University of Washington, where he teaches art. "I think it's going to be very useful in the future."
His research is funded by a Penn State grant. Kujundzic has been here since the first of July and will leave this fall, but he eventually plans to retire in Entiat.

"For glazes, the ash is excellent," said Kujundzic. Initial tests proved that everything needed for a good glaze base is already there, he said. Other chemicals can be added for esthetic effect or for color or texture.

He's found that a volcanic ash glaze is simple and non-sophisticated for some uses.

Because volcanic ash is so abundant, his aim is to use 60 to 70 percent in his mixtures. He's achieved that ratio without difficulty.

After he found out that ash makes a good glaze base, he tested to see whether it was possible to duplicate commonly used glaze bases. Kujundzic said he succeeded in making glazes with the same properties he's familiar with by adding very little other material.

The third phase of his experimenting is to see if he can produce something new for the art of ceramics with volcanic ash.

He's also convinced there will be a healthy demand by potters for the ash. "The glazes we use now are so expensive it drives you crazy," he said. For example, the price of one of the most used chemicals has risen from $3 to $30 a pound in a few years.

The cost of volcanic ash should be minimal in comparison because it's so abundant and there would be no cost for grinding or refining the substance, since it comes naturally ready-to-use.

There's a much greater sales value to volcanic ash than simply selling it to tourists in little vials, he said. "There's a day when we'll be exporting it very shortly."

Though his work is just with the ceramics aspects, Kujundzic had a list of other uses for volcanic ash.

It's a good abrasive for polishing, grinding or cleansing; it's an excellent base for colored glass and it has valuable qualities for fertilizing crops, he said.

A market could be found by simply putting ads in ceramic or industrial magazines, he said.

Most people underestimate the importance of the ceramic industry, he believes, and aren't aware of the many current and potential uses for ceramics.

Ceramics are being used in clothing and gloves for workers in high temperature industries; in space research, as in the lining of the bottom of space shuttles; and in tires, where ceramics impregnated in them makes them extremely tough, said Kujundzic.

He also said that a ceramic car engine has been devised that might last forever.

Kujundzic warns not to waste the ash. He screwed up his face into a disapproving expression when he described a sight he saw in Yakima. "They just bulldozed it all, into dumps and vacant lots," he said.

"If they had tons of dried apricots falling from the sky, they wouldn't waste them."
PRELIMINARY REPORT ON VOLCANIC ASHES AS GLAZE FLUXES

A series of experiments are being made to determine the practicability of Oregon volcanic glasses or ashes as a glaze constituent. This is a progress report on the experiments to date and should not be taken as complete or conclusive in any way. The bare surface of the testing has been scratched and it is hoped that more time will be available for work in the future.
Nelson ash (grey Nelson) clay in marl proper name.

Location: Near St. Helens

Analysis:

\[
\begin{align*}
\text{SiO}_2 & \quad 55.51 \\
\text{Fe}_2\text{O}_3 & \quad 7.23 \\
\text{Al}_2\text{O}_3 & \quad 22.17 \\
\text{MgO} & \quad 1.50 \\
\text{K}_2\text{O} & \quad 0.15 \\
\text{Na}_2\text{O} & \quad 0.20 \\
\text{Moisture and loss on ignition} & \quad 13.10
\end{align*}
\]

\text{(Mineralogical formula)}

\[
\begin{align*}
\text{MgO} & \quad 0.885 \\
\text{Al}_2\text{O}_3 & \quad 5.34 \\
\text{SiO}_2 & \quad 22.4 \\
\text{K}_2\text{O} & \quad 0.039 \\
\text{Fe}_2\text{O}_3 & \quad 1.11
\end{align*}
\]

Weight 2313

P.C.E.: Cira C/16 (much higher than feldspars)

Color: Dark brown

Note: This material is more of a clay substance than an ash.

Tests were run as fusion buttons to C's - /03-6

a. Ash 100% infusible.
   a. Ash 80% + colemantite 20% C/1 medium button.
   Ash 60% + colemantite 40% C/03 low button.
   Ash 80% + cryolite 20% C/2 low button.
   b. Ash 70% + cryolite 30% C/2 flat.
   Ash 60% + cryolite 40% C/01 flat.
   Ash 90% + dolomite 10% C/2 high unfused mass.
   c. Ash 80% + dolomite 20% C/6
   Ash 70% + dolomite 30% C/2
   Ash 90% + whiting 10% hard cinter.
   d. Ash 80% + whiting 20% hard cinter.
   Ash 70% + whiting 30% hard cinter.

Ash F-8373

Location: Wheeler Co. Hyaug 19.5 miles west of Spray.

Analysis:

Volcanic phases 95% Dominantly feldspar

P.C.E.: Cira C/02 Good fusion, light brown color.
Ash P-3442
Location: Sec. 4, T. 7 S., R. 41 E.
Analysis: Volcanic glass est. 75-85%
          Mineral grains est. 15-25% (feldspar dominant)
P.C.E.: C/2 Badly bloated.

Ash P-3444
Location: NE¼ SE¼ sec. 9, T. 27 S., R. 9 E.
Analysis: Volcanic glass est. 85-90%
          Mineral grains est. 10-15% (feldspar dominant)
P.C.E.: C/3 Good fusion, dark brown.

Ash P-3443
Location: NE¼ SE¼ sec. 9, T. 27 S., R. 9 E.
Analysis: Volcanic glass est. 80-85%
          Mineral grains est. 15-20% (feldspar dominant)
P.C.E.: C/3 Same as P-3444.

Ash P-3441
Location: Sec. 32, T. 2 S., R. 2 E.
Analysis: Volcanic glass 60-70%
          Mineral grains 30-35%
          Diatoms 2-5%
P.C.E.: C/4 Floating
Ash P-8481

Location: Sec. 23, T. 33 S., R. 1 E.

Analysis: Volcanic glass est. 70-80%

Mineral grains est. 10-15% (feldspar dominant)

Rock grit 5%

Pumice grit 5-10%

P.C.E.: C/4 Good fusion, dark brown.

Ash P-8480

Location: Sec. 23, T. 33 S., R. 1 E.

Analysis: Volcanic glass 60-65%

Mineral grains 35-40% (feldspar dominant)

P.C.E.: C/2 Dark color, fusion good.

Ash P-8479

Location: Sec. 23, T. 33 S., R. 1 E.

Analysis: Volcanic glass 60-65%

Mineral grains 25-30% (feldspar dominant)

Pumice fragments 5-10%

P.C.E.: C/3 Dark color, fusion good-fair.

Ash P-8484

Location: From Merle Sleeper pit 1 mile west of Bend, Oregon.

Analysis: Volcanic glass 95%

Mineral grains 5% (feldspar dominant)

P.C.E.: C/3 Light brown fusion.
Ash P-8483

Location: From Sleeper pit approximately 1 mile west of Bend, Oregon.

Analysis: Volcanic glass 85%  
Mineral grains 10%  
Rock fragments 5%

P.C.E.: C/4 Fusion dark brown.

Note: Ashes P-8483 All started to tip at minus C/2 but did not bend  
P-8484 completely until given temperatures.  
P-8481

Sample P-8512

Location: Adair, Oregon, E\frac{1}{2} of SE\frac{1}{4} sec. 33, T. 31 S., R. 46 E.

Analysis: Volcanic glass 95% (Highest percent of volcanic glass submitted to date)  
Mineral grains (negligible)

P.C.E.: C/8 Gray translucent fusion. Highest temperature to date, also  
lightest in color of all ashes reported in this paper.

Ash P-8512

Was made as mixture with whiting and colemanite and fired to C/2.

Ash 90% + whiting 10% Some glassy fusion, did not wet surface, crawling to marked degree.
Ash 80% + whiting 20% Same as above but less crawling present.

Ash 95% + Colemanite 5% Some glassy fusion, did not wet surface, crawling  
to marked degree.
Ash 90% + Colemanite 10% Same as above but less crawling.
Ash 85% + Colemanite 15% Good fusion, crawling evident but less than any  
mixes in this group.
Ashes tentatively selected for further work:

P-8373  All others were eliminated due to: 1. darkness
P-8443                                           2. bloating
P-8484                                           3. uneven fusion and/or unpleasant
goat 1939  effects of fusion.

New ashes received up to January 1, 1950:

P-9231
P-8596 (Removed from testing because of high plastic content. Probably bentonite)
P-9321
P-9229

Ash  P-9231

Location:  Secs. 1, 2, 7, 8, 11, and 12, T. 18 S., R. 12 E.

Analysis:  Volcanic glass est. 95%

Mineral grains est. 5% (mainly feldspar)

P.C.E.:  C/2 Good glass, dark gray color at C/6 as a glaze, no crazing
present.

Ash  P-9330

Location:  Secs. 1, 2, 7, 8, 11, and 12, T. 18 S., R. 12 E.

Analysis:  Volcanic glass 95%

Mineral grains 5% (mainly feldspar)

P.C.E.:  C/2 Dark glass, good fusion at C/6, crazing present.

Ash  P-9229

Location:  Sec. 24, T. 6 S., R. 13 E.

Analysis:  Volcanic glass 99% (exploded perlite)

P.C.E.:  C/4 Light colored glass, clean fusion at C/6 as glaze, bubbles
present (probably caused by insufficient grinding of bubbles
in the bloated perlite).
The ashes tested so far produced in all cases, except one (P-8519),
dark-firing glasses at temperatures in the neighborhood of 0/1-5, most
of them about 0/4 or 2150°F. P-9519 produced a light gray to white
fusion at 0/8 or 2300°F.

All the ashes with the exception of P-8519 have no use as a feldspar
substitute. They could be used as fluxes for building products production
or as low-grade fluxes for dark-colored, low temperature glazes for use
on architectural facing tile, roofing tile, etc.

The commercial glasses (Frits) used as fluxes at this time run in
the neighborhood of $80.00 to $120.00 per ton f.o.b. plant. These glasses
have a standard known composition and are usually compounded for a
specific plant's use by the manufacturer.

Whether or not the low cost of the ashes would or could offset the
standard materials and practice is a moot question. There is one plant,
however, using volcanic ash of a light-firing color and a fusion of
crystal C/3. This plant is in Kansas and manufactures a low price art-ware
for the florist trade. They have had success in the use of their ash as
a glaze base to which other oxides are added. Not much has been reported
on their production or the quality of the ware produced.

The ashes selected for the testing will be used as constituents of
a group of glazes at C/04 as well as C/2.4. The higher range seems more
practical from the sale of the ash, since more could be used. There is
a chance that eutectics may be reached which will produce glasses for
use at the lower temperatures which will contain an appreciable ash con-
tent.

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## END POINT, BENDING INTERVAL, AND CONE INTERVALS
OF ORTON STANDARD PYROMETRIC CONES

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