Glaze Unity (Seger) Formula from Oxide Analysis

Unity molecular formula of a glaze from its oxide analysis: fluxes summed to one, with alumina, boria and silica per unit flux, Si:Al ratio and formula weight.

Method: Seger unity molecular formula of glazes

Input parameters

Unit system: SI

Parameter	Value	Unit
K_2O	3.0000	%
Na_2O	3.0000	%
CaO	10.000	%
MgO	2.0000	%
ZnO	3.0000	%
Al_2O_3	14.000	%
B_2O_3	5.0000	%
SiO_2	60.000	%

Calculated results

Parameter	Value	Unit
Alumina per unit flux	0.39792	
Boria per unit flux	0.20813	
Silica per unit flux	2.8940	
Silica to alumina ratio	7.2727	
Alkali (K_2O + Na_2O) per unit flux	0.23257	
Formula weight (g per unit)	289.80	

Notes for this case

• Each oxide's weight is divided by its molar mass; the fluxes (RO and R_2O: K_2O, Na_2O, CaO, MgO, ZnO) are scaled to total one, and alumina, boria and silica are expressed per that unit. Glossy stoneware glazes typically have Si:Al of 7–10 with 0.25–0.45 Al_2O_3; matte glazes lower ratios. The formula weight is the glaze mass (grams) that contains one unit of flux. Enter the analysis on any consistent basis; loss on ignition is excluded.

Formula and method

$$n_i = \frac{w_i}{M_i}, \quad \mathrm{UMF}_i = \frac{n_i}{\sum n_{flux}}$$

Variables

K_2O	K_2O	-
Na_2O	Na_2O	-
CaO	CaO	-
MgO	MgO	-
ZnO	ZnO	-
Al_2O_3	Al_2O_3	-
B_2O_3	B_2O_3	-
SiO_2	SiO_2	-
$Si:Al$	Silica to alumina ratio	-

$KNaO$	Alkali (K_2O + Na_2O) per unit flux	-
M_f	Formula weight (g per unit)	-

Method and standards

Unity formula.

Assumptions and limits

- Oxide analysis as entered.

References

Seger unity molecular formula of glazes

Report details

Report reference	FCC-VB4B-KN7W (the same inputs always give the same reference)
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Calculator	Glaze Unity (Seger) Formula from Oxide Analysis
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Release checks	3 reference cases of this calculator, computed independently, are checked on every release

Results are for engineering estimation. Verify critical designs against the referenced standards and your own data.

This calculator online

https://calc.firecad.com/chemical/ceramics-glass/glaze-seger-unity-formula

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Reopens the calculator with the inputs of this report.