Glaze Calculation Additional Notes.

The general flow of information:

Recipe

Shows WEIGHTS of actual glaze materials

Recipe example:

Satin Base c 10

Potash feldspar -	25.8
Whiting	35.6
Kaolin	26.1
Silica	14.3

Usually to one decimal place

Common format is 100% for the base recipe, with colorants and glaze conditioners and additives in addition to the 100% formula

Work flow from recipe to Unity;

You know the ingredients used and the weights used of those ingredients.

If you know the TOTAL weight, and you know how much ONE weights, you can divide the total by the weight of one to find out how many you have.

e.g. Pot spar 25.8 wt x $\frac{1\ molecule}{556\ wt\ spar}$= .046 Mol spar

Now multiply the number of molecules you have times what's in the fired formula of one molecule of spar to determine what the spar contributes to the fired glaze:

.046 mol spar(KNaO●Al2O3●6SiO2)=

.046 KNaO● ,046 Al2O3● .247 SiO2

Put these numbers from spar in the correct columns of the Unity chart:

Flux RO, R_2O	**Viscosity R_2O_3**	**Glassformer RO_2**
KNaO ..046	Al2O3 .046	SiO2 .247

Repeat this for all materials in the glaze. Total like oxides.

To achieve Unity, total the flux column. Divide each number of molecules in all 3 columns by this total. As a check, the numbers in the flux column should now equal one or close to on (from rounding off)

Unity Molecular

Shows the relative NUMBERS OF MOLECULES of oxides used in ceramics needed the glaze recipe

Unity Example:

RO, R_2O	**R_2O_3**	**RO_2**
KNaO .115 CaO .885	Al2O3 .367	SiO2 1.787

Usually to 3 decimal places

Common format is expressed with the flux column equaling ONE (Unity).

Work flow from Unity to Recipe:

You know the oxides needed and the number of relative molecules of those oxides.

Determine what to solve for first. Usually, the oxides that are only available in insoluble form as complex ingredients that will bring along additional oxides. These days, with Gerstly borate in question, the most complicated thing to solve for is boron, followed by sodium/potassium (usually combined because they behave similarly as KNaO.)

In the unity formula above, the first thing to solve for is the KNaO.

We need .115 molecules KNaO.

Determine from your familiarity with glaze materials what you would use as an insoluble source of KNaO. Frit is possible, but many contain boron, which we don't need, and frit is more expensive than feldspar or neph sy. Neph sy uses up less of the glaze silica than feldspar, but will deflocculate the glaze. Spar might be a reasonable choice.

If the coefficient of the oxide you want is one in the material you selected, multiply the molecules needed by the fired formula for your ingredient:

.115 KNaO mol needed (KNaO●Al2O3●6SiO2)=

.115 KNaO● .115 Al2O3● .69 SiO2

Subtract each oxide from the needed amounts in your unity formula. (continued)

Glaze Calculation Additional Notes.

Unity Molecular (continued)

RO, R_2O		**R_2O_3**		**RO_2**	
KNaO mol needed	115	Al2O3 mol needed	.367	SiO2 mol needed	1.787
- KNaO from spar	-.115	- Al2O3 from spar	-.115	- SiO2 from spar	-.690
Completed	**0**	Al2O3 Yet needed	.252	SiO2 yet needed	1.097
CaO .885					

The second part: once you know the number of molecules of a material you plan to use, you need to multiply that by the weight of ONE to determine the total weight of the material you'll be using.

.115 mol spar x $\frac{556\ wt\ spar}{1\ mol\ spar}$ = **63.9 weight of feldspar.**

NOTE: if the coefficient of the oxide you're solving for is something other than ONE in the fired formula (e.g. solving for boron by using Gerstley borate (.177 Na2O● .823 CaO● . .886 B2O3● . .658 SiO2), you must divide the amount needed by the amount supplied to determine how many molecules you'll need to get the desired number of molecules.

Continue on for each oxide the glaze needs until you have solved for all oxides and determined the weights of all materials in your glaze recipe.

Put the recipe into 100 % format. To do this you total the recipe, then divided each material by this total and multiply by 100.