Basanite: Step 1

Oxides	SiO_2	TiO_2	Al_2O_3	Fe_2O_3	FeO	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	Total	
wt. % oxide	44.30	2.51	14.70	3.94	7.50	0.16	8.54	10.19	3.55	1.96	0.74	98.09	
molecular wt. of oxide	60	80	102	160	72	71	40	56	62	94	142		
mol. prop. oxide	.7383	.0314	.1441	.0246	.1064	0.0	.2135	.1820	.0573	.0209	.0052	M.W.	Norm
Q (S)												60	
Or (KAS_6)	.1251		.0209							.0209		556	
Ab (NAS_6)	.3438		.0573						.0573			524	
An (CAS_2)	.1320		.0660					.0660				278	
Lc (KAS_4)												436	
Ne (NAS_2)												284	
C (A)												102	
Ac ($NF^{3+}S_4$)												462	
Di(wo) (CS)	.0986							.0986				116	
Di(en) (MS)	.0798						.0798					100	
Di(fs) ($F^{2+}S$)	.0188				.0188							132	
Wo (CS)												116	
Hy(en) (MS)	.1336						.1337					100	
Hy(fs) ($F^{2+}S$)	.0316				.0316							132	
Ol(fo) (M_2S)												140	
Ol(fa) ($F^{2+}{}_2S$)												204	
Mt ($F^{2+}F^{3+}$)				.0246	.0246							232	
He (F^{3+})												160	
Il ($F^{2+}T$)		.0314			.0314							152	
Ap ($C_{3.33}P$)								.0174			.0052	310	
TOTALS	0.9633	0.0314	0.144	0.0246	0.106	0.0000	0.214	0.1820	0.0573	0.0209	0.0052		

-0.2250

MgO/(MgO+FeO) = 0.2135/(0.2135+0.0504) = 0.809

Basanite: Step 2

Oxides	SiO_2	TiO_2	Al_2O_3	Fe_2O_3	FeO	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	Total	
wt. % oxide	44.30	2.51	14.70	3.94	7.50	0.16	8.54	10.19	3.55	1.96	0.74	98.09	
molecular wt. of oxide	60	80	102	160	72	71	40	56	62	94	142		
mol. prop. oxide	.7383	.0314	.1441	.0246	.1064	0.0	.2135	.1820	.0573	.0209	.0052	M.W.	Norm
Q (S)												60	
Or (KAS_6)	.1251		.0209							.0209		556	
Ab (NAS_6)	.3438		.0573						.0573			524	
An (CAS_2)	.1320		.0660					.0660				278	
Lc (KAS_4)												436	
Ne (NAS_2)												284	
C (A)												102	
Ac ($NF^{3+}S_4$)												462	
Di(wo) (CS)	.0986							.0986				116	
Di(en) (MS)	.0798						.0798					100	
Di(fs) ($F^{2+}S$)	.0188				.0188							132	
Wo (CS)												116	
Hy(en) (MS)												100	
Hy(fs) ($F^{2+}S$)												132	
Ol(fo) (M_2S)	.0668						.1337					140	
Ol(fa) ($F^{2+}{}_2S$)	.0158				.0316							204	
Mt ($F^{2+}F^{3+}$)				.0246	.0246							232	
He (F^{3+})												160	
Il ($F^{2+}T$)		.0314			.0314							152	
Ap ($C_{3.33}P$)								.0174			.0052	310	
TOTALS	0.8807	0.0314	0.1441	0.0246	0.1064	0.0000	0.2135	0.1820	0.0573	0.0209	0.0052		

-0.1424

Nepheline Calculation: the goal of this calculation is to make just enough albite and nepheline so that there is neither a SiO_2 deffeciency or excess. Let:

N = available Na_2O
S = available SiO_2
x = number of albite molecules
y = number of nepheline molecules

Where all of the provisional albite made in the preceeding steps is "unmade" into Na_2O and SiO_2. Because albite and nepheline each contain one Na atom in the formula:

$$x + y = N$$

Also from the mineral formula (Ab=NAS_6; Ne=NAS_2) relative to SiO_2 comes:

$$6x + 2y = S$$

Since we need to find x and y, and we know the values of S and N from our norm budget, the next logical step is to use the two equations to solve for one of the unknowns- in this case x:

$$y = N - x$$
$$6x + 2(N - x) = S$$
$$6x + 2N - 2x = S$$
$$4x + 2N = S$$
$$4x = S - 2N$$
$$x = (S - 2N)/4$$

The above equation allows us to solve for the exact amount of albite to create in terms of Na_2O component so as to balance the SiO_2 budget. We can solve for y from the original relationship:

$$y = N - x$$

Any of the steps that require the breakdown of a mineral to relaease more SiO_2 can be approached in a similar way.

Using values from the norm calculation:

S = 0.2014
N = 0.0573
Ab = (0.2014 - (2)(0.0573)) / 4 = 0.0217
Ne = 0.0573 - 0.0217 = 0.0356

Note that in the Ab calculation that is the calculated value of Ab had been negative that we would have to continue to the next step in the norm calculation which would breakdown another mineral to balance SiO_2. Now the sum of Na2O in both Ab and Ne balances the original Na_2O cation abundance, as does the total budget of SiO_2.

Basanite: Step 3

Oxides	SiO_2	TiO_2	Al_2O_3	Fe_2O_3	FeO	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	Total	
wt. % oxide	44.30	2.51	14.70	3.94	7.50	0.16	8.54	10.19	3.55	1.96	0.74	98.09	
molecular wt. of oxide	60	80	102	160	72	71	40	56	62	94	142		
mol. prop. oxide	.7383	.0314	.1441	.0246	.1064	0.0	.2135	.1820	.0573	.0209	.0052	M.W.	Norm
Q (S)												60	
Or (KAS_6)	.1251		.0209							.0209		556	11.59
Ab (NAS_6)	.1302		.0217						.0217			524	11.37
An (CAS_2)	.1320		.0660					.0660				278	18.35
Lc (KAS_4)												436	
Ne (NAS_2)	.0711		.0356						.0356			284	10.10
C (A)												102	
Ac ($NF^{3+}S_4$)												462	
Di(wo) (CS)	.0986							.0986				116	11.44
Di(en) (MS)	.0798						.0798					100	7.98
Di(fs) ($F^{2+}S$)	.0188				.0188							132	2.49
Wo (CS)												116	
Hy(en) (MS)												100	
Hy(fs) ($F^{2+}S$)												132	
Ol(fo) (M_2S)	.0669						.1337					140	9.36
Ol(fa) ($F^{2+}{}_2S$)	.0158				.0316							204	3.22
Mt ($F^{2+}F^{3+}$)				.0246	.0246							232	5.71
He (F^{3+})												160	
Il ($F^{2+}T$)		.0314			.0314							152	4.77
Ap ($C_{3.33}P$)								.0174			.0052	310	1.62
TOTALS	0.7383	0.0314	0.1441	0.0246	0.1064	0.0000	0.2135	0.1820	0.0573	0.0209	0.0052		98.00