

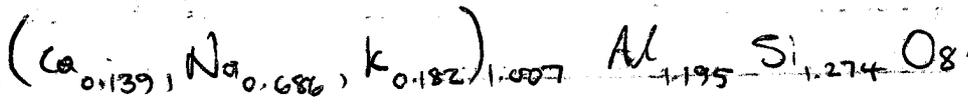
GLT 251 - Crystal Chemistry and Optics

Practical Questions.

Try a feldspar.

	Wt-%	mol-wt	mol-prop	cation-equ	oxide equ	coefficients
SiO ₂	43.550	60.084	0.7248	0.7248	1.4496	1.274
Al ₂ O ₃	34.660	101.961	0.3399	0.6798	1.0197	1.195
CaO	4.440	56.077	0.0792	0.0792	0.0792	0.139
Na ₂ O	12.090	61.979	0.1951	0.3902	0.1951	0.686
K ₂ O	4.820	94.195	0.0517	0.1034	0.0517	0.182
Total	99.610				4.5512	

$$8/4.5512 = 1.7578$$



Accordingly a feldspar should have the coefficients of Al + Si = 4 and Ca + Na + K = 1. In this case the end members Ca, Na, and K are equal to 1.007, but the ratio Al and Si are equal to 2.469.

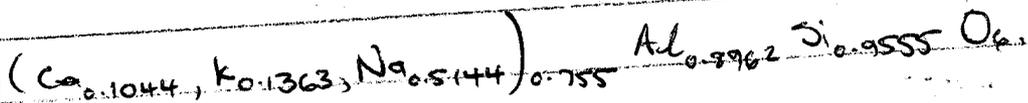
This analysis is therefore not a feldspar.

Ting = pyroxene (leucite)

	wt-%	mol-wt	mol prop	cation eqn	oxide eqn	coefficients
SiO ₂	43.550	60.084	0.7248	0.7248	1.4496	0.9555
Al ₂ O ₃	34.660	101.961	0.3399	0.6798	1.0197	0.8962
CaO	4.440	56.077	0.0792	0.0792	0.0792	0.1044
Na ₂ O	12.090	61.979	0.1951	0.3902	0.1951	0.5144
K ₂ O	4.870	94.195	0.0517	0.1034	0.0517	0.1363
Total	99.610				4.5512	

Al
Fe
M
T

$$6/4.5512 = 1.3183$$



leucite is a pyroxene with mineral formula $KAlSi_2O_6$,
our Si is 0.9555 and not approximating 2. This
analysis therefore is not a leucite.

My conclusion is that this analysis is something else as
it does not fit the formula for feldspar or leucite.

3.

	wt-%	mol. wt	mol prsp	cation eqv	oxide eqv	coefficients.
Al ₂ O ₃	19.050	50.987 101.961	0.3737 0.1868	0.3737	0.5604	0.8399
FeO	52.052	71.85	0.7245	0.7245	0.7245	1.6288
MgO	16.200	40.3	0.40196	0.40196	0.40196	0.9037
NiO	6.900	⁶⁹³ 74.963	0.0924	0.0924	0.0924	0.2077
Total	94.202				1.77926	4.

$$4 / 1.77926 = 2.2481$$

Revised analysis

	cation eqv	Fe ³⁺ cations	charge
Al ₂ O ₃	0.3736	0.7038	2.1114
FeO	0.7245	1.3649	2.7298
MgO	0.40196	0.7572	1.5144
NiO	0.0924	0.17407	0.3481
	1.59246	3.0000	6.7037

$$\text{Factor} = 1.8839$$

$$8 - 6.7037 = 1.2963 \text{ Fe}^{3+} \text{ deficit}$$

$$\text{Fe}^{2+} = 1.3649 - 1.2963 = 0.0686$$

$$\therefore \text{FeO} = 0.0686 / 1.8839 * 71.85 = 2.616 \%$$

$$\text{FeO}_{1.5} = 1.2963 / 1.8839 * 79.846 = 54.91 \%$$

$$\left(\text{Fe}^{3+}_{1.296}, \text{Al}_{0.8399} \right)_{2.1095} \left(\text{Fe}^{2+}_{0.0686}, \text{Mg}_{0.9037}, \text{Ni}_{0.2077} \right)_{1.18} \text{O}_4$$

	wt-%
Al ₂ O ₃	19.050
FeO	2.616
Fe ₂ O ₃	49.437 54.91
MgO	16.200
NiO	6.900
Total	99.577