

Pilanesbergite: a new rock-forming mineral occurring in nepheline syenite from the Pilanesberg Alkaline Complex, South Africa

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Supplementary Material (Tables S1, S2 and S3)

Table S1: Composition of mineral phases used in chemographic modelling.

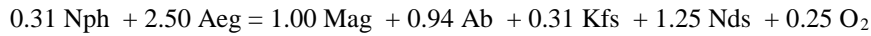
Code	Mineral	Composition
<i>Ab</i>	Albite	$\text{NaAlSi}_3\text{O}_8$
<i>Aeg</i>	Aegirine	$\text{NaFe}^{3+}\text{Si}_2\text{O}_6$
<i>Aen</i>	Aenigmatite	$\text{Na}_4\text{Fe}^{2+}_{10}\text{Ti}_2\text{Si}_{12}\text{O}_{40}$
<i>Flr</i>	Fluorite	CaF_2
<i>Kfs</i>	K-feldspar	KAlSi_3O_8
<i>Lrz</i>	Lorenzenite	$\text{Na}_2\text{Ti}_2\text{Si}_2\text{O}_9$
<i>Nph</i>	Nepheline	$\text{KNa}_3(\text{AlSiO}_4)_4$
<i>pArf</i>	Arfvedsonite*	$\text{K}_{0.4}\text{Na}_{2.2}\text{Ca}_{0.4}\text{Fe}^{2+}_{4.1}\text{Fe}^{3+}_{0.9}\text{Al}_{0.3}\text{Si}_8\text{O}_{22}\text{F}(\text{OH})$
<i>Pbt</i>	Pilanesbergite	$\text{Na}_2\text{Ca}_2\text{Fe}^{2+}_2\text{Ti}_2(\text{Si}_2\text{O}_7)_2\text{O}_2\text{F}_2$
<i>Ti-Aeg</i>	Component in aegirine	$\text{NaFe}^{2+}_{0.5}\text{Ti}_{0.5}\text{Si}_2\text{O}_6$
<i>Ttn</i>	Titanite	CaTiSiO_5
<i>Component in melt:</i>		
<i>Nds</i>	Sodium disilicate	$\text{Na}_2\text{Si}_2\text{O}_5$ component in melt
<i>Absent, limit-defining phases:</i>		
<i>Mag</i>	Magnetite	$\text{Fe}^{3+}_2\text{Fe}^{2+}\text{O}_4$
<i>Naj</i>	Naujakasite	$\text{Na}_6\text{FeAl}_4\text{Si}_8\text{O}_{26}$
Endmember compositions are used, except for arfvedsonite (*), which is the observed composition in the sample (<i>pArf</i>).		

Table S2. Mineral assemblages of pilanesbergite.

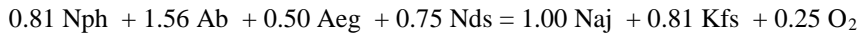
<i>Ti-free minerals</i>	<i>Ti-bearing minerals</i>	
	<i>Stable</i>	<i>Unstable</i>
Aeg + Arf + Kfs + Ab + Nph +	Ttn	
Aeg + Arf + Kfs + Ab + Nph +	Aen	Ttn
Aeg + Arf + Kfs + Ab + Nph +	Aen + Pbt	Ttn
Aeg + Arf + Kfs + Ab + Nph +	Pbt	
Aeg + Arf + Kfs + Ab + Nph +	Ti-Aeg	Pbt
Aeg + Arf + Kfs + Ab + Ntr +	Lrz	
<i>Assemblages defining limits for Nds activity:</i>		
Aeg + Kfs + Ab + Ne + Mt ¹		
Aeg + Kfs + Ab + Ne + Naj ²		
<i>Maximum a_{H_2O} limit:</i>		
Ab + Ne + Kfs + Ntr		
<i>1: Minimum limit for a_{Nds} in the system</i>		
<i>2: Maximum limit for a_{Nds} in the system, boundary towards hyperagpaitic conditions in which nepheline is no longer stable</i>		

Table S3 Low-variance phase reactions in pilanesbergite-bearing Green Foyaite, Pilanesberg Complex, South Africa.

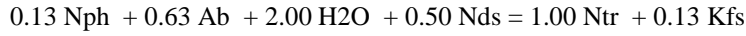
Aegirine-magnetite (minimum a_{Nds} level for the system, not shown)



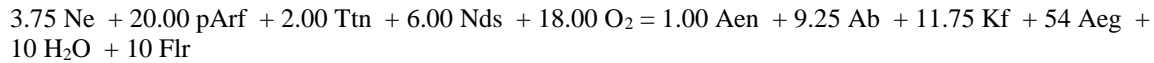
Neheline-Aegirine-Naujakasite (maximum a_{Nds} level for the system, not shown)



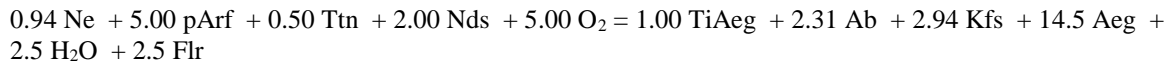
Albite-nepheline-natrolite



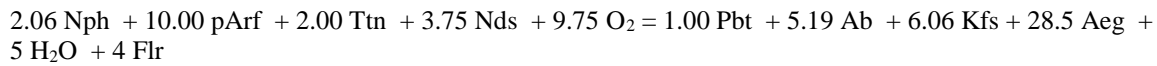
1: Aenigmatite-titanite



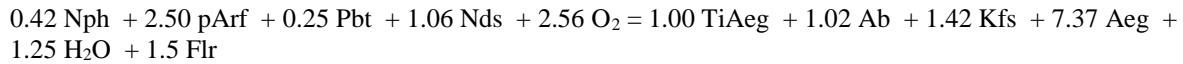
2: Titanite – Ti-Aegirine



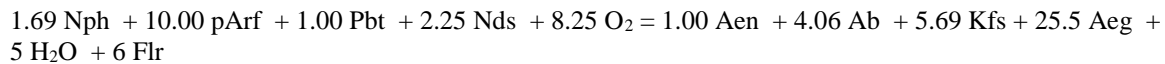
3: Titanite - Pilanesbergite



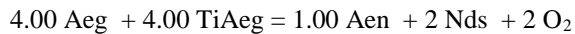
4: Pilanesbergite – Ti-Aegirine



5: Pilanesbergite-Aenigmatite



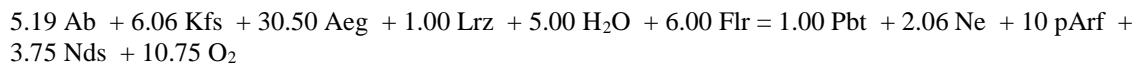
6: Aenigmatite – Ti-Aegirine



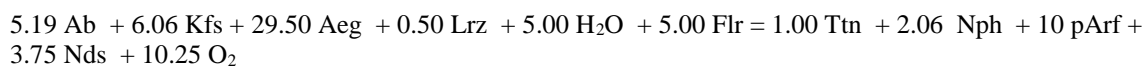
7: Ti-Aegirine - Lorenzenite



8: Pilanesbergite - Lorenzenite



9: Titanite – Lorenzenite



10: Aenigmatite-Lorenzenite

