

UNIVERSITY OF PRETORIA  
GLY 251 – CRYSTAL CHEMISTRY AND OPTICS  
1. Semester test - second attempt

**Practical questions**

MOLECULAR WEIGHTS

SiO <sub>2</sub>	60.084	
Al <sub>2</sub> O <sub>3</sub>	101.961	
CaO	56.077	$C_a = 40.078$
Na <sub>2</sub> O	61.979	
K <sub>2</sub> O	94.195	
FeO	71.85	
MgO	40.3	
CaO	56.077	
TiO <sub>2</sub>	79.88	
ZrO <sub>2</sub>	123.222	$\Sigma = 915.224$

1 A mineral gives the analysis

	Wt%
SiO <sub>2</sub>	43.550
Al <sub>2</sub> O <sub>3</sub>	34.660
CaO	4.440
Na <sub>2</sub> O	12.090
K <sub>2</sub> O	4.870
TOTAL	99.610

$Ca Na_{1-x} Si_2 O_8$

$x (Ca_x Na_{1-x}) Al_2 SiO_8$

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A friend claims that this is obviously feldspar – all the elements are there. Another friend reckons that one has to be careful and reminds of the similarities between leucite (theoretically  $KAlSi_2O_6$ ) and K-feldspar in terms of elements present and the fact that substitutions could easily have happened. I think both are making the mistake of not calculating and checking. Does this analysis fit the formula for feldspar, leucite, or is it even something else? Use your calculated mineral formulas to discuss. [20]

2 Högbomite is a rare oxide mineral but I found an analysis. If I only could remember whether this is a spinel. Convince me with a complete evaluation. [15]

	Wt%
Al <sub>2</sub> O <sub>3</sub>	56.200
FeO	35.400
MgO	7.800
TOTAL	99.400

3 Zirconolite is  $CaZrTi_2O_7$ . What is the concentration (in wt-%) of the element zirconium? [15]