

The American University of Beirut
Final Examination

Crystallography/Mineralogy (211)
Department of Geology
A. M. Abdel-Rahman

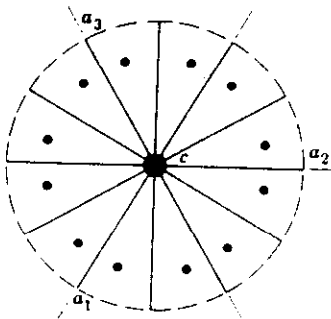
June 14, 1997
Time: 2 hours
Exam rules apply

Part I

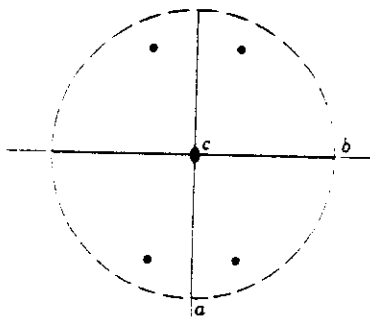
Answer all questions of Part I; use diagrams (when possible) along with text to illustrate your answers.

(MARKS)

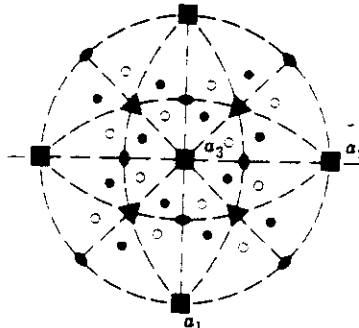
- (3) 1. (a) Give all the elements that define the triclinic system, and those that define the hexagonal-hex. crystallographic system.
- (4) (b) Compare and contrast those two point groups: 23 and 32.
- (2) (c) How would you distinguish between a rhombic dipyramid and a tetragonal dipyramid?.
- (8) (d) What is the point group that each of the following four stereographic projections represent:



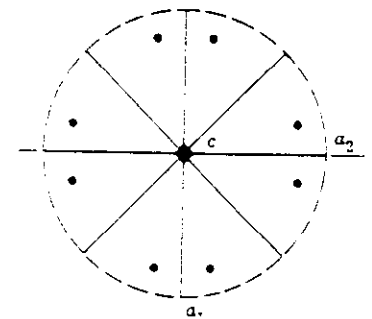
(i)



(ii)



(iii)



(iv)

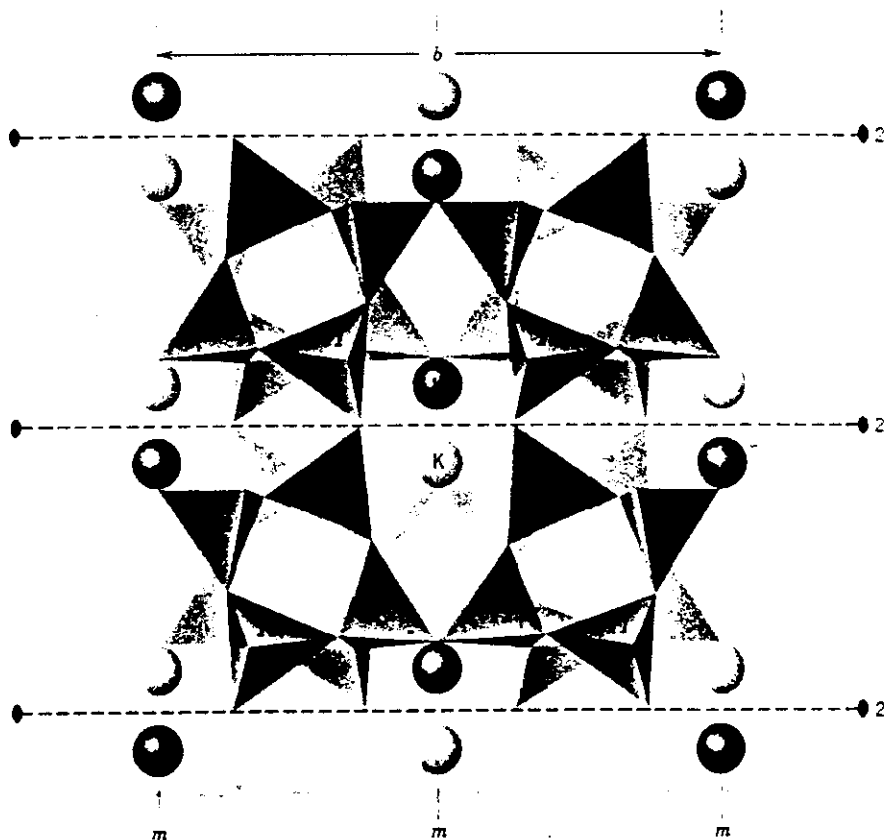
- (15) 2. Give the exact chemical formula for each of the following minerals.

(a) Fayalite	(f) Siderite
(b) Pyrope	(g) Phlogopite
(c) Cristobalite	(h) Sodalite
(d) Arfvedsonite	(i) Diopside
(e) Covellite	(j) Chromite
- (3) 3. (a) How does the structure of stishovite differ from that of quartz? Comment on the occurrence of



stishovite.

- (4) (b) Biopyriboles: describe the general structure of this group of minerals, and give one mineralogical example. Which research technique is used to study them?
- (5) (c) What are pyroxinoids, and how do their structures differ from that of the pyroxene minerals?
Name two pyroxinoid minerals and give their chemical composition.
- (5) (d) The crystal structures of the zeolite minerals allow them to be used in a number of applications. Name two zeolite minerals, and describe one of their uses or applications. Comment on their formation and occurrence.
- (6) 4. (a) The serpentine mineral group includes three polymorphs: name these types of serpentine, and describe how these minerals differ structurally, illustrating the cause of structural mismatches. Comment on the origin of this pseudomorphic assemblage.
- (3) (b) Metamict minerals: define, describe, and give a mineralogical example.
- (3) (c) Sanidine is a characteristic feldspar mineral which typically forms within some high temperature silica-saturated lavas. Name an equivalent mineral that may crystallize from a silica-undersaturated lava, give its composition, and indicate which mineral group does it belong to?.
- (4) (d) The diagram given below represents the structure of high sanidine, projected on (201). Describe this structure.



Part II

Answer only one out of two questions in Part II; please note that the question is worth 15 marks

- (15) 5. Give the general formula of the amphibole mineral group.
Describe in detail the classification of the amphibole mineral group, giving the mineral names and the exact chemical formulae (use diagrams along with text to illustrate your answer).
- (15) 6. Describe in detail the classification of the oxide mineral group (all types of simple and multiple oxides), with special emphasis on the general formulae. Give mineralogical examples, with their chemical compositions, for each of the classification categories.
Briefly describe the "spinel structure", with some reference to "inverse spinel".
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GOOD LUCK