The American University of Beirut
Final Examination

Crystallography/Mineralogy (211)
Department of Geology
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June 19, 1999
Time: 2 hours
Exam rules apply

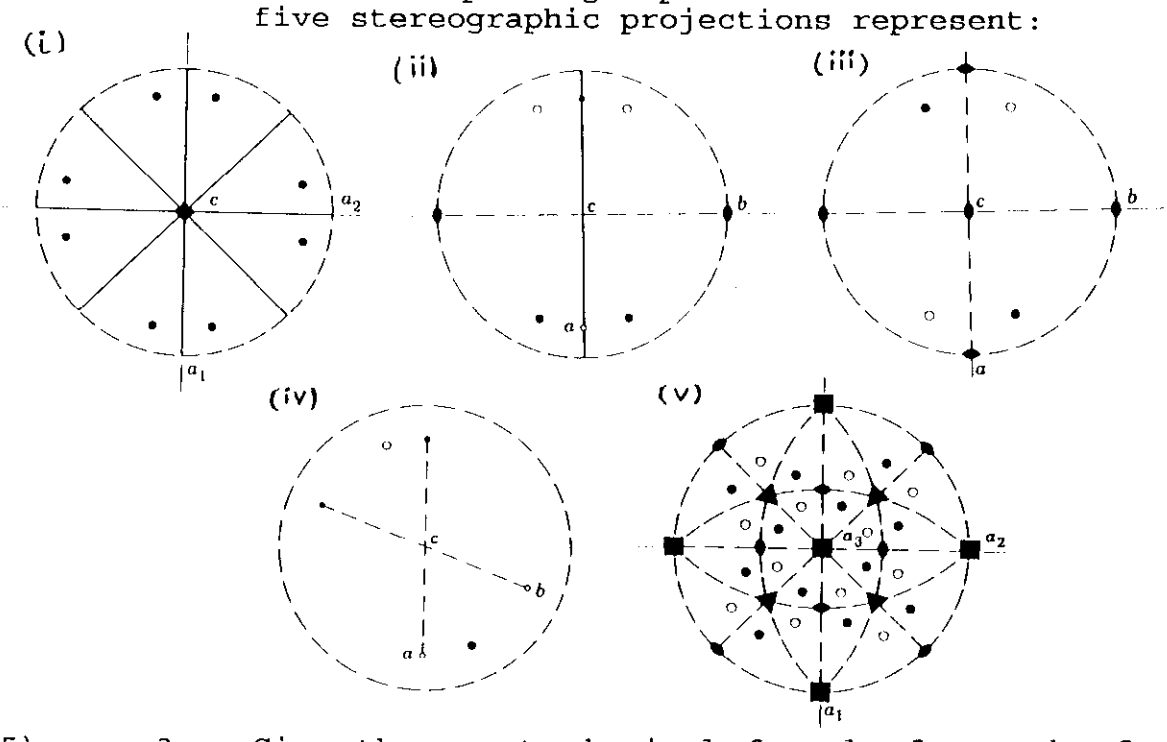
Part I

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

(MARKS)

(8) 1. To which crystal system does each of these point groups belong:
6/m 2/m 2/m, m, 1, 2, 23, 32, 4, 431

(10) 2. What is the point group that each of the following five stereographic projections represent:



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

(a) Tridymite
(b) Anthophyllite
(c) Sillimanite
(d) Sanidine
(e) Diopside
(f) Jadeite
(g) Talc
(h) Almandine
(i) Phlogopite
(j) Forsterite

(7) 4. Write an essay on the "pyroxinoids"; make sure to include the names and chemical composition of the three pyroxinoid minerals, and to show how do their structures differ from that of the pyroxene minerals (use diagrams to illustrate your answer).

(12) 5. The plagioclase solid solution series contains an important group of minerals;
(i) What is the nature of substitution within end members of this series?
(ii) List all minerals of this series and indicate the An-content of each.
(iii) Use the Or-Ab-An triangular diagram to show the extent of solid solution between orthoclase, albite and anorthite. Plot the various feldspar minerals directly on this diagram.

(6) 6. 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.

(7) 7. The diagram given below is a diagrammatic sketch of the structure of muscovite. Give the chemical composition of muscovite, and describe its structure in detail.

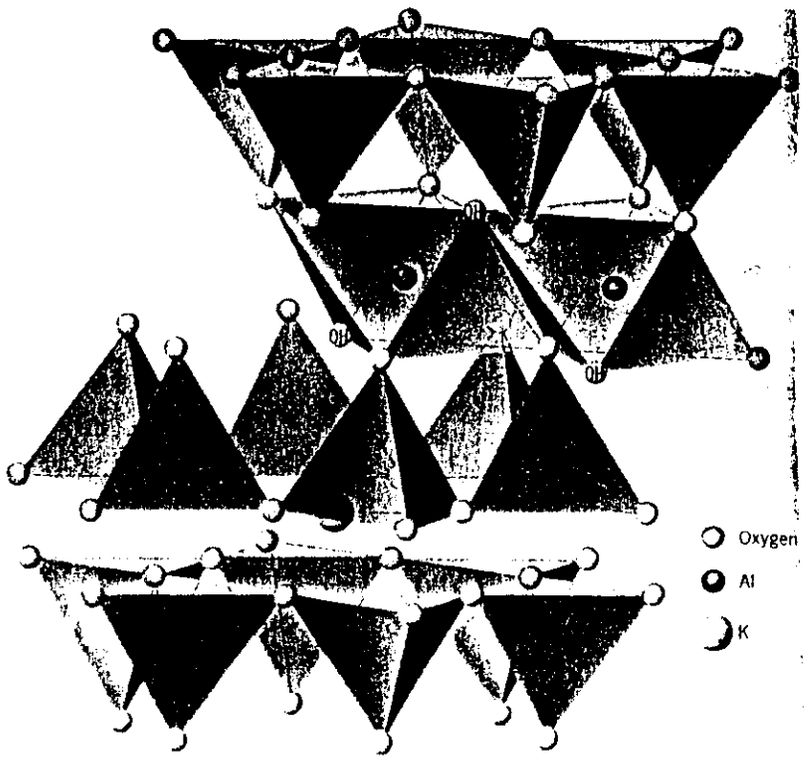


FIG. 10.56. Diagrammatic sketch of the muscovite structure (after Grim).

Part II

Answer only one out of two questions in Part II; please note that the question is worth 20 marks

(20) 8. 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 when possible to further illustrate your answer).

(20) 9. Describe in detail the classification and the structure of the carbonate mineral group.
Comment on the distinct nature of the various structures within this group.
Comment on the extent of solid solution among the various phases within the carbonates.
Indicate how does the variation in pressure of formation affect the coordination number, and thus the structure of some mineral phases within this group.
(Use diagrams when possible to further illustrate your answer).

GOOD LUCK