GARNETS

Proceedings of a symposium held on the occasion of the joint annual meetings of the MINERALOGICAL ASSOCIATION OF CANADA and the GEOLOGICAL ASSOCIATION OF CANADA at the University of Alberta, Edmonton, May 19-21, 1976.

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PREFACE

Since the mid-1960's garnets have received a large amount of attention by petrologists, mineralogists, and geochemists. One of the reasons for the increased attention was the availability of the electron probe microanalyzer and the recognition that garnets typically show systematic chemical zonation on a scale of a few microns (Hollister 1966, *Science 154,* 1647-1651, and many others). Study of chemical zonation in garnets has led to several different hypotheses as to how garnets grow in metamorphic and igneous environments. Recently, attention has been focused on the systematic arrangement and chemistry of inclusions within garnet crystals. Experimental and thermochemical studies have emphasized (1) partitioning of elements between garnet and other phases as a function of pressure, temperature and bulk composition; (2) the nature of garnet solid solution, i.e., quantitative estimates of the deviations of garnet solid solutions from ideality. These experimental and thermochemical studies, in conjunction with studies on garnet zoning and element partitioning between garnet and coexisting phases, have led to the possibility of quantitative interpretation of stages in the pressure-temperature history of metamorphic and igneous rocks.

The Mineralogical Association of Canada meeting in Edmonton seemed to be a particularly appropriate time to bring together a number of scientists who had been studying some of the problems described in the preceding paragraph. The symposium was held on May 21, 1976. Ten papers were presented and six of these are in this issue. Abstracts of the other four papers are in *GAC/MAC Program Abstracts* 1, p. 70 and p. 80.

Some of the points that were emphasized in the papers and subsequent lively discussions were:

(1) accurate data on deviation of garnets from ideal solution behavior are difficult to ob-

tain experimentally but such data will be extremely valuable in the estimation of *P-T* conditions of crystallization of garnet-bearing assemblages.

(2) Garnets from high-grade metamorphic terrains show little or no chemical zoning and this may reflect homogenization of initially zoned garnets at high temperatures. Quantitative estimates of these effects require consideration of volume, intergranular and intracrystalline diffusion, and element partitioning between garnet and both inclusions and intergranular matrix.

(3) Consideration of Ca-zoning patterns in garnet provides evidence about metamorphic reactions during garnet growth as well as variations in *P* and *T*.

(4) Compositional zoning in the edges of garnet at contacts with cordierite are interpreted to result from diffusion of components in and out of the garnet and through the surrounding cordierite in response to a cordierite-producing reaction.

(5) Immiscibility in garnets has been suggested on the basis of the scarcity of certain garnet compositions, but direct observational evidence of exsolution has previously been unavailable. Ghose & Evans presented several lines of evidence that exsolution on the scale of ~130Å may have occurred in a garnet from a metarodingite.

On behalf of the Mineralogical Association of Canada I wish to express my thanks to all contributors to this Symposium. I would also like to thank the many geologists who attended the symposium and contributed to the formal and informal discussions.

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