

Abstract

This thesis is divided into review section followed by an experimental part. The first part focuses on geothermobarometry, illustrates its history and provides its detailed principles. Furthermore, it discusses various possibilities of the use of different mineral assemblages for purposes of thermometry and barometry. This part puts an emphasis on exchange reactions, the role of solvus in thermometry, reactions based on weight transfers, and reactions involving gas phases. A chapter on Macedonian geography and regional geology provides a detailed description of the Vardar ophiolite belt, which was the source of the samples used in experimental part of the thesis, and its relationship to and other geological units in Macedonia, namely the Eastern Vardar Ophiolite zones, the Kopaonik unit, and the western part of the Vardar Ophiolite zone. Finally, a process of exsolution in subsolidus, which is important for the group of pyroxenes, is discussed. The area of interest is the use of the process of exsolution in thermometry. The thermodynamic conditions for exsolution are important features of the exsolution. The experimental part of the thesis includes a description of the samples and results of chemical analyses carried out with an electron probe microanalyzer. Chemical data were processed with two programs for the classification of pyroxenes and/or thermobarometry. Results of calculations were critically assessed and pressure-temperature conditions of pyroxene crystallization in rocks of Vardar ophiolite belt were estimated with a chosen one. The tested thermometers include models by Wood & Banno (1973), Nickel & Brey (1984), Sen & Jones (1989), Brey & Köhler (1990), and Putirka (2008) and tested barometers were those by Mercier et al. (1984) and Nimis & Taylor (2000). The most realistic results taking into account the geological conditions, is provided by Brey & Köhler (1990) thermometer in combination with Nimis & Taylor (2000) barometer. The estimated temperatures of crystallization typically vary between 618 and 1322 °C whereas pressures attained values between 18 and 33 kbar.

Keywords

pyroxene, geothermometry, geobarometry, ophiolite, Vardar zone, exsolution lamellae