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THE ANNITE - PHLOGOPITE JOIN: AN IDEAL SOLUTION?

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Existing Fe - Mg partitioning data between garnet and biotite (FERRY & SPEAR, 1978, and PERCHUK & LAVRENT'EVA, 1983) have been reanalyzed based on revised standard-state properties of annite, as extracted by DACHS (1994) from hydrogen-sensor data of the redox reaction annite = sanidine + magnetite + H_2. Because annite standard-state properties could be taken from this independent source, the partitioning data of FERRY & SPEAR (1978) and PERCHUK & LAVRENT' EVA (1983) were solely used to constrain the Fe - Mg mixing in biotite, an advantage compared to previous determinations.

The data processing was done by fitting the partitioning data isothermally to an assymetric Margules equation, taking into account the Al^{VI} content of biotite in the experiments of PERCHUK & LAVRENT'EVA (1983), as given by ARANOVICH et al. (1988). The interaction parameters ($W_{G,i}$) obtained (Table 1) are positive in sign for $W_{G,AnnPhl}$ (ranging between ~3 and ~18 kJ/mol, one-site basis) and negative for $W_{G,PhlAnn}$ (ranging between ~-12 and ~-25 kJ/mol, one-site basis). The annite - phlogopite binary therefore appears as an assymetric solution with negative deviation from ideality for the annite component ($\gamma_{Ann}^{Bt} < 1$), except at Mg-rich compositions. Plotted against temperature, there is no clear temperature dependence visible in the W_G's, but a considerable scatter reflecting inconsistencies in the underlying partitioning data at different temperatures. Using the W_G's as given in Table 1, the experimental temperatures can be reproduced with an average precision of 19° C.

The deduced mixing behavior of Fe - Mg biotites can be tested against constraints coming from equilibrium data of WONES & EUGSTER (1965). They studied the displacement of the endmember reaction annite = sanidine + magnetite + H_2 due to the incorporation of Mg into biotite. Combined with the results of DACHS (1994) on the same equilibrium, the activity of the annite component in the reversed experiments of WONES & EUGSTER (1965) was estimated and a similar behavior was found as derived above from the partitioning data ($\gamma_{Ann}^{Bt} < 1$).
Volume - composition relationships along the annite - phlogopite join (REDHAMMER, et al., in prep.) exhibit negative excess volumes showing the same assymetric trend as following from the W_G's, with a maximum at $X_{Ann} = 0.7$. The fitted Margules volume parameters are (three-site basis): $W_{V,AnnPhl} = 0.018 \pm 0.016$ J/(bar.mol) and $W_{V,PhlAnn} = -0.391 \pm 0.025$ J/(bar.mol).

T(°C)	$W_{G,AnnPhl}$	1σ	$W_{GPhl,Ann}$	1σ
600	18357	570	-12100	314
650	11553	3056	-18639	1595
700	2680	1505	-21506	950
750	7720	2114	-18293	1805
800	4143	2233	-25096	3014
850	13968	2524	-12134	2484
900	5462	1828	-18595	1160

Table 1: Interaction parameters of the annite - phlogopite join (one-site basis), extracted isothermally from Fe - Mg partitioning data between garnet and biotite. Data source: see text. 1 σ is one standard deviation.

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ZUSAMMENSETZUNG VON HELLGLIMMERN IN GESTEINEN DES RECKNER-KOMPLEXES UND SEINER NEBENGESTEINE (TARNTALER BERGE, TIROL)

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Der "Reckner-Komplex" ist ein tektonisch stark überprägtes Fragment eines mesozoischen Ozeanbodens ("Dismembered Ophiolite"). Er liegt in mesozoischen Serien des Unterostalpins, allerdings nahe der Überschiebungsbahn des Unterostalpins auf das Penninikum (Abb. 1). Der interne Aufbau des Reckner-Ophiolit-Komplexes wurde ausführlich von DINGELDEY (1989), der der ganzen Abfolge von ENZENBERG (1967) beschrieben. Neben einigen petrologischen und geochemischen