

EXPERIMENTAL STUDY OF MG-CORDIERITE SATURATION OF THE C-H-O-N FLUID COMPONENTS

Bul'bak T.A., Shvedenkov G.Yu.*

Institute of Mineralogy and Petrography SB RAS, *Novosibirsk State University

taras@uiggm.nsc.ru, Fax: +7-3832-332792

shved@nsu.ru, Fax: +7-3832-302242

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Runs on the cordierite saturation with “dry” methane, ammonia and components of binary mixtures $\text{H}_2\text{O}-\text{CH}_4$ and $\text{H}_2\text{O}-\text{NH}_3$ at $P=50, 150, 200$ MPa and temperatures from 400 to 800 °C were performed to establish the possibility of Mg-cordierite application as a sensor of fluid regime in mineral genesis. Purity of initial Mg-cordierite from fluid components was verified at the sensitivity level of IR- and chromatographic methods. Powders with fractions 25-50 μm was used. Duration of experiments comprised 300 hours. Fact of penetration of methane and ammonia in structural channels of Mg-cordierite was supported experimentally. The presence of fluid molecules in channels is evidenced by observed typical bands on IR- and Raman-spectrum. The coefficients of distribution CH_4 , NH_3 and H_2O between fluid phase and Mg-cordierite were temperature independent practically on evidence from mass spectrometry (fig. 1).

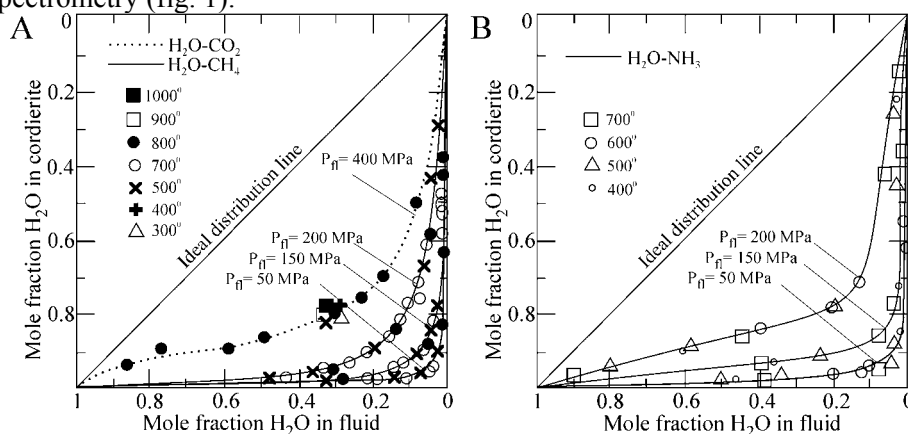


Fig. 1. Distribution of CH_4 and H_2O (A), NH_3 and H_2O (B) between fluid phase and Mg-cordierite on our data ($P_f=50; 150; 200$ MPa). Distribution of CO_2 and H_2O on data [1].

In “dry” system a small quantities of H_2O (up to 0.4 mass.%) are formed by reactions between methane (or ammonia) and frame oxygen of the cordierite structure. By this means it does not always happen that such content of water in structural channels reflects its presence in fluid.

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Reference

1. W. Johannes, W. Schreyer, Am. J. Sci., 1981, 281, 299.

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