

Experiments study on dehydration of antigorite

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Antigorite is a key hydrous mineral in subductions zone. When oceanic lithosphere dives into the interior of the earth at ocean trenches, dehydration of antigorite occurs with increasing temperature and pressure. The process is thought to cause the seismicity of the lower plane located in a double seismic zone. The antigorite dehydration experiments were performed using isothermal thermogravimetric analysis with a grain size 5-10 μm at 893, 913, 933, 953 and 973K. The results showed the reaction progress of dehydration varied with the temperature, and the dehydration rate increased obviously with increasing of the temperature. The dehydration kinetics of antigorite followed a 2D diffusion model, the activation energy(E) and pre-exponential factor(InA) was 247KJmol^{-1} and 28.3s^{-1} . We determined that the release of aqueous fluid is 1.9×10^{-4} , 6.5×10^{-4} , 1.0×10^{-3} , 1.3×10^{-3} , $1.8 \times 10^{-3} \text{m}^3_{\text{fluid}}\text{m}^{-3}_{\text{rock}}\text{s}^{-1}$ at 893K, 913K, 933K, 953K, 973K, respectively. Our results indicate the dehydration rate of antigorite is faster than the relaxation rate of 3×10^{-7} to $3 \times 10^{-12} \text{s}^{-1}$. The brittle failure occurs indicating the fast dehydration of antigorite may trigger the seismicity of the lower plane of the double seismic zone.