

## **Experimental determination of siderite stability at high pressure**

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### **ABSTRACT**

The stability field of siderite has been determined up to 10 GPa. Decarbonation of siderite occurs at pressures below 6 GPa with a Clapeyron slope of about 0.0082 GPa/K. At higher pressure, we observed direct melting of siderite without decarbonation. The melting temperature is about 1550 °C at 10 GPa. Our experimental results, compared with previous studies on the decomposition curve of magnesite, indicate that Fe has a significant effect on the stability of magnesite-siderite solid solutions under upper mantle conditions. The reaction products are strongly dependent on the oxygen fugacity of the system. The disproportionation reaction during decomposition of siderite might be an important mechanism to explain the stability of carbon as graphite (diamond) in the Earth's mantle.

**Keywords:** Siderite, magnetite, graphite, oxygen fugacity, disproportionation, carbon cycle