

Water solubility in carbonatite melts

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ABSTRACT

Water solubility in Ca-Na-Mg carbonate melt was measured at 900 °C from 0.25 to 2.25 kbar using a modified double-capsule technique and rapid-quench cold-seal vessels. The data can be described by the empirical relationship $W = 8.705 P^{0.635}$, where W is water solubility in weight percent and P is pressure in kbar. The relative error in water solubility calculated by this equation is estimated to be about 15%. Already at 1 kbar, water solubility reaches nearly 10 wt%, which is two to three times the value observed for most silicate melts under similar conditions. The exceptionally high water solubility in carbonatite magmas together with the preferential partitioning of alkalis into a coexisting fluid phase may explain the massive aqueous metasomatism (finitisation) usually observed around intrusive carbonatite bodies.