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VOLATILECALC: a silicate melt-H₂O-CO₂ solution model written in Visual Basic for excel

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Abstract

We present solution models for the rhyolite-H₂O-CO₂ and basalt-H₂O-CO₂ systems at magmatic temperatures and pressures below $\hat{1}/45000\hat{A}$ bar. The models are coded as macros written in Visual Basic for Applications, for use within Microsoft[®] Excel (Office[™] 98 and 2000). The series of macros, entitled VOLATILECALC, can calculate the following: (1) Saturation pressures for silicate melt of known dissolved H₂O and CO₂ concentrations and the corresponding equilibrium vapor composition; (2) open- and closed-system degassing paths (melt and vapor composition) for depressurizing rhyolitic and basaltic melts; (3) isobaric solubility curves for rhyolitic and basaltic melts; (4) isoplethic solubility curves (constant vapor composition) for rhyolitic and basaltic melts; (5) polybaric solubility curves for the two end members and (6) end member fugacities of H₂O and CO₂ vapors at magmatic temperatures. The basalt-H₂O-CO₂ macros in

VOLATILECALC are capable of calculating melt–vapor solubility over a range of silicate–melt compositions by using the relationships provided by Dixon (American Mineralogist 82 (1997) 368). The output agrees well with the published solution models and experimental data for silicate melt–vapor systems for pressures below 5000 bar.



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Keywords

Volatiles; Magma; Water; Carbon dioxide; Vapor–melt equilibria; Silicate melt

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