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Letter

A novel method for experiments in a one-atmosphere box furnace

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Abstract

We present a conceptually simple method to perform high-temperature experiments in a one-atmosphere box furnace that has a negligible cost of materials. The experimental setup consists of two commercially available materials and can be customized to sample or furnace size with few limitations. Furthermore, the design allows easy extraction of samples in one piece, making them eligible for textural analysis.

The setup comprises a graphite capsule and a fireclay shell, the latter of which acts as a heat-resistant protective shield. Containers must be individually hand-crafted, but each can hold multiple samples. The setup can be reliably used in temperature conditions below the heat tolerance limit of the commercial fireclay, commonly ~1400 °C. Moreover, the graphite capsule buffers the oxygen fugacity to strongly reducing conditions during the experiment. The main advantage of our method lies in the utilization of easily accessible and low-cost materials that provides a widely applicable experimental setup easily used at larger scales. The method was developed during an experimental study of magmatic crystal-liquid suspensions and was reliable for experiments lasting for up to 36 h.

Keywords: High temperature, oxygen fugacity, sample capsule, graphite, textural analysis