

HIGH-PRECISION ^{40}Ar - ^{39}Ar DATING OF DIFFERENT RUMURUTI LITHOLOGIES.

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R-chondrites have highly oxidized mineral assemblages [1,2] and contain, with decreasing abundance, olivine, plagioclase, Ca-rich pyroxene, low-Ca pyroxene, minor phases such as pyrrhotite, pentlandite, chromian spinel, and traces of metallic FeNi. Most R-chondrites are light/dark structured regolith breccias consisting of highly recrystallized fragments as well as unequilibrated lithologies and contain solar-wind-implanted rare gases [3]. The meteorite Rumuruti is the only fall of the highly oxidized R chondrite group. Previous studies performing ^{40}Ar - ^{39}Ar dating on Rumurutiites yielded complex age spectra disturbed by both diffusive ^{40}Ar loss and ^{39}Ar recoil redistribution [4]. This hampers conclusions on the early thermal history of Rumuruti and its parent body. Realizing that Rumuruti is a complex breccia containing fragments of petrologic type 3, 4, 5, and 6 and "shock-blackened" [5] lithologies, we applied ^{40}Ar - ^{39}Ar dating to different lithologies. A light clast of type 5/6 (Rumuruti B), a sample of clastic matrix type 3.8 (Rumuruti C), and a type 3 clast (Rumuruti A).

The age spectra show partial degassing and diffusive ^{40}Ar loss as low apparent ages in the first argon extractions, plateau segments and age drop offs at high degassing temperatures due to ^{39}Ar recoil redistribution into pyroxene and/or olivine. The disturbing features increase in the order Rumuruti B→C→A and correlate with decreasing grain size of plagioclase (glass) which is the major carrier of K and radiogenic ^{40}Ar . In fragments of petrologic type 3, feldspar-normative glass can be found within chondrules and also in the fine-grained, porous matrix. In type 4 plagioclase crystals form large isolated intergrowths (up to 200 μm) which seem to develop into networks in type 5 and 6. The feldspars of type 4, 5, and 6 have a composition of Ab74-90An5-23Or2-9. Age plateaus are best preserved for the coarse grained equilibrated type 5/6 lithology, defining an age of 4.53 ± 0.01 Ga. We interpret the different lithologies to have the same thermal history, but with different response to thermal events due to different plagioclase (glass) grain size. This implies a very short metamorphic history of the R-chondrite parent body and very early breccia formation, probably within a few Ma after R-chondrite parent body formation.

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