High-precision Os isotopes of CV-CK carbonaceous chondrites

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Deficits in Os nuclide abundances with large contributions from the s-process (^{186}Os, ^{188}Os, ^{190}Os) relative to those dominated by r-process were first identified in chondrites of lower metamorphic grades [1]. These isotopic anomalies were interpreted as the result of variable amounts of acid-resistant presolar grains composed of diamond, graphite, or most likely SiC [1-4]. To further examine the variation of time-integrated Pt/Os and Re/Os in bulk chondrites and asteroidal achondrites [1,5-9], twelve CV-CK clan carbonaceous chondrites across a range of metamorphic grades (CV3-CK6) were characterized for their high-precision Os isotopic composition. Using Pt/Os ratios of 1.81 for CV3 [1] and 1.72 for CK4-6 chondrites [10], $^{186}Os/^{188}Os_i$ ratios, corrected to 4.567 Gyr using present-day ratios, are 0.1198204±0.0000043 for CV3, 0.1198230±0.0000033 for CK4, 0.1198232±0.0000026 for CK5, and 0.1198223±0.0000008 for CK6 (±2σ, n=3), indistinguishable from each other, but distinct from average H-group ordinary chondrites (0.1198269±0.0000014; [1,5]). These differences for s-process ^{186}Os abundances between CV-CK and H-group chondrites are consistent with their parent bodies inheriting different amounts of nucleosynthetic components during formation from the solar nebula. These findings will be evaluated not only by invoking nebular heterogeneities, but also by considering effects of parent body processing [11].

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