HOMOGENEITY OF TELLURIUM ISOTOPES IN CHONDRITES, LEACHATES OF ALLENDE AND CANYON DIABLO. M. A. Fehr[1], M. Rehkämper[2], D. Porcelli[3] and A. N. Halliday[4], [1,2,4]Department of Earth Sciences, ETH Zürich, CH-8092 Zürich, Switzerland ([1]fehr@erdw.ethz.ch, [4]halliday@erdw.ethz.ch), [3]Dept. of Earth Sciences, Oxford OX1 3PR, UK.

Introduction: ^{126}Sn decays to ^{126}Te with a half-life of 0.235 Myrs and is a possible short-lived chronometer for early solar system development. ^{126}Sn can only be produced in significant amounts by the r-process, which is thought to take place in a supernova environment. The discovery of ^{126}Te excesses that correlate with Sn/Te in meteorites would thus provide confirmation of the theory that a supernova injected freshly synthesised nuclides into the molecular cloud from which our solar system formed and served as a trigger for nebula collapse. Tellurium is also of interest because it has eight stable nuclides that are suited for the study of nucleosynthetic processes. The nuclide ^{120}Te is produced only by the p-process, $^{122-124}$Te only by the s-process, $^{128,\ 130}$Te only by the r-process, whereas $^{125,\ 126}$Te are produced by the r- and s-process.

Previous studies have reported large (100%-level) Te isotope anomalies in presolar diamonds of Allende [1], [2]. Bulk chondrites and iron meteorites measured by TIMS are homogeneous in Te isotopes [3]. For Te isotopic measurements, MC-ICPMS achieves a precision, which is one to two orders of magnitudes better than that of TIMS [4], [5]. Bulk carbonaceous chondrites measured by MC-ICPMS were all found to be identical in Te isotope composition to the Earth [5]. Assuming the bulk Sn/Te ratios of carbonaceous chondrites reflect variable early volatile element depletion during condensation in the nebula that represent their parent bodies, we calculated a maximum possible initial ^{126}Sn/^{118}Sn of $1\mathrm{x}10^{-4}$ [5].

Techniques and Samples: In the present study, we analyzed bulk samples of the ordinary chondrites Plainview (H5), Mezö Madaras (L3.7) and ALH84081 (LL6), the enstatite chondrite Abee (EH4) and the iron meteorite Canyon Diablo (IA). In addition, we conducted measurements on leachates of Allende. A powdered sample of Allende was sequentially leached with reagents of increasing strength ([6] - [9]): 8.5 M acetic acid, 4 M HNO_3, 6 M HCl, 3 M HCl – 13.5 M HF, conc. aqua regia in a high pressure asher.

All measurements were performed by MC-ICPMS. The data are normalized to ^{125}Te/^{128}Te = 0.22204 using the exponential law. Results are expressed in ε-units relative to a JMC Te solution. The reproducibility (2s) of the isotopic measurements for 100 ng samples of Te is typically ±4500 ppm for ^{120}Te/^{128}Te, ±140 ppm for ^{122}Te/^{128}Te, ±100 ppm for ^{124}Te/^{128}Te, ±30 ppm for ^{126}Te/^{128}Te and ±60 ppm for ^{130}Te/^{128}Te.

Results and Discussion: Tellurium was present in most of the Allende leachates. The majority of the Te was in the 6 M HCl–leach (67.5 %), 28 % of the Te was in the HCl - HF–leach and a minor fraction in the 4 M HNO_3–leach (4.5 %). The distribution of Te in the leachates is in accord with sulfides as the major host-phase of Te in Allende. There was almost no Te in refractory (aqua regia-soluble) phases, as would be expected for a moderately volatile element. As Te is thought to be very mobile [10], it might be expected to be present in secondary phases. However, there was also almost no Te in the most easily soluble phases (acetic acid-leachate), which should be mainly alteration products.

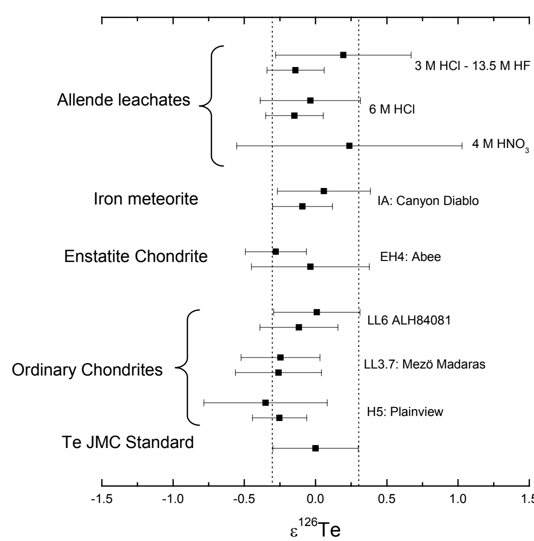

Fig. 1: Tellurium isotopic composition (ε^{126}Te) of different solar system materials.

The Te isotopic compositions (Fig. 1) of all measured chondrites, the Canyon Diablo iron meteorite and the Allende leachates were within error identical to the JMC Te standard. This indicates that Te isotopes are homogeneously distributed in bulk chondrites, iron meteorites and the leached phases of Allende. This result is in accord with previous studies, which identi fied Cr, K and Mo isotope anomalies in leached phases of Orgueil but not in leachates of Allende ([6] - [9]).

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