THE DISTRIBUTION OF THE P-PROCESS ^{190}Pt ISOTOPE IN IRON METEORITES.

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Introduction: A *p*-process deficit has previously been identified in Sm and Nd, based on bulk measurements of carbonaceous chondrites [1]. Results for other heavy *p*-process isotopes such as ^{180}W and ^{184}Os, however, indicate a homogenous distribution of these isotopes in iron meteorites [2, 3, 4]. Platinum is an ideal element to search for concomitant effects, with six naturally occurring isotopes that are of *p*- (^{190}Pt), *s*- (^{192}Pt) and *r*- (^{194}, ^{195}, ^{196}, ^{198}Pt) process origin. However, few published data of sufficient precision exist for ^{190}Pt because of the small abundance (0.014 %) of this isotope [5]. We will present new high-precision ^{190}Pt data for six iron meteorite groups.

Methods: Platinum isotopes are purified following the method described by [6]. Our procedure entails the separation of Pt from general matrix elements. This is followed by separation from Ir, which causes tailing effects on Pt isotopes [7, 8]. Lastly, Os is removed from the samples via volatilization. Samples are analysed using a Neptune *Plus* MC-ICP-MS operated with a Cetac Aridus II desolvating system. The instrument is fitted with two 10^{12} Ω amplifiers that are used to measure ^{190}Pt and ^{188}Os. Two cup configurations are employed. The first allows for the collection of all Pt isotopes plus the interference isotope monitors ^{188}Os and ^{200}Hg. The second cup configuration is designed specifically for the high-precision collection of ^{190}Pt, which is measured along with ^{192}Pt, ^{195}Pt, and ^{198}Pt, plus ^{188}Os and ^{200}Hg. All data are corrected for instrumental mass bias using the exponential fractionation law internally normalized to $^{198}Pt/^{195}Pt = 0.2145$ [7]. This method yields external 2 S. D. reproducibilities of 0.31 for $\varepsilon^{192}Pt$, 0.08 for $\varepsilon^{194}Pt$ and 0.03 for $\varepsilon^{196}Pt$, based on repeat analyses of metal from the North Chile meteorite. The accuracy of our method was tested using the isotopic standard SRM 3140, which was passed through the chemical separation procedure. The results yield values within uncertainty of the unprocessed terrestrial standard solution, and repeats of this standard indicate the 2 S. D. external reproducibility for $\varepsilon^{190}Pt$ in our high-precision set-up is ~2 ε.

Results and discussion: We have obtained preliminary high-precision Pt isotope data for the IIAB iron meteorites Edmonton and North Chile, and the IVB meteorites Hoba and Tlacotepec. In addition, we will present high-precision ^{190}Pt data for Toluca (IAB), Carbo (IID), Cape York (IIIAB), and Gibeon (IVA).

Our new Pt isotope data confirm the lack of *s*- and *r*-process nucleosynthetic variations in the iron meteorites, in good agreement with previous studies [5, 7, 8, 9]. The data show variations in $\varepsilon^{192}Pt$, $\varepsilon^{194}Pt$ and $\varepsilon^{196}Pt$ between iron meteorites, but they agree with the modelled trends expected from exposure to galactic cosmic rays (GCR) [10].

New high-precision data for $\varepsilon^{190}Pt$ indicate no deviation from the terrestrial value in the unexposed IIAB iron meteorites ($\varepsilon^{190}Pt$ = -0.5 – 0), which agrees with the results of [5] for this group. However, the IVB irons show $\varepsilon^{190}Pt$ excesses of 2.9 and 5.6 (Fig. 1). The IVB irons were strongly exposed to GCR, and a comparison to other Pt isotope ratios reveals that $\varepsilon^{190}Pt$ excesses positively correlate with increasing exposure. Once the effects of GCR are subtracted, results for the IVB irons hint at a small potential *p*-process excess on ^{190}Pt. However, this is not fully resolved with our current analytical precision. Excesses in ^{190}Pt would stand in contrast to studies of *p*-process ^{180}W and ^{184}Os in iron meteorites, where no variations have yet been detected [2, 3, 4].

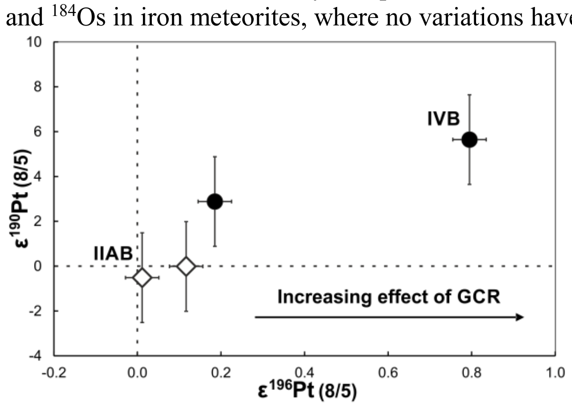

Figure 1. High-precision $\varepsilon^{190}Pt$ data for the IIAB and IVB iron meteorites. The $\varepsilon^{196}Pt$ data for the IIAB iron meteorites reveal that these samples are relatively unexposed to GCR. The IIABs yield an $\varepsilon^{190}Pt$ value within uncertainty of the terrestrial standard solution. Data for the IVB iron meteorites, however, show positive $\varepsilon^{190}Pt$ values, distinct from the terrestrial value. Excess $\varepsilon^{190}Pt$ is positively correlated with $\varepsilon^{196}Pt$, which is affected by exposure to GCR. This suggests that $\varepsilon^{190}Pt$ is also affected by GCR in these strongly-exposed samples.

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