Ultra-High Nd Isotope Ratio Precisionsthe Limit of Exponential Mass Fractionation Correction

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Modern Thermal Ionisation Mass Spectrometers are capable of analysing isotope ratios to precisions very close to counting statistics. The reproducibility of the measurements are however subject to a number of external factors. Some of these are instrument related (focussing, gain calibration etc), while others are related to sample loading and mass fractionation. We have analysed Nd isotopes in the multidynamic mode of analysis in an attempt to eliminate instrument variables. The resultant data measured over several weeks shows an apparent trend between the exponentially corrected ¹⁴³Nd/¹⁴⁴Nd and ¹⁴²Nd/¹⁴⁴Nd ratios and the normalising ratio ¹⁴⁶Nd/¹⁴⁴Nd. For example the ¹⁴³Nd/¹⁴⁴Nd ratio external precision is 5 ppm 1SD, which reduces to 3 ppm with a correction for the variation with ¹⁴⁶Nd/¹⁴⁴Nd. Internal precisions are 2 ppm 1S.E. The data suggest that at the sub 5 ppm levels of precision a first order exponential fractionation law breaks down.

We will also present isotope ratio results from ICP multicollectors and compare the data with that obtained for the TIMS.