$^{21}Ne/^{20}Ne$ ratio in air

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Introduction

The advent of modern noble gas mass spectrometers offers new opportunities for accurate measurement of Ne isotopes, in particular through the resolution of isobaric interferences. It has recently been suggested that $^{21}Ne/^{20}Ne$ measurements may be in error due to previously unrecognised ^{20}NeH interference [1]. As part of our development of high-resolution methods for Ne isotope ratio measurement, we have redetermined atmospheric $^{21}Ne/^{20}Ne$, paying particular attention to non-statistical sources of error.

Methods

A primary requirement is that instrumental fractionation be mass dependent. For this reason, measurements were made by single collector peak jumping. $^{22}Ne/^{20}Ne$ was used to correct for instrumental fractionation.

A single bottle of commercial Ne was analysed using two Nu Instruments *Noblesse* mass spectrometers, operated with MRP (=m/Δm 5-95% on side of peak) 5200 – 6200. ^{21}Ne was measured in two ways: (1) at the high mass side of the peak top (as were ^{20}Ne and ^{22}Ne), but requiring a small correction for ^{20}NeH (which was estimated from mass scans) and (2) at the low mass side with ^{20}NeH edge resolved, but with a correction for peak top non-flatness across the full width of the peak.

The same bottle of Ne was also analysed on a Nu Instruments *Evolution* high resolution gas source mass spectrometer. Mass scans at 5000 resolution (10% valley definition) confirmed absence of interferences to 10^{-4}, prior to measurement at lower resolution (to provide usable peak flat).

Results

All results so far obtained from both *Noblesse* and *Evolution* are consistent with each other; within error they also overlap with the 50-year old value of [2]. The level of NeH in the instruments used was also significantly lower than reported by [1]: we observed $^{20}NeH/^{21}Ne$ ~0.3% on one *Noblesse* and <0.1% on the other. A fuller description of the results and analysis of uncertainties will be presented at the meeting.

[1] Honda *et al*., abstract to AGU Fall meeting 2014. [2] Eberhardt *et al*. (1965), *Z Naturforschg*, **20a**, 623-624.