

## PRECISE AND ACCURATE DETERMINATION OF NEODYMIUM AND HAFNIUM ISOTOPE RATIOS

- Excellent mass fractionation stability
- Precise and accurate isotope measurements

A 500 ng/g JNdi-1 Nd standard solution and a 500 ng/g JMC-475 Hf solution were used in this study. The standards were dissolved in 2% nitric acid. The solutions were introduced into the mass spectrometer using a standard cyclonic spray chamber with concentric glass nebuliser. Data was collected using static analysis. Each analysis consisted of 50 ten second integrations, baselines were measured by ESA deflection at the beginning of each analysis. The analysis duration was approximately 10 minutes. A sequence of 10 repeat analyses were made of the Hf solution, equating to 100 minutes of data collection. A sequence of 45 repeat analyses were made of the Nd solution, equating to 7.5 hours of data collection. No tuning of the instrument or nebuliser was made in either case once the sequence had begun.

In both cases, the data was fractionation-corrected using the exponential law. Certified values of  $^{179}\text{Hf}/^{177}\text{Hf} = 0.7325$  and  $^{146}\text{Nd}/^{144}\text{Nd} = 0.7219$  were used for internal normalization. The  $^{180}\text{Hf}$  ion beam intensity was ca. 10.7 V, equating to a total Hf sensitivity of approximately 61 V/ppm. The  $^{142}\text{Nd}$  ion beam intensity was ca. 6.4 volts, equating to a total Nd sensitivity of approximately 47 V/ppm.

Figure 1 shows the fractionation corrected  $^{180}\text{Hf}/^{177}\text{Hf}$  ratios of the 10 repeat analyses of the 500 ng/g JMC-475 solution. The other corrected main isotope ratios are presented in Table 1. The ratios are very reproducible, and within measurement errors of the certified values.

Figure 2 shows the fractionation corrected  $^{143}\text{Nd}/^{144}\text{Nd}$  ratios of the 45 repeat analyses of the 500 ng/g JNdi-1 solution. The other corrected main isotope ratios are presented in Table 2. The ratios are very reproducible, and within measurement errors of the certified values.



Nu Plasma II

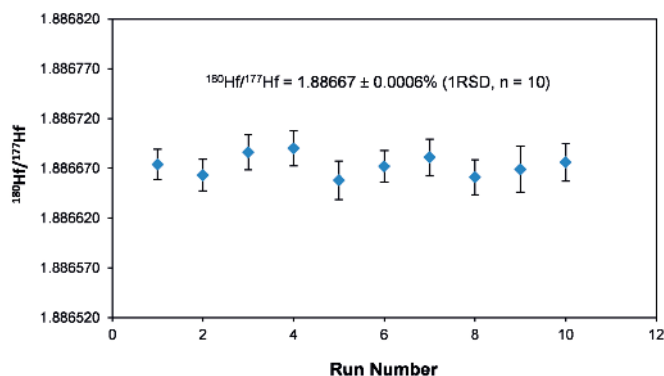


Figure 1: Fractionation corrected  $^{180}\text{Hf}/^{177}\text{Hf}$  ratios for 10 repeat analyses of the 500 ng/g JMC-475 solution. The error bars are 2SE.

Table 1: Fractionation corrected Hf isotope ratios for ten repeat analyses of the 500 ng/g JMC-475 solution. Each analysis took approximately 10 minutes, equating to 100 minutes of data collection.

Run #	176/177	RSE (ppm)	178/177	RSE (ppm)	180/177	RSE (ppm)
1	0.282157	7	1.46720	3	1.88667	4
2	0.282159	6	1.46720	3	1.88666	4
3	0.282155	6	1.46721	3	1.88669	5
4	0.282158	5	1.46721	4	1.88669	5
5	0.282155	6	1.46722	4	1.88666	5
6	0.282158	6	1.46720	3	1.88667	4
7	0.282157	5	1.46721	3	1.88668	5
8	0.282165	5	1.46720	3	1.88666	5
9	0.282159	5	1.46721	4	1.88667	6
10	0.282159	6	1.46721	3	1.88668	5
<b>Mean</b>	<b>0.282158</b>		<b>1.46721</b>		<b>1.88667</b>	
<b>SD</b>	<b>2.66460E-06</b>		<b>5.42525E-06</b>		<b>1.06354E-05</b>	
<b>RSD (ppm)</b>	<b>9</b>		<b>4</b>		<b>6</b>	

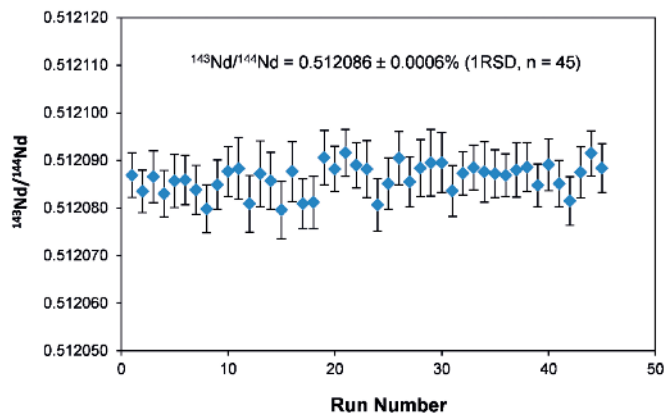


Figure 2: Fractionation corrected  $^{143}\text{Nd}/^{144}\text{Nd}$  ratios for 45 repeat analyses of the 500 ng/g JNdi-1 solution. The error bars are 2SE.

**Table 2:** Fractionation corrected Nd isotope ratios for 45 repeat analyses of the 500 ng/g JNd-I solution. Each analysis took approximately 10 minutes, equating to 7.5 hours of data collection.

Run #	142/144	RSE (ppm)	143/144	RSE (ppm)	145/144	RSE (ppm)	148/144	RSE (ppm)	150/144	RSE (ppm)
1	1.14173	4	0.512087	5	0.348421	4	0.241548	8	0.236369	9
2	1.14173	5	0.512084	4	0.348422	4	0.241546	8	0.236364	10
3	1.14174	6	0.512087	5	0.348424	5	0.241552	8	0.236369	10
4	1.14174	6	0.512083	5	0.348422	4	0.241547	9	0.236364	12
5	1.14176	6	0.512086	5	0.348426	5	0.241545	7	0.236365	12
6	1.14174	6	0.512086	5	0.348424	4	0.241551	8	0.236365	11
7	1.14174	5	0.512084	5	0.348426	5	0.241549	7	0.236367	10
8	1.14174	5	0.512080	5	0.348423	5	0.241549	7	0.236372	9
9	1.14175	4	0.512085	5	0.348418	5	0.241547	7	0.236363	9
10	1.14175	6	0.512088	5	0.348419	5	0.241545	7	0.236367	10
11	1.14176	6	0.512088	6	0.348424	4	0.241550	8	0.236365	11
12	1.14174	6	0.512081	6	0.348422	5	0.241551	9	0.236373	12
13	1.14175	6	0.512087	7	0.348421	5	0.241548	7	0.236370	10
14	1.14174	6	0.512086	6	0.348421	4	0.241548	8	0.236366	10
15	1.14173	5	0.512080	6	0.348421	4	0.241551	7	0.236374	10
16	1.14174	6	0.512088	6	0.348423	4	0.241550	7	0.236370	10
17	1.14175	4	0.512081	5	0.348424	4	0.241547	6	0.236368	6
18	1.14176	6	0.512081	5	0.348422	5	0.241550	8	0.236367	11
19	1.14175	6	0.512091	6	0.348422	4	0.241550	7	0.236367	8
20	1.14174	5	0.512088	5	0.348417	4	0.241552	7	0.236374	10
21	1.14176	7	0.512092	5	0.348420	4	0.241550	7	0.236366	14
22	1.14175	6	0.512089	5	0.348419	5	0.241549	7	0.236371	9
23	1.14175	6	0.512088	6	0.348423	4	0.241550	7	0.236367	11
24	1.14174	5	0.512081	5	0.348422	4	0.241551	8	0.236371	9
25	1.14174	6	0.512085	5	0.348423	4	0.241551	8	0.236368	9
26	1.14175	7	0.512091	6	0.348421	5	0.241552	7	0.236370	12
27	1.14176	5	0.512086	5	0.348419	4	0.241549	7	0.236368	12
28	1.14176	6	0.512088	6	0.348425	5	0.241547	7	0.236366	10
29	1.14175	5	0.512090	7	0.348423	6	0.241547	6	0.236366	9
30	1.14174	7	0.512090	6	0.348419	4	0.241552	7	0.236368	8
31	1.14175	5	0.512084	5	0.348419	5	0.241555	6	0.236366	10
32	1.14176	5	0.512087	4	0.348420	5	0.241550	7	0.236369	8
33	1.14175	5	0.512089	5	0.348423	4	0.241555	7	0.236367	10
34	1.14175	5	0.512088	6	0.348424	4	0.241553	8	0.236372	11
35	1.14173	5	0.512087	5	0.348424	4	0.241559	8	0.236377	10
36	1.14174	5	0.512087	4	0.348419	4	0.241553	6	0.236370	11
37	1.14175	6	0.512088	6	0.348419	5	0.241551	6	0.236374	10
38	1.14174	7	0.512089	5	0.348421	4	0.241552	8	0.236377	10
39	1.14173	5	0.512085	4	0.348423	4	0.241552	7	0.236378	10
40	1.14174	6	0.512089	5	0.348426	4	0.241554	7	0.236375	10
41	1.14173	6	0.512085	5	0.348421	4	0.241555	8	0.236379	10
42	1.14174	6	0.512082	5	0.348423	5	0.241555	6	0.236374	7
43	1.14175	4	0.512088	5	0.348420	4	0.241549	8	0.236375	9
44	1.14175	6	0.512092	5	0.348421	4	0.241553	7	0.236371	11
45	1.14174	6	0.512088	5	0.348422	5	0.241556	6	0.236370	11
<b>Mean</b>	<b>1.14175</b>		<b>0.512086</b>		<b>0.348422</b>		<b>0.241550</b>		<b>0.236370</b>	
<b>SD</b>	<b>8.12764E-06</b>		<b>3.1518E-06</b>		<b>2.1867E-06</b>		<b>2.9654E-06</b>		<b>4.0172E-06</b>	
<b>RSD (ppm)</b>	<b>7</b>		<b>6</b>		<b>6</b>		<b>12</b>		<b>17</b>	