Reactor 26 | Feb 2023 - May 2023 Summary

**\*\* The project lead is responsible for double checking all laboratory normalizations and applying any additional corrections, as needed.**

**Session information:**

## Responsible for QC and corrections to final lab data: Kirsten Andrews [June 2023]

Add any significant updates in a different color or link to a new summary file: here.

## Description of session: Reactor 26 lasted 3 months from the middle of February to the middle of May. Reactor 26 began because Reactor 25 had over 200 samples run through it (97 waters, 70 carbonates, 54 primes) so rather than have Reactor 25 die in the middle of a sample run, Reactor 26 was packed and installed. The first time the reactor was packed a stainless steel filter was placed inside the reactor with hopes that it would pack the reactor better than the nickel wool. However, after hooking the reactor up to the line, no yields were coming through so it was believed that the stainless steel filter may have been reacting with the CoF3 powder. Going back to the original method of packing the reactor with nickel wool only, Reactor 26 officially started (Feb. 16, 2023). Reactor 26 ran smoothly, with a Fe Catalyst change on 4/26/23, at the end of a carbonate session. Reactor 26 finished on 5/11/23 after very nosy, big jumps in USGS47 values. Reactor 26 went through 123 water samples, 76 carbonates, and 42 primes.

## Decisions about correction of data (breaks, linear vs basic correction etc):

Reactor 26 was reduced in 2 different ways. Version 1 contains no segment breaks with a linear correction, while version 2 contains 1 segment break, with a linear correction for segment 1 and a basic correction for segment 2. With version 1, SMOW and SLAP D’17O residual values range from around -10 to 12 per meg. All standards in this reactor (including SMOW, SLAP, USGS47, USGS45, and IAEA-C1) range from -20 to 20 per meg (with an outlier 102-GC-AZ01 sample at 33 per meg) (see [R26\_3allCorr\_std.pdf](https://drive.google.com/file/d/1xOeQDCbMh_OH7IkrH9WqV1XqX-Sea39R/view?usp=drive_link) in the [R26\_ver.1\_basic\_figures](https://drive.google.com/drive/folders/1iMaHZ__O03yorj7VI-dG3FudOcl_Rdpx?usp=drive_link) folder). To bring these standard values closer to 0, version 2 was created. Version 2 contains 1 segment break at standard IPL-17O-4733 IAEA-C1-R26-16 due to changing the Fe Catalyst. For version 2, segment 1 is corrected with a linear correction that allows SMOW and SLAP values to range from -10 to 10 per meg and all standards to range from -15 to 35 per meg. Segment 2 is corrected with a basic correction that allows SMOW and SLAP values to range from -10 to 5 per meg and all standards to range from -8 to 5 per meg with a outlier IAEA-C1 sample at -30 per meg (see [R26\_3allCorr\_std.pdf](https://drive.google.com/file/d/1J0QSQjaFMsne279nBkCs07CrOZq1u66K/view?usp=drive_link) in the [R26\_ver.2\_basic\_figures](https://drive.google.com/drive/folders/1R4YWjuFgHWBYl_ELDW21sSZjxxZKqwVz?usp=drive_link) folder). If version 1 with no segment breaks is used, n = 12 SMOW, n = 11 SLAP, n = 4 USGS45, n = 2 USGS47, n = 3 102-GC-AZ01, and n = 10 IAEA-C1 samples were corrected with each set of standards having a standard deviation of 7, 5, 7, 1, 10, 12 respectively ([R26\_summaryStd\_linear.csv](https://drive.google.com/file/d/1qSE-SfMcjsE7dtnlGZxgvpafjayQ0XAb/view?usp=drive_link) in the [R26\_ver.1 csv files](https://drive.google.com/drive/folders/1XOK4ajLuW473a0lPZOqCcJkQszmsEHbh?usp=drive_link) folder). If version 2 is used, segment 1 contains n = 8 SMOW, n = 7 SLAP, n = 2 USGS45, n = 2 USGS47, n = 3 102-GC-AZ01, and n = 9 IAEA-C1 samples with standard deviations of 5, 7, 3, 1, 10, 11 respectively ([R26\_summaryStd\_seg1linear.csv](https://drive.google.com/file/d/1GUYYsyoVVy9YfYydwPq_Ut3Gotx3IjWj/view?usp=drive_link) in the [R26\_ver.2 csv files](https://drive.google.com/drive/folders/1z1Rc1IHXs1iDZ9-f8CZHEuKqWGzSdC3a?usp=drive_link) folder), and segment 2 contains n = 4 SMOW, n = 4 SLAP, n = 2 USGS45, and n = 1 IAEA-C1 sample with standard deviations of 5, 4, 0, NA respectively ([R26\_summaryStd\_seg2basic.csv](https://drive.google.com/file/d/1cCF13DoiUIYRfWiY5A64aXPjARL-BIRn/view?usp=drive_link) in the [R26\_ver.2 csv files](https://drive.google.com/drive/folders/1z1Rc1IHXs1iDZ9-f8CZHEuKqWGzSdC3a?usp=drive_link) folder). It is important to note that whether version 1 or version 2 is used, standard and sample values do not change dramatically (see [R26\_corData\_linear.csv](https://drive.google.com/file/d/1G1qG9UhPISAwE9-Bj2_1nX30CWXTL-HG/view?usp=drive_link), [R26\_corData\_seg1linear.csv](https://drive.google.com/file/d/1wwyaKqN_tHSC-7JOTD5sqPX1GfKhYk6P/view?usp=drive_link), and [R26\_corData\_seg2basic.csv](https://drive.google.com/file/d/1PYuN_QBxXFWGykde0ia-CNpp9qw4Y8Zi/view?usp=drive_link)), therefore, in order to keep data corrections as simple as possible, version 1 was used to correct Reactor 26.

Version info:

Ver.1: No segments. Linear correction used. SMOW and SLAP D’17O residual values ranged from -10 to 11 per meg. This version was chosen for the final data correction.

Ver.2: Segment at IPL-17O-4733 IAEA-C1-R26-16. Segment 1 was linear with SMOW and SLAP values from -10 to 10 per meg and segment 2 was basic with SMOW and SLAP values from -10 to 5 per meg. This version was not used for the final data correction.

## Changes to script or file structure/formatting

* Changed script to allow linear and basic summarystd csv files to include standard names
  + How to find this change
    - Open the IPL\_17O\_correction\_V09.2.r script
    - Go to the “# Output corrected data for all and auto-preferred correction schemes” section
    - The last line of this chunk of code reads “write.csv(summary.std[[k]], curFile.summary.std, row.names = TRUE)”
      * This code reads row.names = TRUE when before it was FALSE
    - Now the “R26\_summaryStd” csv files include standard names as a column

## Notable Events:

* 2/23/23: Kirsten changed ref gas
* 2/28/23: Kirsten changed ref gas
* 3/3/23: Kirsten changed ref gas
* 3/8/23: Kirsten updated computers
* 3/9/23: Kirsten changed Septum
* 3/18/23: Julia changed ref gas - 1 aliquot (20 nA @ 84.9%)
* 3/22/23: Julia switched He Tank
* 3/23/23: Julia changed ref gas - 1 aliquot
* 3/27/23: Robot stopped working because USB24 Board 0 wasn’t connecting to the computer and the robot - Kirsten and Julia worked through this together
* 3/28/23: Robot stopped working and wouldn’t move. USB24 Board 0 wasn’t connected - Kirsten and Julia worked through this together
* 3/30/23: Kirsten changed ref gas - 1 aliquot (20nA @ 84.9%)
* 3/31/23: Julia purged gas ballasts
* 4/6/23: Nick changed ref gas @ 13:45
* 4/17/23: Kirsten changed ref gas - 1 aliquot (20nA @ 79.8%)
* 4/17/23: Kirsten purged ballast
* 4//19/23: Kirsten updated computers
* 4/26/23: Naomi and Kirsten changed Fe catalyst
* 5/5/23: Julia added ref gas - 1 aliquot (20nA @ 84%)
* 5/8/23: Kirsten purged ballasts for 15 mins
* 5/9/23: Kirsten added ref gas - 1 aliquot (20nA @ 82.9%)
* 5/9/23: Purged oil pump ballast for 10 mins
* 5/11/23: Reactor 26 end
* 5/15/23: Kirsten updated computers