

PNNL-32872

Using Separation-Enhanced Isotope Ratio Mass Spectrometry

CRADA 525 (PNNL 78164)

May 2022

Tim Bays

Los Alamos National Laboratory
Coordinating Research Council

DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor Battelle Memorial Institute, nor any of their employees, makes **any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights.** Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof, or Battelle Memorial Institute. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

PACIFIC NORTHWEST NATIONAL LABORATORY
operated by
BATTELLE
for the
UNITED STATES DEPARTMENT OF ENERGY
under Contract DE-AC05-76RL01830

Printed in the United States of America

Available to DOE and DOE contractors from the
Office of Scientific and Technical Information,
P.O. Box 62, Oak Ridge, TN 37831-0062;
ph: (865) 576-8401
fax: (865) 576-5728
email: reports@adonis.osti.gov

Available to the public from the National Technical Information Service
5301 Shawnee Rd., Alexandria, VA 22312
ph: (800) 553-NTIS (6847)
email: orders@ntis.gov <<https://www.ntis.gov/about>>
Online ordering: <http://www.ntis.gov>

Using Separation-Enhanced Isotope Ratio Mass Spectrometry

CRADA 525 (PNNL 78164)

Abstract

May 2022

Tim Bays

Prepared for
the U.S. Department of Energy
under Contract DE-AC05-76RL01830

Pacific Northwest National Laboratory
Richland, Washington 99354

Abstract

Stable isotope ratio measurements using IRMS have been shown by LANL to be effective for tracking co-processed biogenic carbon, with results approaching that of AMS. The lower cost of an IRMS may enable deployment to refineries improving access and analysis turnaround times (≤ 2 -hours), and by extension data that can allow process optimization to maximize renewable carbon in desired refinery products. This work will apply chemical separation approaches as part of the IRMS analyses, enabling biogenic carbon tracking in fuel product streams by boiling point range, by chemical class, or even by compound. This work will show IRMS to be at a minimum as reliable and comparable to AMS, by using separations to improve sensitivity at low blend ratios and enable refinery process optimization through onsite analysis.

Pacific Northwest National Laboratory

902 Battelle Boulevard
P.O. Box 999
Richland, WA 99354
1-888-375-PNNL (7665)

www.pnnl.gov