AQRP Monthly Technical Report

PROJECT TITLE	Sources of Organic Particulate Matter in Houston: Evidence from DISCOVER-AQ data Modeling and Experiments	**PROJECT #**	14-024
PROJECT PARTICIPANTS	The University of Texas at Austin ENVIRON University of California, Riverside	**DATE SUBMITTED**	7/10/2014
REPORTING PERIOD	**From:** June 18, 2014 **To:** June 30, 2014	**REPORT #**	1

A Financial Status Report (FSR) and Invoice will be submitted separately from each of the Project Participants reflecting charges for this Reporting Period. I understand that the FSR and Invoice are due to the AQRP by the 15th of the month following the reporting period shown above.

Detailed Accomplishments by Task

Task 1

- We have begun a literature review of the data on secondary organic aerosol (SOA) from the oxidation of intermediate volatility VOCs (IVOCs).
- TCEQ provided an extract of the 2012 STARS database (version 4b) of point source emissions for Texas. ENVIRON will analyze these data seeking to identify emissions of intermediate volatility VOCs (IVOCs) in the Houston area.

Task 2

- We have developed a design for the thermodenuder and the heated injector which will be needed for the chamber experiments. The thermodenuder will most likely be built by Swagelok (they are in the process of preparing a formal drawing / estimate for us); the heated injector will most likely be built by a machine shop at UT Austin. Before developing the design for the thermodenuder we conducted a thorough literature review.
- We have also started the chamber characterization experiments. Specifically, we characterized the UV intensity in the chamber by measuring the NO2 photolysis rate.

Preliminary Analysis

None.

Data Collected

- TCEQ provided an extract of the 2012 STARS database (version 4b) of point source emissions for Texas. ENVIRON will analyze these data seeking to identify emissions of intermediate volatility VOCs (IVOCs) in the Houston area.

- The NO2 photolysis rate was measured to be 0.0065 sec^{-1}

- A list of peer-reviewed articles discussing the formation of secondary organic aerosol from IVOCs is given below:

Aimanant, S. and Ziemann, P. J.: Chemical Mechanisms of Aging of Aerosol Formed from the Reaction of n -Pentadecane with OH Radicals in the Presence of NO x, Aerosol Sci. Technol., 47(9), 979–990, doi:10.1080/02786826.2013.804621, 2013.

Chan, A. W. H., Kautzman, K. E., Chhabra, P. S., Surratt, J. D., Chan, M. N., Crounse, J. D., Wennberg, P. O., Flagan, R. C., Seinfeld, J. H. and Sciences, P.: Secondary organic aerosol formation from photooxidation of naphthalene and alkylnaphthalenes : implications for oxidation of intermediate volatility organic compounds (IVOCs), Atmos. Chem. Phys., (2007), 3049–3060, 2009.

Jordan, C. E., Ziemann, P. J., Griffin, R. J., Lim, Y. B., Atkinson, R. and Arey, J.: Modeling SOA formation from OH reactions with C8–C17 n-alkanes, Atmos. Environ., 42(34), 8015–8026, doi:10.1016/j.atmosenv.2008.06.017, 2008.

Lim, Y. B. and Ziemann, P. J.: Effects of molecular structure on aerosol yields from OH radical-initiated reactions of linear, branched, and cyclic alkanes in the presence of NOx., Environ. Sci. Technol., 43(7), 2328–2334 [online] Available from: http://www.ncbi.nlm.nih.gov/pubmed/19452882, 2009.

Presto, A. a, Miracolo, M. a, Kroll, J. H., Worsnop, D. R., Robinson, A. L. and Donahue, N. M.: Intermediate-volatility organic compounds: a potential source of ambient oxidized organic aerosol., Environ. Sci. Technol., 43(13), 4744–4749 [online] Available from: http://www.ncbi.nlm.nih.gov/pubmed/19673260, 2009.

Presto, A. A., Miracolo, M. A., Donahue, N. M. and Robinson, A. L.: Secondary Organic Aerosol Formation from High-NO x Photo-Oxidation of Low Volatility Precursors : n -Alkanes, Atmos. Chem. Phys., 44(6), 2029–2034, 2010.

Shakya, K. M. and Griffin, R. J.: Secondary Organic Aerosol from Photooxidation of Polycyclic Aromatic Hydrocarbons, Environ. Sci. Technol., 44(21), 8134–8139, 2010a.

Shakya, K. M. and Griffin, R. J.: Secondary organic aerosol from photooxidation of polycyclic aromatic hydrocarbons., Environ. Sci. Technol., 44(21), 8134–8139, doi:10.1021/es1019417, 2010b.

Tkacik, D. S., Presto, A. a, Donahue, N. M. and Robinson, A. L.: Secondary organic aerosol formation from intermediate-volatility organic compounds: cyclic, linear, and branched alkanes., Environ. Sci. Technol., 46(16), 8773–8781 [online] Available from: http://lib.bioinfo.pl/paper:22823284\nhttp://adsabs.harvard.edu/abs/2012EnST...46.8773T, 2012.

Zhang, H. and Ying, Q.: Secondary organic aerosol from polycyclic aromatic hydrocarbons in Southeast Texas, Atmos. Environ., 55, 279–287, doi:10.1016/j.atmosenv.2012.03.043, 2012.

Zhang, X., Schwantes, R. H., Coggon, M. M., Loza, C. L., Schilling, K. a., Flagan, R. C. and Seinfeld, J. H.: Role of ozone in SOA formation from alkane photooxidation, Atmos. Chem. Phys., 14(3), 1733–1753, doi:10.5194/acp-14-1733-2014, 2014.

Identify Problems or Issues Encountered and Proposed Solutions or Adjustments

None to date

Goals and Anticipated Issues for the Succeeding Reporting Period

None to date

Detailed Analysis of the Progress of the Task Order to Date

Progress on the task order has been as expected to date.

Submitted to AQRP by: Lea Hildebrandt Ruiz

Principal Investigator: Lea Hildebrandt Ruiz