

Hydrocarbon and Terpene Gas Standards Research and Development to Assist in Atmospheric Measurements

J. Rhoderick

National Institute of Standards and Technology, Gaithersburg, MD 20899; 301-975-3937, E-mail: george.rhoderick@nist.gov

The World Metrological Organizations (WMO) Global Atmospheric Watch (GAW) group responsible for Volatile Organic Compounds (VOC) has been measuring hydrocarbons and terpenes for many years but has seen large discrepancies in available calibration standards. In 2006 the WMO/GAW-VOC group approached the National Metrology Institutes (NMIs) worldwide to collaborate together and develop calibration gas standards for key hydrocarbons and terpenes. The NMIs, working through the Consultative Committee on the Quality of Material/Gas Analysis Working Group, have individually researched and developed gas mixture standards. The Gas Metrology Group (GMG) of the Analytical Chemistry Division at the National Institute of Standards and Technology (NIST) has successfully developed a suite of standards containing 18 alkane, alkene and aromatic hydrocarbons (in nitrogen) ranging in concentrations from 50 to 250 ppt. International comparisons between participating NMIs are currently ongoing with some preliminary results indicating good agreement. The GMG of NIST is currently researching stability of terpenes and monoterpenes in treated aluminum gas cylinders at low ppb concentrations. Four of 11 terpenes studied have demonstrated 7 month stability, while others indicate that chemical reactions may be taking place within the gas mixture. Limited comparisons between NMIs have been undertaken with preliminary results indicating mixed agreement. Agreement between the suite of ppt hydrocarbon standards and the terpene stability issues will be illustrated and discussed.

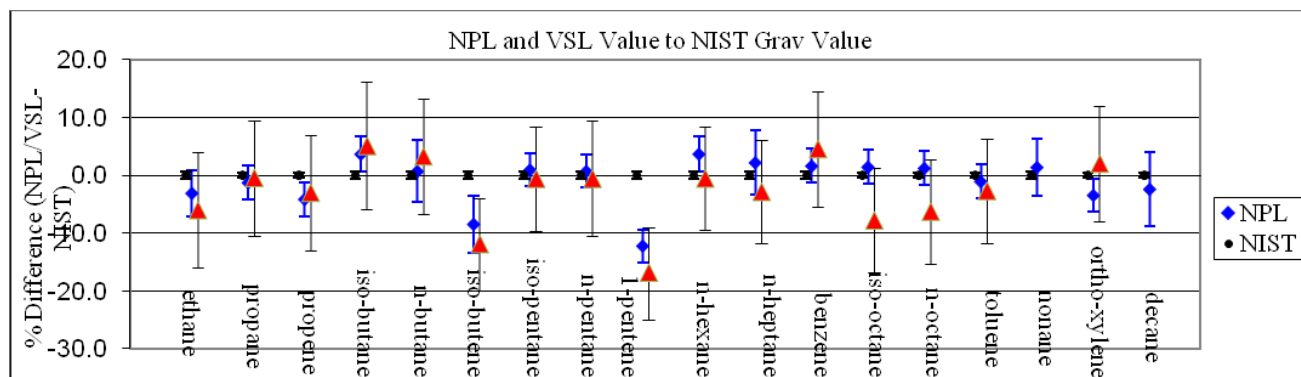


Figure 1. Preliminary results between National Physical Laboratory (NPL), Van Swinden Laboratoruim (VSL) and NIST at nominal 200 ppt hydrocarbon standard. Agreement is in general better than 4.0 % but iso-butene and 1-pentene may be degrading.

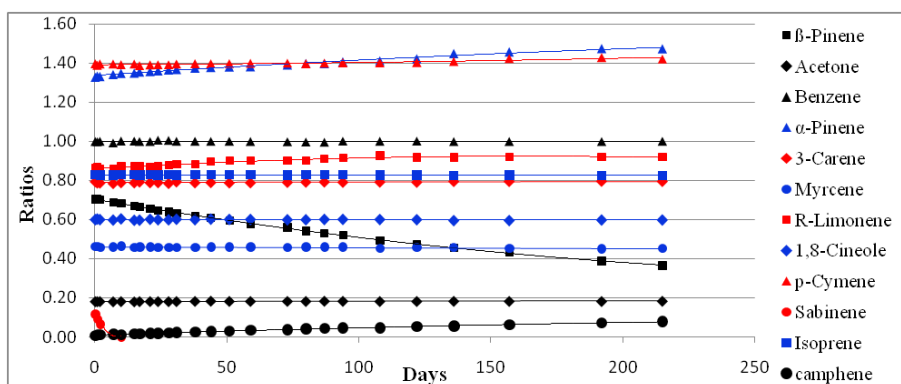


Figure 2. Stability of terpene gas mixture at nominal 5 ppb in aluminum cylinder over days.