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Brief report on primary mixture preparation for precise CO observation

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Greenhouse gases (GHG) have been known as causing materials of the greenhouse effect. Because it is very important to reduce their emission, they has been paid attention since Kyoto protocol to the United Nations Framework Convention on Climate Change. Accurate observation data of ambient GHG are vital for the study of the relationship between GHGs and global warming, but it is not easy to quantify their mixing ratios owing to their globally and temporally tiny variation. For example, mixing ratio of carbon dioxide in the atmosphere, is reported to be growing by +1.7 ppm (parts per million)/year for recen 10 years according to GAW report. CO has contributed as an indicator in that an air mass is from source or background, although it lacks its traceability.
CO is known to be emitted from industry, vehicle, and biomass burning. The atmospheric lifetime of CO varies from weeks to months depending on OH radical amount however ambient CO ranges from 50 nmol/mol to 300 nmol/mol at marine boundary, from 100 nmol/mol to 500 nmol/mol at city area. In order to monitor precisely CO at ambient, the World Meteorological Organization (WMO) requires its measurement capability of 2 nmol/mol uncertainty. For these reasons, it's necessary for the measurement results to be accurate and consistent among the assigned standards.
. In order to prepare CO/air standard mixtures with an absolute scale we have studied several factors on gravimetry; purity analysis of CO and an artificial air and stability including unexpected contamination during preparation and adsorption on inner wall of cylinders. Currently we are going to present the preliminary results on the development of standard mixtures with $\sim$ 300 nmol/mol. The mixtures were verified by comparing their amount with a Gas Chromatography / Electron Capture Detector (GC/FID) and cavity ring down spectrometer (CRDS). Analytical capability during comparison is within $\pm$ 2 ppb, which satisfies WMO DQO.