

MEASUREMENTS OF PEROXY RADICALS USING CHEMICAL AMPLIFICATION/CAVITY RING-DOWN SPECTROSCOPY

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The peroxy radical chemical amplification (PERCA) method is combined with cavity ring-down spectroscopy (CRDS) to measure peroxy radicals HO₂ and RO₂. HO₂ and RO₂ are converted to NO₂ via reactions with NO, with subsequent reactions to recycle most of the OH and RO coproducts back to HO₂ by reactions with CO and O₂ and amplify the level of NO₂. The amplified NO₂ is then monitored by CRDS, a sensitive absorption technique. The PERCA-CRDS method is calibrated with a HO₂ radical source (0.5-3 ppb); using a 3-meter Teflon tubing as the reactor and 2.5 ppmv NO and 5% vol/vol CO, the PERCA amplification factor or chain length is determined to be 150 ±50 in this study. The peroxy radical detection sensitivity by PERCA-CRDS is approx. 5 pptv/30s. Ambient measurements of the peroxy radicals are carried out at Riverside, California in 2007 to demonstrate the PERCA-CRDS method.