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A NOx Denuder: Using GroG Impregnated with Cobalt Oxide to Strip Nox

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Nitrogen monoxide and nitrogen dioxide, collectively known as NO_X, play an integral role in atmospheric chemistry. NO_X is an atmospheric pollutant that has detrimental effects on human health, air quality, and visibility. When present in high levels, NO_X inhibits the formation of OH radicals and ozone, key components of many atmospheric chemical cycles. Additionally, NO_X emissions from combustion sources interfere with certain types of aerosol optical measurements, since NO_X absorbs strongly at certain wavelengths. A denuder was made to strip NO_X compounds from an incoming aerosol stream to reduce its interference in such optical measurements. Cone shaped nozzles allow for the subduction of aerosol into the inner chamber of the denuder, upon which the aerosol traverses down one of four stainless steel mesh channels and reacts with packed catalyst. Fine firesand and chamotte particles known as GroG were coated with cobalt nitrate hexahydrate and oxidized to cobalt oxide at 300°C. Adsorption of NO was observed at flow rates of 1900 SCCM of 150 ppm NO. NO concentrations at the denuder outlet were measured using a Model 42i-TL Trace Level NOx Analyzer. The percentage of NO removed from the inlet stream after five minutes was 36.8%. This suggests that for a 1% reduction in flowrate, 28% reduction in outlet NO concentration is achieved. The denuder holds promise for enabling more accurate characterization of aerosol composition.