ABSTRACT

A spectrophotometric method for atmospheric carbon monoxide measurement using the molybdenum blue complex formed by phosphomolybdic acid and carbon monoxide was developed.

The wavelength for analysis is 880 nm. At this wavelength, only the amount of carbon monoxide influenced the absorbance of the molybdenum blue complex at a pH range of 1.50-2.10, after a shaking time of two hours and thirty minutes, and an excess phosphomolybdic acid of about 2.7-30 times the concentration of carbon monoxide. Although the palladium(II) reagent served only as a catalyst, the ratio of its concentration to the concentration of carbon monoxide was kept at 1:1.50 to ensure complete formation of molybdenum blue after two hours and thirty minutes. The absorbance of molybdenum blue at these optimum conditions was directly proportional to the concentration of carbon monoxide.

The accuracy and reliability of the method was performed on known concentrations of carbon monoxide obtaining a 1-10% error.

The applicability of the phosphomolybdic acid method was tested by analyzing the concentration of carbon monoxide in air samples. The results were compared to results obtained by the three other spectrophotometric methods for carbon monoxide measurement: cacotheline, leuco crystal violet and *p*-sulfaminobenzoic acid, and the Orsat analysis. The carbon monoxide concentrations in the air samples ranged from .094 to .275 ppm which are below the threshold allowable limit of 9 ppm for an eight-hour continuous exposure to carbon monoxide set by the Environmental Management Bureau.

Nitrogen dioxide inhibited the formation of molybdenum blue, hence, the air samples have to be scrubbed with water prior to analysis. Carbon dioxide, sulfur dioxide and formaldehyde gases, also present in air, did not interfere in the carbon monoxide determination by the phosphomolybdic acid method.