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CHEMICAL PHYSICS OF ATMOSPHERIC PHENOMENA

Temperature Dependence of the Sensitivity of an Infrared Fourier Spectrometer

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Abstract—The analytical dependence of the signal-to-noise ratio (SNR) of the measured interferograms of an infrared (IR) Fourier spectrometer on the temperature contrast of the observation path and on the physicochemical properties of the test substance is obtained. The analytical dependences of the minimum detectable concentration of a substance on the value of the temperature contrast are obtained. It is shown experimentally that the theoretical estimates of the minimum detectable concentrations with an accuracy of the order of the mean square error correspond to the experimental values. The obtained analytical dependences make it possible for the given physicochemical properties of substances, the parameters of the IR Fourier spectrometer, and the values of the temperature contrast to estimate minimum detectable concentration of the substance.

Keywords: Fourier transform spectrometer, infrared spectroscopy, remote sensing, detection, identification
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