Turkish Journal of Chemistry

Turkish Journal

of

Chemistry

Keywords
Authors

chem@tubitak.gov.tr

Scientific Journals Home Page

Fundamental Noise Studies in Flame Atomic Magneto-Optic Rotation and Atomic Absorption Spectrometry

Ahmet T. İNCE
Yeditepe University, Letters and Science Faculty,
Department of Physics, Üsküdar, İstanbul-TURKEY
Richard D. SNOOK, John B. DAWSON
Department of Instrumentation and Analytical Science,
University of Manchester Institute of Science & Technology,
PO Box 88, M60 1QD, Manchester-ENGLAND

Abstract: A study of inherent noise sources present in a purpose built flame atomic magneto-optic rotation (AMOR) spectrometer system was carried out with a view to identifying their sources. Two different optical configurations were employed, a crossed polariser and a 45° offset polariser configuration. The offset polariser configuration was operated in both an AMOR and atomic absorption (AA) mode for the noise measurements. Two main interference frequencies were found to occur in all the optical measurement modes. An interference flame feature frequency (15.5 Hz -39.0 Hz) which arose from an ``organ-pipe" effect in the gas flow through the flame cooling sheets. The second interference frequency (at 100 Hz) was thought to arise due to modulation of the analyteís magneto-optic properties due to ripple on the electromagnet d.c. power supply. Photon noise and fluctuation noise were found to be present as background noise. The fluctuation noise was dominant at higher analyte concentrations. The characteristics and origins of fluctuation noise are discussed and investigated for each measurement mode. The noise spectra of the conventional AA measurements were compared with those of the contemporary AMOR measurements, to ascertain any differences in noise power spectra which may affect the signal-to-noise ratio.

Key Words: Atomic magneto-optic rotation spectrometer (AMORS), air-acetylene flame atomiser, Faraday configuration, fluctuation noise, offset polarisers, atomic absorption spectrometer.

Turk. J. Chem., **24**, (2000), 43-58.
Full text: pdf
Other articles published in the same issue: Turk. J. Chem.,vol.24,iss.1.