

# Determination of Trace Amounts of Bismuth by *In-Situ* Trapping Hydride Generation Flame Atomic Absorption Spectrometry

by Henryk Matusiewicz\* and Magdalena Krawczyk

Poznan University of Technology, Department of Analytical Chemistry  
ul. Piotrowo 3, 60-965 Poznań, Poland

**Keywords:** Bismuth; Reference materials; *in-situ* trapping; Hydride generation; Flame atomic absorption spectrometry

Analytical performance of hydride generation–integrated atom trap (HG–IAT) atomizer flame atomic absorption spectrometry (FAAS) system for determination of bismuth in reference material has been evaluated. Bismuth was converted to  $\text{BiH}_3$  vapors, which were atomized in air-acetylene flame-heated IAT. One investigated operational capabilities of the HG–IAT–FAAS hyphenated technique, which were improved compared to these of the existing arrangements (a water-cooled single silica tube, a double-slotted quartz tube, or an „integrated trap”). An improvement in detection limit was achieved compared to that obtained using either of the above atom trapping techniques separately. Detection limit for Bi, defined as 3 times the standard deviation of a blank ( $3\sigma$ ), was  $0.4 \text{ ng mL}^{-1}$ . For 120 s *in-situ* pre-concentration time (sample volume 2 mL), sensitivity for Bi determination was 175-fold better than in flame AAS. Sensitivity could be further improved by increasing the collection time. Precision of Bi determination was expressed as RSD and equaled 8.2% ( $n = 6$ ). The measurements were performed using the following equipment: a slotted tube, a single silica tube, and integrated atom trap-cooled atom traps. The accuracy of the method was verified applying standard calibration technique to the analysis of certified reference materials (GBW 07302 Stream Sediment and GBW 07601 Human Hair). The determined Bi contents agreed well with the certified values.