

Determination of Thiamine as a Complex with 11-Molybdo-bismuth(III)Phosphate in Sequential Injection Lab-at-Valve System

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Metalsubstituted heteropoly complexes were used as analytical reagents for the determination of sulfur-containing substances capable of forming complexes with a metal-substituent. The spectrophotometric and sequential injection lab-at-valve procedures were developed for the determination of thiamine based on its reaction with 11-molybdo-bismuth(III)phosphate complex. Absorbance in the visible and near ultraviolet regions of the spectrum increased as a result of the reaction. The maximum deviation of absorbance from additivity was observed at 390 nm ($\epsilon_{390} = 6.0 \cdot 10^3 \text{ mol}^{-1} \cdot \text{l} \cdot \text{cm}^{-1}$). The developed method is simple, green, highly sensitive and selective. B vitamins, moderate excess of ascorbic acid, a number of other reducing agents, other components of pharmaceutical preparations do not interfere with the determination of thiamine. The procedure for the determination of thiamine was automated using the sequential injection analysis manifold supplemented with an external reactor. This allowed to eliminate the Schlieren effect, improve the accuracy and sensitivity of the determination. The calibration graph was linear in the range of thiamine concentrations from $3 \cdot 10^{-6}$ to $2 \cdot 10^{-4} \text{ mol L}^{-1}$, detection limit was $10^{-6} \text{ mol L}^{-1}$ ($l = 1 \text{ cm}$), and the throughput of the method was 15 determinations per hour. The accuracy of the method was assessed by the determination of thiamine in vitamin B complex formulations.

Keywords: heteropoly complex, 11-molybdo-bismuth(III)phosphate, thiamine, sequential injection analysis, lab-at-valve
