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Measurement of the total protein in serum by biuret method with uncertainty evaluation

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Abstract

As recommended by IFCC, the biuret method is generally used to determine the total protein as a reference method. In order to achieve accurate measurement of the total protein by biuret method, a detailed description of establishment, validation and uncertainty evaluation of this method is proposed in the metrological view in this paper. Then the method was used to determine the total protein in RELA serum samples and the results of 2015-RELA sample A and B were $73.9 \text{ g}\cdot\text{L}^{-1}$ and $58.9 \text{ g}\cdot\text{L}^{-1}$, with the RSD of 1.18% and 1.07%, respectively. The uncertainty was evaluated in detail fully following the Guide to the Expression of Uncertainty in Measurement, and the expanded uncertainty of RELA sample A and B were 2.0 and $1.2 \text{ g}\cdot\text{L}^{-1}$, respectively. The results have good agreement with those from other research institutions. The proposed procedure gives a good example to realize an accurate reference method with strict metrological control, which can benefit not only total protein measurement but also other biological measurement by reference methods.

Keywords

Biuret Method, Total Protein, RELA-Samples, Uncertainty

1. Introduction

The total protein content in human tissue fluid plays an important role on the state of health [1]. Serum is the most important tissue fluid in human body, and total serum protein have a variety of functions, such as maintaining the osmotic pressure of the blood vessel, maintaining the pH of plasma, transporting various metabolites, regulating the physiological function of the transport material, and has a close relationship with the immune function of the body, which can give us useful information about our health condition. The level of the total serum protein reflects the loss of protein caused by liver function and renal disease. Measurement of total serum protein can be used to monitor the nutritional status of the body indirectly, and benefit diagnostic of certain diseases [2]. With the reasons above, the total serum protein is a routine examination in clinical diagnostics.

Numerous measurement methods of total serum protein have been developed because of its importance. Several methods, such as the Kjeldahl method [3], the biuret method [4, 5], the Lowry method [6], the Bradford method [7] and the UV absorbance method [8] are widely used. Although the Kjeldahl method is widely used, it is too tedious and time-consuming to be used as a routine assay procedure. The

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