Mercury is a naturally-occurring chemical element that is found in air, water and soil. It is released into the environment in various ways such as volcanoes, the weathering of rocks and human activity. It is generally accepted that mercury is one of the most challenging elements for analysis. The stability is poor unless mercury is preserved in a proper preservative agent. The loss of mercury tends to occur at low-level mercury analysis. This study was to improve the stability of mercury (Hg) in water for proficiency testing (PT) in Thailand.

Introduction

Mercury is released into the environment in various ways such as volcanoes, the weathering of rocks and human activity. It is one of the persistent organic pollutants (POPs) and found in inorganic forms. The determination of mercury in various water contents is gaining more importance particularly in drinking water because it affects the human health directly. In the determination of mercury, there were so many challenges to overcome. The United States Environmental Protection Agency (USEPA) also reviewed and approved some methods for the determination such as Method 245.1 (ICP-MS), Method 245.2 (ACVTS), Method 245.7 and Method 1631 (CV-AFS) [1]. The conduct of mercury species was to investigate the effects of acidic fluid and type of bottle on the holding time. Mercury may lost to the bottle walls in some cases. The wall loss mechanism has been described by Bloom (1994) and Jenifer et al. (2004). It is generally accepted that mercury is one of the most challenging elements for analysis. The stability is poor unless mercury is preserved in a proper preservative agent. The loss of mercury tends to occur at low-level mercury analysis. This study was to improve the stability of mercury (Hg) in water for proficiency testing (PT) in Thailand.

PT Process

Low concentration of mercury was studied in accordance with the national regulatory limit (1 µg/L-1 ppb) in drinking water. Two preservative agents (HCl and BrCℓ) were chosen to prepare two different kinds of preserved water for PT samples. Samples were contained in PE bottle. After distribution period (10 days), all bottles were stored in refrigerator (4 - 8 °C) for long term stability study. The assigned value (vA) and measurement uncertainty (Uk(vA)) were given by National Institute of Metrology (Thailand). The reference values for sample A and B were 0.900 ± 0.070 and 1.090 ± 0.040 µg/L, respectively. The target standard deviations (σA), 30 % CV were used for proficiency assessment. The participants’ performance was evaluated z - score. The performance of laboratory was accessed using z and En scores according to ISO/IEC 13528.

Result and Discussion

Homogeneity and stability of PT samples

Two types of preserved water had different appearances (Figure 1). The homogeneity assessment and stability assessment of the sample was performed in accordance with ISO/IEC 13528. Statistical analysis showed that samples were stable throughout laboratory proficiency testing periods. These results suggested that both HCl and BrCℓ preservatives were appropriate for mercury preservation in water.

References