



Determination of hypochlorite by using membraneless gas-separation microfluidic paper-based analytical device

Nidup Wangdi^{1,2}, Taweechai Amornsakchai², Saowapak Teerasong³,
Thaitaporn Sonsa-ard^{1,2}, Jirayu Sitanurak^{1,2}, Duangjai Nacapricha^{1,2*},

¹*Flow Innovation-Research for Science and Technology Laboratories (FIRST Labs), Mahidol University Rama 6 Road, Bangkok 10400, Thailand*

²*Department of Chemistry and Center of Excellence for Innovation in Chemistry, Faculty of Science, Mahidol University, Rama 6 Road, Bangkok 10400, Thailand*

³*Department of Chemistry and Applied Analytical Chemistry Research Unit, Faculty of Science, King Mongkut's Institute of Technology Ladkrabang, Bangkok, Thailand*

*e-mail: dnacapricha@gmail.com

Abstract: A new method with portable devices was developed for determination of hypochlorite. The method is based on the concept “membraneless gas-separation microfluidic paper-based analytical device” (MBL-GS μ PAD). The direct applicability for detection of hypochlorite in the environmental samples, exhibits its genuine usefulness in the resources limited areas or beyond. It requires only 11 minutes for complete analysis via acidification of sodium hypochlorite to generate chlorine gas in the donor reservoir of the μ PAD. Followed by diffusion of Cl_2 gas into the acceptor reservoir of the μ PAD, displacing iodine from the mixture of potassium iodide and 1% starch solution in the acceptor reservoir, forming violet starch-iodine complex as the end product. Hence, the concentration of the hypochlorite is easily quantified from the developed color intensity with the aid of photography in the linear range (0.0672- 0.538 mg L^{-1}). An example of the linear calibration is $y = 2745x + 105.26$: $r^2 = 0.98$. Precisions (% RSDs) of the method were from 4.2 to 7.5%. In spite of manually operated, it promises to be one of the alternative means for hypochlorite measurement for substituting very complex and expensive techniques due to its immediate on-site implementation and reliability.

Key word: Membraneless gas-separation microfluidic paper-based, μ PAD, Hypochlorite