

Spectrophotometric continuous flow system for monitoring cyanide and thiocyanate

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The capacity of flow technique as a powerful, efficient and simple approach has been successfully combined with gas diffusion cell and explored for monitoring the potential toxic substances, i.e. cyanide and thiocyanate. By employing three channel-flow system-gas diffusion spectrophotometer, this technique was based on the instantaneous reaction of cyanide with nickel(II) in ammonia buffer to form tetracyanonickelate(II), which characteristically absorbs UV light at 267 nm. Cyanide sample (from channel 1) is directly converted into molecular hydrogen cyanide in acid donor stream (channel 2), then it diffuses through a hydrophobic membrane in the gas diffusion cell into the ammonia buffer acceptor stream (channel 3) to form tetracyanonickelate(II) for detection. Whereas, thiocyanate sample requires oxidation by cerium(IV) in the donor stream (channel 1) to form cyanide and proceeded as that of cyanide sample. Some common operational and chemical conditions were studied to obtain optimum sensitivity and selectivity. Under the optimum conditions, the technique performed linear up to 100 mg L⁻¹ for both cyanide and thiocyanate, with RSD of typically less than 5% and detection limits of 0.3 mg L⁻¹. The proposed technique incorporating this continuous procedure provides analysis rate of 30 samples h⁻¹ and the presence of interfering sulfide ion up to 200 ppm was anticipated. The proposed method has been applied for determination of cyanide and thiocyanate samples from urine, photographic wastewaters, as well as gold mining industry with satisfactory results.

Biography

Hermin Sulistyarti has completed her Ph.D. from La Trobe University, Australia and postdoctoral studies from University of Melbourne, Australia. She has been teaching at University of Brawijaya Malang, Indonesia since 1988 and appointed as head of Post Graduate Chemistry Study Program in 2009. She has published several papers in reputed journals and currently, she is a leader of "Central Low Cost & Automated Method and Instrumentation Analysis" University of Brawijaya Malang, and collaborates with Analytical Chemistry University of Melbourne.

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