THESIS APPROVAL

GRADUATE SCHOOL, KASETSART UNIVERSITY

Master of Science (Chemistry)
DEGREE

Chemistry
FIELD

Chemistry
DEPARTMENT

TITLE: Analysis of Arsenic in Ground Water Samples Using Voltammetry

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THESIS

ANALYSIS OF ARSENIC IN GROUND WATER SAMPLES USING VOLTAMMETRY

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A Thesis Submitted in Partial Fulfillment of
the Requirements for the Degree of
Master of Science (Chemistry)
Graduate School, Kasetsart University
2006

ISBN 974-16-1886-7

Sureeporn Aemaot 2006: Analysis of Arsenic in Ground Water
Samples Using Voltammetry. Master of Science (Chemistry),
Major Field: Chemistry, Department of Chemistry.
Thesis Advisor: Associate Professor Pakawadee Sutthivaiyakit, Ph.D.
76 pages.
ISBN 974-16-1886-7

The contamination of ground water with arsenic has been reported in many parts of the world, including Ron Piboon District, Nakhon Si Thammarat Province, Thailand. The excessive intake of arsenic compounds particularly the trivalent form eventually can damage DNA directly.

The purpose of this research was to develop a sensitive and accurate anodic stripping voltammetry method (ASV) at a gold electrode, to determine trace level of arsenic(III) in ground water samples. Arsenic(III) is determined at a deposition potential of -0.2 V vs Ag/AgCl, deposition time of 180 s, scan rate of 80 mVs^{-1} and modulation amplitude of 0.1 V. An artificial neural network (ANN) was utilized for the analysis of voltammogram data. A two layer back-propagation network was used with hyperbolic tangent transfer function. The learning rate and the momentum rate were 0.4 and 0.25, respectively. This neural network was trained with a maximum number of epochs equal to 8000. The linear calibration curve of pure arsenic(III) was obtained in concentration range between 0.25 and 50 ppb with correlation coefficient of 0.9998. Relative standard deviation at 5 ppb was 3% (n=10) and the limit of detection was 0.25 ppb which was lower than the maximum contaminant level(MCL) of EPA permit for dissolved arsenic in drinking water (10 ppb).

This proposed method was applied to determine arsenic(III) in ground water samples collected from Ron Piboon District, Nakhon Si Thammarat Province without elimination of the interferences. The results obtained from integrated ASV and ANN agree very well with those obtained from HG-AAS (EPA method 1632).

Student's signature Thesis Advisor's signature ___ / ___ / ___

ACKNOWLEDGEMENTS

I wish to express my sincere gratitude to my advisor, Associate Professor. Dr. Pakawadee Sutthivaiyakit for her valuable guidance, inspiration, supervision and encouragement throughout the course of my postgraduate study.

I am deeply grateful to Mrs.Saijai Charnsethikul, Assistant Professor Chongkolnee Kaewsriprakai and Assistant Professor. Dr. Amornrat Promboon for their valuable suggestions as thesis committee.

I would like to thank the Department of Chemistry and its staff, Faculty of Science, Kasetsart University for making this research program possible.

Financial support from Postgraduate Education and Research Program in Chemistry (PERCH) are gratefully acknowledged.

Finally, I would like to thank my family and friends for their encouragement and understanding.

Sureeporn Aemaot
May 2006