Annual Report

2013-2014

Institute of National Analytical Research and Service (INARS)

Research & Dvelopment (R&D) Activities

Institute of National Analytical Research and Service (INARS)

Institute of National Analytical Research and Service (INARS) provide analytical services alongside its research activities. Major Field of research activities of the Institutes are Analytical Chemistry, Environmental Sciences and Natural Products Chemistry. The scientists of the Institute are also engaged in Medicinal Plant research for standardization of herbal drug preparation and formulation, Method development, Method validation and expansion of analytical scope for accreditation. To fulfill the international and national regulatory, trade and export requirement from importing markets under WTO agreements all the testing laboratories should have accreditation certification as per international standards ISO/IEC 17025:2005. To meet these requirements INARS earned ISO/IEC 17025:2005 standard accreditation certificate on thirty four (34) water quality parameters by National Accreditation Board for Testing and Calibration Laboratories (NABL), India. The ultimate objective of this Institute to contribute to growth of industrialization and reduction of poverty by assisting trade, export import business with reliable, accurate and traceable testing service as well as conformity assessment infrastructure support service for the development, strengthening and diversification of production and export base of Bangladesh.

Bangladesh Council of Scientific and Industrial Research (BCSIR) are mandated by the Government of Bangladesh to verify /reject performance claims of Arsenic Removal Technologies (ART). This mandate allows no ART to be sold in Bangladesh without verification of its performance claims by BCSIR. ARD/INARS scientist acquired verification/rejection performance claims of Arsenic Removal Technology (ART) through Canadian International Development Agency (CIDA) funded ETV-AM and BETV-SAM project and verify/rejects performance claims of Arsenic Removal Technologies (ART). INARS conducts Inter-laboratory Comparison/round robin of four water quality parameter (Iron, Manganese, Arsenic and Phosphate) test.

Major Activities of the Institute

- To conduct Research and Development (R & D) in Analytical Chemistry, Environmental Chemistry, Natural Products Chemistry.
- Implement and maintain a quality system that is documented and incorporates adequate review, audit and internal quality control
- Adequately train, supervise and demonstrate continuing proficiency of the persons within the laboratory to carry out assigned activities
- Select and validate appropriate test methods and related work instructions and incorporate adequate quality control of the methods

- Produce traceable results supported by a system of measurement traceable to the SI through an NMI with uncertainties appropriate to requirement
- To participate in Proficiency Test (PT) for particular parameters and organize inter laboratory comparison (round-robin) services with an aim of obtaining accreditation as a PT provider.
- To conduct research and development (R & D) in Analytical Sciences and develop new methodology.
- To conduct Instrument training programme to developed skilled personnel to use the state of Art Equipments.

1. Development of Digital Arsenic Field Test Kit.

Dr. Nasim Sultana, , Md. Aminul Ahsan, , Masudur Rahman, Shajahan Siraj, Shamim Ahmed, Md. Shahariar Bashar, Md. Abdullah Al-Mansur, Ahedul Akbor, Ms. Samia Tabassum, Md. Saidul Islam, Md. Tofazzol Hossain.

Introduction: Bangladesh is most densely populated country in the world. More than 90 percent of the people of Bangladesh are drinking groundwater. But in 1993 for the first time naturally-occurring arsenic contaminated water was detected in Bangladesh. The arsenic hazard in Bangladesh villagers now appeared as a disaster affecting thousands physically, physiologically, mentally and economically; it is intensifying malnutrition, poverty and destitution among the poor villagers. Arsenic in drinking water causes cancer and serious skin problems. So testing and avoiding or filtering arsenic contaminated water is only prevention way.

Objective:

- To invent an arsenic kit which will be used to test the presence or absence of arsenic in water.
- To keep this in low cost range as it becomes easy to use for people.

Work Progress: An electric circuit has been developed which can detect the presence of Arsenic. Work is going on for further development. A patent has been submitted to the Department of Patents, Designs and Trademarks, Ministry of Industries, 91, Motijheel C/A, Dhaka-1000.

2. Production of Mineral Water

Dr. Nasim Sultana, Dr. Mohammad Mosatfa. Md. Aminul Ahsan, Shajahan Siraj, Shamim Ahmed, Md. Abdullah Al-Mansur, Shakila Akter, Md. Ahedul Akbar, Md. Mamunur Rashid, Md. Majedul Haque

Objective:

- To develop a process for production of safe drinking water.
- To develop a mineral kit for production of mineral water.
- To evaluate the methods used for safe drinking water production.

Work Progress: A mineral kit (mixer of nutrients essential for human) has been made from raw materials. Mineral water has been made by the prepared mineral kit. The stability of mineral water has been completed. Microbial work is under processing. A process will be submitted soon.

3. Arsenic Removal Technology Verification

Dr. Nasim Sultana, Dr. Mohammad Mosatfa. Md. Aminul Ahsan, Shajahan Siraj, Shamim Ahmed, Md. Abdullah Al-Mansur, Shakila Akter, Md. Ahedul Akbar, Md. Mamunur Rashid, Md. Majedul Haque

Objective:

- To verify the performance claims of Arsenic removal technologies relating to production of arsenic safe drinking water from Arsenic contaminated ground water.

Progress: 14 (Fourteen) Arsenic Removal Technologies (ART) have been verified and Six of them certified for marketing.

4. Fingerprint Analysis of some selected Bangladeshi Medicinal Plants using TLC, HPLC AND LC-MS Profiling

Dr. *Nasim Sultana,* Dr Mohammad Mostafa, *Shamim Ahmed, Shakila Akter and Mohammad Majedul Haque*

Objective:

- To study some medicinal plants such as *Adhatoda vasica, Andrographis paniculata, Albizia lebbeck, Asparagus racemonus, Centella asiatica* etc which are commonly used in herbal industries as herbal medicines and herbal preparations in our country.
- To develop chemical profiling of the herbal extracts, which will ensure herbal identity and improve the quality of plant-based products.

Work Progress:

Four medicinal plants Adhatoda *vasica, Andrographis paniculata, Asparagus racemonus and Withania somnifera* herbal monograph has been completed. The chemical profiling, Botanical identification, Microscopic identification, Physico-chemical parameters, heavy metal, pesticides residue, anti-oxidant, anti-microbial and phytochemical works on these four medicinal plants have been completed.

New R&D project of INRAS (2014-15)

1. Development of process for herbal hair tonic from Sheuli Flower (*Nyctanthes arbor-tristis* Linn.)

Ms. Katrun Nada, Dr. Nasim Sultana, Md. Majedul Haque

Work progress: Literature survey has been completed. Research work is going on.

2. Development of Validation of analytical methods for the determination of vitamins in medicinal and dietary products

Dr. Nasim Sultana, Dr. Mohammad Mosatfa. Md. Aminul Ahsan, Md. Abdullah Al-Mansur

Work progress: Literature survey has been completed. Research work is going on.

Achievements:

The achievements of the Institute as follows;

- INARS/Analytical Research Division was the 1st government organization that was earned ISO/IEC 17025 standard accreditation certificate by National Accreditation Board for Testing and Calibration Laboratories (NABL), India in 2009. INARS earned/renewed ISO/IEC 17025 standard accreditation certificate on thirty four (34) water quality parameters by NABL, India.
- The Institute of National Analytical Research and Service, BCSIR has got ISO/IEC 17025 standard accreditation certificate on eleven (11) water quality parameters in June 2012 by Bangladesh Accreditation Board (BAB).
- The INARS provide testing services alongside its research activities. Customers are mostly from Bangladeshi industries, different government departments / organizations / institutions, donor governments and NGOs. The scientists and technicians of INARS render their service to solve 931 industrial and analytical adhoc problems.
- Scientists of INARS were supervised 12 M.Sc, 1M.Phil and 7 PhD students during the financial year.
- 10 (ten) research articles published in National and International journal during the period of 2013-2014.
- Bangladesh Council of Scientific and Industrial Research (BCSIR) are mandated by the Government of Bangladesh to verify /reject performance claims of Arsenic Removal Technologies (ART). This mandate allows no ART to be sold in Bangladesh without verification of its performance claims by BCSIR. ARD/INARS acquired verification/rejection performance claims of Arsenic Removal Technology (ART) through Canadian International Development Agency (CIDA) funded ETV-AM and BETV-SAM project. ARD/INARS scientist verified 14 (fourteen) Arsenic Removal Technologies (ART) and six of them certified for marketing.
- ARD/INARS conducted 7th Inter-laboratory Comparison/round robin of four water quality parameter (Iron, Manganese, Arsenic and Phosphate) test with the aim of obtaining accreditations as Service Provider Proficiency Testing (PT).

Publications

Scientific Papers Published in National & International Journal

1. M.T.I Chowdhury., M.A razzaque., Nasim Sultana., S.S.B. Mustafiz.,Sakila Akter., Ayesha Akter., and J.A Mahmud., Chlorinated Pesticides Residue Status in Some Winter Vegetables. International Journal of Agriculture and Crop Sciences, IJACS/2013/6-11/667-675.
2. Halima Momtaz., F. Alam., M. A. Ahsan.,A.K.M.R. Alam., N. Sultana., S. Siraj.,M.A. Akbor and M.M. Rashid, Treatment of metal-containing effluents from textile-dyeing industries by macrophytes to improve surface water treatment systems. *Bangladesh J. Sci. Ind. Res..*, 48 (2), 89-96, 2013
3. M. Mostafa., Hemayet Hossain., M. Mahmudul Hasan., M. Anwar Hossain and Sahana Parveen., Antibacterial activity of six medicinal plants used in traditional medicine growing in Bangladesh. International Journal of Pharmaceutical Sciences and Research 5(6), 2210-2215, (2014)
4. Akhtaruzzaman Chowdhury, Md. Ashraful Alam, Ridwan Bin Rashid, Md. Abdullah Al-Mansur, Mohammad S Rahman and Mohammad A RashidS., Steriods and Triterpenoids from Corypha taliera Roxb: A critically Endangered Palm Species of Bangladesh. Research Journal of Medicinal Plant 7 (2): 125-129, (2013
5. Taslima Akter., M. Mahboob Ali Siddiqi., M A.Al-Mansur., M H Shorab., A M Sarwaruddin Chowdhury and C M Hasan., Four Compounds isolated from Polygonum lanatum Roxb. Dhaka Univ. J.Sci. 61(2): 213-214, (2013)
6. Taslima Akter., M. Mahboob Ali Siddiqi., M A Al-Mansur., M H Shorab., A F M Mustafizur rahamn., C M Hasan and A M Sarwaruddin Chowdhury., New Diarylheptanoid from Garuga pinnata Roxb. Dhaka Univ. J.Sci. 61(2): 131-134, (2013)
7. Hemayet Hossain., Abdullah Al-Mansur., Sanjida Akter., Umme Sara, Md Ranzu Ahmed and Abu Anis Jahangir., Evaluation of Anti-inflammatory activity and total tannin content from the leaves of Bacopa monnieri Linn. International Journal of Pharmaceutical Sciences and Research 5(4), 1246-1252, (2014)
8. Badrun Neher, Md Abdul gafur, Md Abdullah Al-Mansur., Md Mahbubur Rahman Bhuiyan, Md Rakibul Qadir and farid Ahmed., Investigation of the Surface Morphology and Structural Characterization of Palm Fiber Reinforced Acrylonitrile Butadiene Styrene (PF-ABS) Composites. Material Science and Application, 5, 374-386, (2014)

9. Sakila Akter., Nasim Sultana., M. Aminul Ahsan., Shamim ahmed., Md. Ahedul Akbor., Md. Majedul Haque., Md. N. Ahmed.m, Md. Shariful Islam and Md. Nur Hossain., Seasonal variation of some physic-chemical properties of River water around Dhaka city. Jahangirnagar University of Journal Sciences., 36 (2), 93-104, (2013)
10. M. M. Haque., M. Aminul Ahsan., Md. Ahedul Akbor. M.M Rashid and Nasim Sultana., Phytochemical screening of some Bangladeshi medicinal plants. BJSIR., 48(3), 193-196, (2013)

Training /Seminar/ Symposium/Workshop /Conference/Exibition

1. Dr. Nasim Sultana and Shamim Ahmed has successfully completed "Operation, Mainatainaance and Troubleshooting on Total nitrogen Analyzer" held on 07-13 July, 2013, Milan, Italy.
2. Dr Nasim Sultana and Shamim Ahmed has conducted in-house training programme on NMR at BCSIR during 25-26 June 2014.
3. Dr Mohammad Mostafa, Ahedul Akbor, and Shamim Ahmed has successfully completed a "Assessor Training Course on ISO/IEC 17021:2011 & 17065:2012" held on 17-21 November, 2013 Dhaka organized by the Bangladesh Accreditation Board (BAB) and Norwegian Accreditation NA).
4. Md. Ahedul Akbor and Shamim Ahmed has conducted in-house training programme on GC and GC-MS at BCSIR during 18-20 February 2014.
5. Md. Ahedul Akbor and Sakila Akter has conducted in-house training programme on UV-Vis Spectroscopy at BCSIR during 18-19 December, 2013
6. Md. Ahedul Akbor has participated in-house training programme on NMR at BCSIR during 25-26 June 2014.

Guidance to Research Work (Ph.D/M.Phil/M.S/NCST & BCSIR Fellow

1. Dr. Nasim Sultana supervised Ph.D research works of Brazendra Nath Sarkar, Student of Department of Chemistry, National University on "Chemical Investigation & Biological activity studies of some Medicinal plants" (Ph.D Awarded).

2. Dr. Nasim Sultana supervised Ph.D research works of Mohammad Emdadul Islam, Student of Department of Chemistry, National University on "Chemical Investigation & Biological activity studies of some Medicinal plants" (Ph.D Awarded).

3. Dr. Nasim Sultana supervised Ph.D research works of Musfeks-in-Saleheen, Department of Chemistry, Jahangirnagar University, Saver, Dhaka on "Phytochemical and biochemical studies on Anethum sowal root".

4. Dr. Nasim Sultana supervised Ph.D research works of Shaheen Aziz, Department of Chemistry, Jahangirnagar University, Saver, Dhaka on "Isolation, characterization and bioactivity study of the flowers of Catharanthus rosus (Nayantara) ".

5. Dr. Nasim Sultana supervised Ph.D research works of Ahedul Akbor, Department of Chemistry, Jahangirnagar University, Saver, Dhaka on "Assessment of seasonal variation of organic pollutants near to the Industrial area of Buriganga & remidation of organic pollutants from contaminated water ".

6. Dr. Nasim Sultana supervised Ph.D research works of Md Abdullah Al Mansur, Department of Chemistry, Jahangirnagar University, Saver, Dhaka on "Isolation and characterization of bioactive compounds from some selected medicinal plants of Bangladesh".

7. Dr. Nasim Sultana supervised Ph.D research works of Mohammad Majedul Haque, Department of Chemistry, Jahangirnagar University, Saver, Dhaka on "Phytochemical and Fingerprint analysis of some Bangladeshi medicinal plants".

8. Dr. Nasim Sultana supervised M.Phil research works of Md. Ariful Islam, Department of Chemistry, BUET, Dhaka on "Phytochemical and biological studies of the roots of Hemidusmas indicus (Anantamul).

9. Dr. Nasim Sultana and Shamim Ahmed supervised MS research works of Anamika Saha, Department of Chemistry, University of Dhaka on "Phytochemical and biological studies of the roots of Hemidusmas indicus (Anantamul)".

10. Dr. Nasim Sultana and Shamim Ahmed supervised MS research works of Jerin Sultana, Department of Chemistry, University of Dhaka on "Phytochemical investigation and biological studies of the bark of Albizia lebeck (Shirish)".

11. Dr. Nasim Sultana and Shamim Ahmed supervised MS research works of Sanchita Pal, Department of Chemistry, Jaganath University on "Isolation of bioactive compounds and identification of heavy metals from the root of Hemidusmas indicus (Anantamul)".

12. Dr Mohammad Mostafa supervised MS thesis works of Samsul Arafin, Department of Applied Chemistry and Chemical Engineering, University of Dhaka, Dhaka-1000 on "Chemical and biological investigation on *Cucumis sativus*".

13. Md. Aminul Ahsan supervised M.Sc thesis work of Shahina Akter Moni, Department of Geology and Mining, University of Rajshahi on " Waste water impact of groundwater: Cl/Br ratio and implication of arsenic pollution in Rajarhat, Kurigram, Bangladesh".

14. Md. Aminul Ahsan supervised M.Sc thesis work of Md Ripaj Uddin, Department of Chemistry, National University on "Environmental degradation of the Karnafully River Estuarine water, Chittagong".

15. Md. Aminul Ahsan supervised M.Sc thesis work of Riyadh Hossen Bhuyan, Department of Chemistry, National University on "Study of the pollution status of some major canals in the densely populated Megacity, Chittagong".

16. Md. Aminul Ahsan supervised M.Sc thesis work of Md Aminul Islam, Department of Chemistry, National University on " Physio-chemical Assessment of Water quality parameters with special reference to heavy metals concentration in the sediments of the Karnafully River Estuary , Chittagong".

17. Md. Aminul Ahsan and Md. Ahedul Akbor supervised M.Sc thesis work of Rezuana Afrin, Department of Environmental Science and Resource Mnagement, Mawlana Bhashani Science and Technology University, Santosh, Tangail-1902 on "Analysis of Bio-accumulation of heavy metals in fish in the Turag River".

18. Md. Aminul Ahsan and Md. Ahedul Akbor supervised M. Sc thesis work of Farzana Islam, Department of Environmental Science and Resource Mnagement, Mawlana Bhashani Science and Technology University, Santosh, Tangail-1902 on "Investigation of Heavy metals pn Cultured Fishes of Some selected ponds at Santosh region, Tangail".

19. Md. Ahedul Akbor supervised M. Sc thesis work of Mehidi Hasan, Department of Biotechnology and Genetic Engeering, University of Khulna on "Study of Fermentation behavior and process optimization of Sacromyces cervisiae using chemostat".

20. Dr Nasim Sultana and Md. Ahedul Akbor supervised M.Sc thesis work of Pinto Chandra Das, Department of Chemistry, Jaganath University on "Determination of Volatile Organic Compounds, Normal Saturated and polycyclic Aromatic Hydrocarbons in the water and sediment of Shitolokkha river".

Number of Analytical (Ad-Hoc) Problem Solved

Name of the Division	Routine type	Research type
Institute of National Analytical Research and Service (INARS)	931	320