



INSTITUTE OF CHEMISTRY CEYLON  
COLLEGE OF CHEMICAL SCIENCES



# TENTH ANNUAL UNDERGRADUATE RESEARCH SESSIONS

2015/2016

**Chief Guest - Prof. K.M Nalin De Silva**

Science team leader, Sri Lanka Institute of Nano Technology  
(SLINTEC), Sri Lanka.

**Coordinator - Dr. Chinthaka Ratnaweera**

**5<sup>th</sup> and 6<sup>th</sup> of August 2016**  
**PPGL Siriwardana Auditorium**  
**Adamantane House**  
**Rajagiriya**

# Undergraduate Research Presentations 2016

5<sup>th</sup> August 2016

Venue: PPGL Siriwardene Auditorium

|                 |   |
|-----------------|---|
| <b>9.30 am</b>  | Welcome address by the<br><b>Dean, Prof. P. A. Paranagama</b>   |
| <b>9.35 am</b>  | <b>“Technical Textiles and Smart Textiles”</b><br>Address by the Chief Guest <b>Prof. K. M. Nalin de Silva</b><br>Science Team Leader, Sri Lanka Institute of Nanotechnology (SLINTEC), Sri Lanka |
| <b>10.05 am</b> | Announcement of rules and guidelines to the presenters and audience<br><b>Dr C. N. Ratnaweera</b>   |
| <b>10.10 am</b> | <b>TEA BREAK</b>  |

## Session 1

Moderator - MsPabasaraGamage

Panel: Prof P A Paranagama, Prof SukumalWimalasena, Dr.DinaraGuneseekara, Dr. DinushaUdakala,  
Dr.RanmalGunathilake, Dr.UdayaJayasundara

|          | Time            | Student Name       | Index No. | Supervisor                        | Title  |
|----------|-----------------|--------------------|-----------|-----------------------------------|--|
| <b>1</b> | <b>10.30 am</b> | S. Perera          | 3901      | Dr. D. Gunasekara                 | Development of pullulan based nano particle in gene delivery   |
| <b>2</b> | <b>10.50 am</b> | D. V. C. Dilanka   | 3881      | Mr. E. G. Somapala                | Analysis of heavy metal content of lotus and kohila and their effect in cooking  |
| <b>3</b> | <b>11.10 am</b> | M. P. M. Cooray    | 3823      | Prof. Paranagama<br>Dr. T. Gobika | Insecticidal properties of secondary metabolites produced by an endolichenic Fungus, <i>Penicilliumphinophilum</i> against stored grain insect pests, <i>Callosobruchusmaculatus</i> . |
| <b>4</b> | <b>11.30 am</b> | A. Karannagoda     | 3868      | Dr. R. Kandiah                    | Determination of Variation of Properties of <i>Micromelumminutum</i> Fruit after it has been plucked   |
| <b>5</b> | <b>11.50 am</b> | Y. Wickramasinghe  | 3962      | Dr. L. Arambewela                 | Comparison of the volatile constituents of the essential oils & absolutes of two Nymphaea Species found in Sri Lanka   |
| <b>6</b> | <b>12.10 am</b> | P. D. T. Peramuna  | 3992      | Prof. Paranagama<br>Dr. T. Gobika | Determination of bioactive compounds from <i>Piper langum</i>  |
|          | <b>12.30 am</b> | <b>LUNCH BREAK</b> |           |                                   |  |

## Session 2

Moderator: Ms. Anoosheya Kuganesan

Panel: DrChandani Udawatta, Prof S. A. Deraniyagala, Prof .H.D. G. Gunawardhana, Dr. M. Infas, Prof Pathirathne,  
D.Dinusha Udakala

|          |                |                    |      |  |   |
|----------|----------------|--------------------|------|--|---|
| <b>7</b> | <b>1.30 pm</b> | H. Atapattu        | 3974 | Prof. M. D. P. Costa                                   | Analysis of Lead and Cadmium and some quality parameters in soap available in the Sri Lankan market |
| <b>8</b> | <b>1.40 pm</b> | H. M. H. Bandusena | 3816 | Dr. C. Udawatte<br>Dr. K. Pathirage<br>Mr. D. Fernando | Analysis of metal ion levels in Ashwagandha and Thripala Ayurveda powdered drugs in Sri             |

|    |         |                           |      |                                    |   |
|----|---------|---------------------------|------|------------------------------------|---|
|    |         |                           |      |                                    | Lankan herbal market  |
| 9  | 2.00 pm | M. Thanaventhan           | 3945 | Prof. Paranagama<br>Dr. R. Kandiah | Determination of antioxidant activities in stem & leaf of Indian borage ( <i>Plectranthusamboinicus</i> )                           |
| 10 | 2.20 pm | A. A. T. L. Amarasinghe   | 3997 | Dr. R. Kandiah<br>Mr C Navarathne  | Status of toxic elements ( Cadmium, Chromium & Lead) in commercially available energy drinks; a preliminary study                   |
| 11 | 2.40 pm | C. Weththasinghe          | 3956 | Prof. Paranagama<br>Dr. T. Gobika  | Determination of semiochemicals in <i>Grilicidasepium</i> on the behavior of low country wood termite <i>Glyptotermisdialatatus</i> |
|    | 3.10 pm | <b>TEA BREAK</b>          |      |                                    |   |
| 12 | 3.20 pm | A. M. R. Chamara          | 3196 | Prof. Paranagama<br>Dr. T. Gobika  | Antibacterial properties of endolichenic fungus <i>Daldiniaescholzii</i> isolated from parmotrema sp. from Hakgala forest           |
| 13 | 3.40 pm | G. M. G. S. Chathurangani | 3821 | Prof. K A S<br>Pathirathne         | Contents of several selected heavy metals in randomly selected rice varieties from Anuradhapura district                            |
| 14 | 4.00 pm | A. Balachandran           | 3813 | Dr. C. Udawatte                    | Comparative studies of untreated saw dust as low cost natural adsorbent for removal of Cd(II) from aqueous solutions                |
| 15 | 4.20 pm | W. W. Vidura              | 3995 | Dr. U. S.<br>Weliwegamage          | Adsorption of heavy metals ( Cu <sup>2+</sup> & Pb <sup>2+</sup> ) by clay  |

6<sup>th</sup> August 2016

Session 3

Moderator: Mr. Chanaka Navarathna

Panel: Dr C. N. Ratnaweera, Prof O. A. Illeperuma, Dr L. Weerasinghe, Prof M. P. de Costa, Dr S. Weliwegama

|    | Time     | Name             | Index no | Supervisors              | Title  |
|----|----------|------------------|----------|--------------------------|--|
| 16 | 9.10 am  | C. Perera        | 3984     | Prof. M. D. P. De. Costa | Analysis of fluoride in toothpaste and the factors affecting the loss of bio available fluorides in toothpaste               |
| 17 | 9.30 am  | M. Goonathilake  | 3987     | Dr. M. Infas             | Structural rearrangement of a Zeolite like Metal Organic Framework to a Metal Organic Cube                                   |
| 18 | 9.50 am  | A. Sourjah       | 3941     | Dr. L. Arambewela        | Phytochemical screening and investigation of fermentation process in herbal wine using <i>W. fruticosagrown</i> in Sri Lanka |
| 19 | 10.10 am | R. Silva         | 3938     | Dr. Infas                | Synthesis and characterization of RHO-ZMOF and its viability towards an efficient drug delivery                              |
|    | 10.30 am | <b>TEA BREAK</b> |          |                          |  |
| 20 | 10.40 am | S. D. C.         | 4001     | Prof. Paranagama         | Determination of physiochemical  |

|  |          |                       |      |                                    |   |
|--|----------|-----------------------|------|------------------------------------|---|
|  |          | Rathnayake            |      | Dr. T. Gobika                      | properties of hybrid mango variety in Sri Lanka   |
| 21   | 11.00 am | Y. M. P. K. Madushani | 3882 | Prof. K A S Pathirathne            | A study on dissolution of Aluminium in cooking utensils under selected control conditions                                 |
| 22   | 11.20 am | J. Gopalpillai        | 4004 | Dr. R. Parthipan<br>Dr. R. Kandiah | Analysis of chemical composition of renal stones  |
| 23   | 11.40 am | K. R. K. Purasinhala  | 3909 | Prof. K A S Pathirathne            | Use of plant extracts for controlling of corrosion of copper in 1M HCl solution   |
| 24   | 12.00 am | S. Ariyarathna        | 3807 | Prof. K A S Pathirathne            | Development of an anodic stripping voltammetry methodology for determination of lead and cadmium in rice                  |
|  | 12.20 pm | <b>LUNCH BREAK</b>    |      |                                    |   |
| <b>Session 4</b><br><b>Moderator:</b> Ms Thathsarani Piumika<br><b>Panel :</b> Prof O. A. Illeperuma, DrUdaya Jayasundara, Mr E.G. Somapala, Dr M. Infas,<br>Dr C. N. Ratnaweera |          |                       |      |                                    |   |
| 25   | 1.10 pm  | A. A. S. V. Fernando  | 3843 | Prof. M. D. P. De. Costa           | Finding out a substitute for <i>Gyrinopswalla</i> and production of a cologne   |
| 26   | 1.30 pm  | U. Bopitiya           | 3818 | Dr. Infas<br>Dr. Parthipan         | Synthesis and characterization of zeolite   |
| 27   | 2.10 pm  | T.A. Gamagedara       | 3849 | Dr. R. Kandiah                     | Comparison and analysis of electrolyte content in sports drinks vs fruit juice  |
| 28   | 2.50 pm  | F. S. Nazim           | 3893 | Dr. C. Udawatte                    | Examination of fluorescent metallochromic and pH indicator properties of <i>Garciniagummi-gutta</i> (goraka) leaf extract |
| 29   | 3.10 pm  | D. R. H.Saparamadu    | 3986 | Dr. U. S.Weliwegamage              | Kitchen waste water purification using natural adsorption materials   |

## **Welcome Address**

**Prof. Priyani A. Paranagama**

**The Dean**

**College of Chemical Sciences**

It is with great pleasure that I write this message for the Annual Undergraduate Research Symposium of the College of Chemical Sciences, Institute of Chemistry Ceylon. This is a brilliant opportunity for our undergraduate research students who have completed their research project under the supervision of the internal academic staff members, outside experts from state universities, research institutes and the industry with the aim of providing solutions and insight into emergent new challenges in Chemistry and Chemistry related areas. This research symposium will help them to peruse a genuine research culture amongst academia of national and international level. Therefore College of Chemical Sciences takes pleasure in creating a platform to national and international academia to present scholarly work of researchers and to disseminate their views among other scholars at global level.

Research Symposium would have not been possible without the generous support and dedication made by many contributors. I would like to thank Prof. Samitha Deraniyagala, Rector, College of Chemical Sciences and President, Institute of Chemistry Ceylon for their excellent guidance and encouragement. I would also like to extend my sincere thanks to Prof. Nalin de Silva, one of the eminent scientists in Sri Lanka, Principal Scientists from SLINTEC and Senior Professor in Chemistry, University of Colombo for accepting our invitation and being present as the chief guest to deliver the keynote address. I would like to acknowledge, Dr. Chinthka Ranaweera, Coordinator of the Undergraduate Research Symposium for his contribution made in organizing the symposium and I also appreciate the support given by two teaching assistants, Ms. Anosheya Kuganesan and Ms. Pabasara Gamage to organize this event. I wish you all a fruitful research sessions and I wish all the presenters and participants a successful, productive, and memorable day at this symposium.

## **The Keynote Speech**

### **Technical Textiles and Smart Textiles**

**Professor K. M. Nalin de Silva**

*Sri Lanka Institute of Nanotechnology (SLINTEC) and Department of Chemistry,  
University of Colombo, Sri Lanka*

In the face of developing technologies in the world the use of textile as a high technology material has seemed growing in a rapid rate. These textiles to cater high technological area are termed as technical textiles. Newer and more advanced properties are increasingly sought by even general consumers and changes quality of life and changes in climate has catalyzed these demands. Even new fields in textile have emerged over the years, focusing on technical performance properties rather than their aesthetic or attractive character. The textile industry is about to take a giant stride from being a supplier of fabrics to become a positive force in the development of society. Textile innovations improve people's everyday lives and benefit the industry, the health care sector and the environment. Textile research have evolved in many different subject areas and nanotechnology inspired functionalization can play a key role in almost all of these fields. Fabrics that purify water using sun as energy source will be fascinating. It is possible to make clothes that can take an ECG or become cool at extreme temperatures. Smart textiles will revolutionize our lives. With the aim of being one of the leading destinations in globe for catering the high performance textile industry, SLINTEC textile team engages in building expertise and IP through advanced research in Nanotechnology. In addition, the team is also striving to bring practical solutions to sensitive problems faced by the local

textile industry through industry focused research and developments. Textile fiber and fabric modification with nano materials open up number of newer application areas since, the method produces a route to functionalization of conventional materials with favorable properties of nano materials. At SLINTEC, research have been conducted to impart interesting functionalities such as self-cleaning ability, odor removal ability, superhydrophobicity, UV blocking ability, IR reflectivity, moisture management, wearable electronics, etc.

**Abstract:01****DEVELOPMENT OF A PULLULAN BASED NANOPARTICLE IN DRUG DELIVERY**

**S. Perera<sup>1</sup>, D. Welideniya<sup>2</sup>, D.S Gunasekara<sup>2\*</sup>**

<sup>1</sup>*College of Chemical Sciences, Institute of Chemistry, Rajagiriya, Sri Lanka*

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Gene therapy is a strategic treatment for various inherited and acquired diseases. Currently, Infection (viral mediated gene delivery) and Transfection (chemical mediated gene delivery) are the two main methods employed to introduce foreign genetic material into cells. Polyethylenimines (PEI), PAMAM dendrimers, poly-(L-lysine), poly-(lactic-co-glycolic acid) (PLGA), chitosan,  $\beta$ -cyclodextrin( $\beta$ -CD) oligomers and CD polyrotaxanes are few of the cationic polymers which are investigated as non-viral carrier vehicles. Delivery of nucleic acids to target cells via non-viral vectors has an enormous therapeutic potential. Though the efficacy of non-viral vectors is low they still have a considerable attraction due to their facile synthesis and immunogenicity. In this case of study pullulan a natural, biodegradable, water soluble polymer was functionalized and clicked with the acid labile linker. Resulting polymer complex will then be incorporated with positively charged  $\beta$ -CD to result the cationic polymer which is to be a novel therapeutic agent in gene delivery.

Non-viral gene delivery vectors are attractive due to their potential safety and ease of manufacture, but low transfection potency and poor formulation stability have limited their application. Among the numerous materials that have been studied for gene delivery, poly( $\beta$ -amino ester)s (PBAEs) represent one promising class of degradable delivery materials. Here, we develop PBAE terpolymers incorporating hydrophobic alkyl side chains that exhibit significantly enhanced transfection potency and resistance to aggregation. Non-viral gene delivery vectors are attractive due to their potential safety and ease of manufacture, but low transfection potency and poor formulation stability have limited their application. Among the numerous materials that have been studied for gene delivery, poly( $\beta$ -amino ester)s (PBAEs) represent one promising class of degradable delivery materials. Here, we develop PBAE terpolymers incorporating hydrophobic alkyl side chains that exhibit significantly enhanced transfection potency and resistance to aggregation.

**Keywords:** amino  $\beta$ -CD, gene therapy, non-viral vectors, cationic polymer

**Abstract:02****ANALYSIS OF THE HEAVY METAL CONTENT OF LOTUS (*Nelumbonucifera*) AND KOHILA (*Lasiaspinoso*) AND THEIR EFFECT IN COOKING****D.V.C.D Madushani, E.GSomapala\***<sup>1</sup>*College of Chemical Sciences, Institute of Chemistry, Rajagiriya, Sri Lanka.*<sup>\*</sup>*eg\_somapala@yahoo.com*

Intake of heavy metal contaminated vegetables poses a major risk to human health. Thus, the concentration of Cadmium (Cd), Copper(Cu), Lead(Pb) and Zinc(Zn) of two different aquatic vegetables; Kohila (*Lasiaspinoso*), and Lotus (*Nelumbonucifera*) collected from different areas which belong to dry zone, intermediate zone and wet zone of Sri Lanka, was analyzed using flame atomic absorption spectrometry(Hitachi ZA 3000 Polarized Zeeman). Further, the leached out concentration of those heavy metals during cooking of the vegetables also studied and compared with the values obtained for raw samples. The average contents of heavy metals detected in Kohila ranged from 0.08-1.20, 15.56-58.33, 14.44-410.00 mg kg<sup>-1</sup>for Cd, Cu and Zn respectively. For Lotus the average contents of heavy metals ranged from 0.06-0.10, 27.50-63.33, 7.22-46.11 mg kg<sup>-1</sup>for Cd, Cu and Zn respectively. The mean concentrations of heavy metals which leached out to the cooked medium during cooking were negligible when compared with the heavy metal concentrations of raw samples of Kohila and Lotus. Therefore cooking has no significant effect on reducing the heavy metal contents of above vegetables. In addition the mean concentrations of metals in Kohila and Lotus were found in the order of their abundance as Zn>Cu>Cd and Cu>Zn>Cd respectively. Pb was not detected. It was also found that the Cd and Zn levels of Kohila exceeded the maximum permissible limits set by World Health Organization for human consumption and mean concentrations of Cd, Cu and Zn of Lotus were below the maximum permissible limits. Thus the study highlights that long term consumption of Kohila may possibly cause various health hazards in human. Also the consumption of Lotus may not have significant effect on human health.

**Keywords:** Heavy metals, Kohila, Lotus, cooking**Abstract:03****INSECTICIDAL PROPERTIES OF SECONDARY METABOLITES PRODUCED BY AN ENDOLICHENIC FUNGUS, *Penicillium pinophilum* AGAINST STORED GRAIN INSECT PESTS, *Callosobruchus maculatus*.****M.P.M. Cooray<sup>1</sup>, T. Gobika<sup>1</sup>, Prof. P.A. Paranagama<sup>1,2\*</sup>**<sup>1</sup>*College of Chemical Sciences, Institute of Chemistry, Rajagiriya, Sri Lanka*<sup>2</sup>*Department of Chemistry, Faculty of Science, University of Kelaniya, Sri Lanka*<sup>\*</sup>*priyani@kln.ac.lk*

Fungi produce secondary metabolites with insecticidal properties. This research was carried out to elucidate the insecticidal activity from the isolation of secondary metabolites in fungus, *Penicillium pinophilum* and their toxicity against cowpea weevil, *Callosobruchus maculatus*. Pure fungi cultures were grown in small scale on PDA for two weeks. The fungi grown on PDA were used for further investigations and grown in large scale. After extracted to EtOAc and isolated bioactive compounds. The bioactive EtOAc extracts were partitioned with hexane, CHCl<sub>3</sub> and 50 % MeOH and bioactivity of the three fractions (hexane fraction, chloroform fraction and 50 % MeOH fraction) were evaluated for bioactivity separately using the insecticidal bioassay (Residual Film Bioassay) and anti-inflammatory bioassay (Heat Induced Human Red Blood Cell Bioassay). After bioactive CHCl<sub>3</sub> fraction and its sub-fractions were further purified using column chromatography and preparative TLC respectively. Pure compound 3 isolated from the chloroform extract of

*P. pinophilum* was shown highly % mortality values (lowly LD<sub>50</sub> values) and pure compounds 1, 2 and 3 were shown highly % inhibition values for above bio assays respectively. So results suggest pure compound 3 can be used as bio-insecticide against *C. maculatus* and pure compounds 1, 2 and 3 better than that aspirin as anti-inflammatory drugs.

**Keywords:** insecticidal bioassay, anti-inflammatory bioassay, *P. pinophilum*, *C. maculatus*

**Abstract:04**

**DETERMINATION OF VARIATION OF PROPERTIES OF *Micromelum minutum* FRUIT AFTER IT HAS BEEN PLUCKED**

**A. A. H. Karannagoda<sup>1</sup>, P. A. Paranagama<sup>1,2\*</sup>, R. Kandiah<sup>1</sup>**

<sup>1</sup>*College of Chemical Sciences, Institute of Chemistry, Rajagiriya, Sri Lanka*

<sup>2</sup>*Department of Chemistry, Faculty of Science, University of Kelaniya, Sri Lanka*

*\*priyani@kln.ac.lk*

Ascorbic acid which also known as vitamin C is a non-enzymatic antioxidant which can protect indispensable molecules in human from damage by free radicals and reactive oxygen species. But since vitamin C is water soluble, it cannot be stored in the body and therefore has to be taken by food. The main objective of this research was to determine how vitamin C concentration, antioxidant activity and total phenolic content varies with time and how many compounds present in the fruit. Because by studying these properties we can determine which time period it is convenient to consume high vitamin C content from natural fruits and vegetables after they have been harvested. In order to study these properties fruits of *Micromelum minutum* plant have been chosen. To determine the ascorbic acid concentration variation, *Micromelum minutum* extracts were collected for six weeks from the fruit samples and titrated against Iodine solution. Methanol extracts of fruits of three weeks were subjected to free radical DPPH assay by using ascorbic acid and BHT as the standards. Total phenolic concentration variation was studied by using Folin-Ciocalteu method. A thin layer chromatography was carried out to check the polarity of the compounds which were present in the fruit. From the results obtained it can be concluded that the time period which is more convenient to consume high vitamin C content from natural fruits and vegetables is within the first two weeks after they have been harvested. The total phenolic content of fruit decrease with time and the antioxidant activity of fruit decreases and then tends to increase with time. High number of compounds present in chloroform layer but the yield of the compounds that were dissolved in methanol is higher than the compounds which were dissolved in hexane and chloroform layers.

**Keywords:** *Micromelum minutum* fruit, Vitamin C, Antioxidant activity

**Abstract: 05**

**COMPARISON OF THE VOLATILE CONSTITUENTS OF THE ESSENTIAL OILS AND ABSOLUTES OF TWO NYMPHAEA SPECIES FOUND IN SRI LANKA**

**W.Y.H.Wickramasinghe<sup>1</sup>, Lakshmi Arambewela<sup>1\*</sup>**

<sup>1</sup>*College of Chemical Sciences, Institute of Chemistry, Rajagiriya, Sri Lanka*

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*Nymphaea nouchali* which is an aquatic flowering plant, is native to Sri Lanka. *Nymphaea nouchali* Burm f. (Sky Blue Manel) is the national flower of Sri Lanka. Till recent times many literature erroneously referred to an exotic violet flowered *Nymphaea* (Nil Manel) as the *N. nouchali*. Apart from these two commonly known species another 'Manel' species exists by the name 'Thel-Olu'. The current research is carried out to



inter-relate these three species by their chemical composition. Since research work was carried out in 2014, for the exotic violet flowered *Nymphaea*, only Thel-Olu and Sky Blue Manel are analyzed in this research project. Thin Layer Chromatography of Sky Blue Manel and Thel-Olu was carried out and both have some common compounds.

These two Manel species have morphological differences such as in the flower colors stamen numbers etc. Even though there are morphological differences the GCs of the absolutes and the GC-MSs of the essential oils have many similar compounds though the compositions are not exactly the same. When comparing the GC-MS data of the violet flowered *Nymphaea* with the Thel-Olu and Sky Blue Manel, the violet flowered *Nymphaea* shows differences in volatile constituents, from that of the two Manel species of the current study.

**Keywords:** Sky Blue Manel, Thel-Olu, GC, GC-MS, TLC.

**Abstract:06**

### DETERMINATION OF BIOACTIVE COMPOUNDS OF *Piper longum*

**T.Peramuna<sup>1</sup>, G.Thiripuranathar<sup>1</sup> and P.A.Paranagama<sup>1,2\*</sup>**

<sup>1</sup>College of Chemical Sciences, Institute of Chemistry, Rajagiriya, Sri Lanka

<sup>2</sup>Department of Chemistry, Faculty of Science, University of Kelaniya, Kelaniya, Sri Lanka

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*Piper longum*, popularly known as ‘Thippili’ in Sri Lanka, has been used as a therapeutic agent in the treatment of various pathological conditions. Further it is widely used as a remedy for inflammation in Ayurvedic and Unani systems of medicine. The objective of present study is to investigate phytochemical screening and different bioactivities including DPPH radical scavenging assay, Antibacterial assay and HRBC (Human red blood cell) membrane stabilization assay of different parts of *Piper longum* such as leaf, matured fruit, immature fruit, and stem. The extraction of plant materials was carried out according to two methods including cold extraction and hot extraction. Soxhlet apparatus was used in the hot extraction process and main objective was to evaluate thermally stable compounds. Ethyl acetate was used as the solvent in cold extraction process and methanol was used as the solvent in the process of hot extraction. The results obtained from phytochemical screening and bioactivities depicted that, the plant extracts derived from hot extraction process exhibited comparatively low activities than the bioactivities possessed by plants extracts derived from cold extraction process, due to thermal decomposition. According to the results obtained from phytochemical screening, matured fruit extract obtained from cold extraction process possessed high amount of phenolic and flavonoid content. Leaf and matured fruit extract derived from hot extraction possessed a high amount of phenolic and flavonoid content respectively. The DPPH radical scavenging activity results revealed stem extract obtained from cold extraction and leaf extract obtained from hot extraction showed high radical scavenging activity comparative to other plant extracts. The antimicrobial activity was evaluated using agar well diffusion method. According to the results at the concentration of 10 mg/ml leaf and stem extracts obtained from cold extraction exhibited the antibacterial activity against *Escherichia coli* (ATCC 25922) and *Bacillus subtilis* (MTCC 121). Further, stem and immature fruit extract derived from hot extraction showed inhibition against *Bacillus subtilis* (MTCC 121) at a concentration of 10 mg/ml and none of the extracts showed inhibition against *Staphylococcus aureus* (ATCC 25923). Anti-inflammatory activity of plant extracts was evaluated by HRBC membrane stabilization method. The results obtained from the study depicted that all plant extracts derived from cold extraction and immature fruit extract derived from hot extraction process showed high percentage inhibition activity than the standard drug, Aspirin.

**Keywords:** phenolic content, flavonoid content, antioxidant activity, anti-inflammatory, antibacterial activity

**Abstract:07****ANALYSIS OF LEAD AND CADMIUM AND SOME QUALITY PARAMETERS IN SOAP AVAILABLE IN THE SRI LANKAN MARKET****Harindi Randula Atapattu<sup>1\*</sup>, M D P De Costa<sup>2</sup>**<sup>1</sup>*College of Chemical Sciences, Institute of Chemistry, Rajagiriya, Sri Lanka*<sup>2</sup>*Department of Chemistry, Faculty of Science, University of Colombo, Sri Lanka**\*harindi92@gmail.com*

In this research total of fifteen soaps were analysed from different brands A, B, C, D and E. From each brand three different types bathing soap (X), baby soap (Y) and laundry soap (Z) were selected. The heavy metal content for Cadmium (Cd) and Lead (Pb) were analysed using the Atomic Absorption Spectrophotometer. The goal was to find out if the soaps contained any of the metals mentioned, and if the metals were present then their quantities are within the acceptable limits. Out of the fifteen soaps (AX-EZ) analysed cadmium was present in all the soap samples which were within the allowed limit of 3 ppm. Lead was not present in any of the soap samples analysed. The highest cadmium concentration was obtained in EX. For these samples the quality criteria for different characteristics were analysed. For bathing soaps (X) total fatty matter (TFM), pH, synthetic surface active agents and free caustic alkali content were determined. For baby soaps (Y) quality parameters TFM, freedom from rosin and matter insoluble in ethanol were determined. The quality parameters TFM, matter insoluble in ethanol and free caustic alkali were determined for laundry soaps (Z). For bathing bars highest TFM value of 56.4% was obtained from AX and in baby soaps highest TFM value of 78.1% was obtained from EY. In laundry soap the highest value was obtained from AZ. The other quality parameters that were analysed in bathing soap (X), baby soap (Y) and laundry soap (Z) were found to be within the permissible limits set by the Sri Lanka Standard Institution (SLSI).

**Keywords:** Soap, Lead, Cadmium, Atomic Absorption Spectrophotometer, Quality parameters.**Abstract:08****ANALYSIS OF METAL ION LEVELS IN ASHWAGANDHA AND THIRIPALAAYURVEDA POWDERED DRUGS IN SRI LANKAN HERBAL MARKET****H. M. H. S. Bandusena<sup>1\*</sup>, S.C.D Fernando<sup>1</sup>, P. K. Perera<sup>2</sup>, C.Udawatte<sup>1\*</sup>**<sup>1</sup>*Institute of Chemistry Ceylon, College of Chemical Sciences, Rajagiriya*<sup>2</sup>*Institute of Indigenous Medicine, Rajagiriya**\* chandaniu@hotmail.com*

Over the years, herbal products have been used in various parts of the world for the cure of human disorders. Although herbal products are often considered to be beneficial and free of side effects, there have been reports of acute and chronic toxicity resulting from their use. One of the main causes of toxicity of herbal medicines is the existence of heavy metals. Therefore the main objective of this study is to analyze Ayurvedic powdered drugs, Ashwagandha churna (AC) and Thipala churna (TC) of three different brands available in Sri Lankan herbal market for the quantitative analysis of essential trace and heavy metals. The samples were prepared by wet digestion method using hydrogen peroxide and nitric acid treatment. The presences of metals were analyzed by Flame Atomic Absorption Spectroscopy using a HITACHI ZA3000 Polarized Zeeman Atomic Absorption Spectrometer. The results were compared with the extraneous maximum residue limit recommended by the Food and Agriculture Organization (FAO) /World Health Organization (WHO) for herbal medicines. Lead and cadmium in brand A of AC were not detected in the

samples. However cadmium concentrations in other samples were below the extraneous maximum residue limit. The extraneous maximum residue limits of the FAO/WHO have not been established yet for copper, nickel, chromium and zinc in herbal medicine. The results reveal that among the trace elements zinc (33.25 mg/kg) found in highest amount, but this was below the acceptable daily intake limit (60 mg/day). Chromium was not detected in brand C of AC and TC samples. In conclusion, the quality of herbal churna products sold in Sri Lankan market is safe. However there is need for continuous monitoring of branded herbal churna products sold for human consumption.

**Key words:** Ayurvedic churna, Heavy metals, Trace elements, AAS

**Abstract:09**

### DETERMINATION OF ANTIOXIDANT ACTIVITIES IN STEM AND LEAF EXTRACTS OF INDIAN BORAGE (*Plectranthus amboinicus*)

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Due to undesirable effects of synthetic combinations of many chemicals as food preservatives is one of the problems in food industry which has been proved that each such synthetic compound have potential risk on human health. Therefore investigating and studying the resources of natural antioxidants in order to replace synthetic compounds became necessary. The plant *Plectranthus amboinicus* is known as Country borage in English. The total phenolic content of leaves and stem extracts (ethyl acetate) were found 145.73(±1.61) and 63.46(±2.20) mg GAE/g respectively. The total flavonoid content of leaves and stem extracts (ethyl acetate) were evaluated 116.8(±3.06) and 79.92(±2.84) mg QE/g respectively as they contribute in antioxidant property. The anti-oxidant potential of ethyl acetate extract of leaves and stems of *Plectranthus amboinicus* was investigated by DPPH assay. The anti-oxidant potential of both extracts increased with increasing concentration of extract. When DPPH assay was carried out for the extracts obtained from partition, extract obtained from chloroform was shown its' high antioxidant potential than hexane and methanol.

**Keywords:** *Plectranthus amboinicus*, Antioxidant activity, Total phenolic content, Total flavonoid content.

**Abstract:10**

### STATUS OF TOXIC ELEMENTS (CADMIUM, CHROMIUM AND LEAD) IN COMMERCIALY AVAILABLE ENERGY DRINKS; A PRELIMINARY STUDY

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The total concentration of heavy metals Lead (Pb), Cadmium (Cd) and Chromium (Cr) in commercially available energy drinks were determined by using Flame Atomic Absorption Spectrometry (FAAS). Total concentration of Pb and Cr were determined by FAAS in mg L<sup>-1</sup> range and concentration of Cd level in those samples determined in µg L<sup>-1</sup> level by FAAS using a modified high sensitive method. Digestion of these energy drinks was carried out using Conc.HNO<sub>3</sub> (analytical grade 69%) above a temperature 120°C ± 5 °C on a hot plate for 30 minutes until brown fumes disappeared to give a white fume. Out of the samples analyzed, the highest Pb concentration was found to be 130 µg L<sup>-1</sup> and 75% of the samples were

contaminated with a lead concentration in the range  $\mu\text{g L}^{-1}$ . Out of the latter, 62.5% samples were exceeded maximum contaminant level (MCL)  $15 \mu\text{g L}^{-1}$ . The highest concentration of Cd was found to be  $6.2 \mu\text{g L}^{-1}$ . Even though all samples were contaminated with Cd, only 12.5% of the samples were exceeded the MCL of  $5 \mu\text{g L}^{-1}$ . Cr was not detected in the samples analyzed.

**Keywords:** Lead, cadmium, Chromium, Energy drinks, FAAS

**Abstract:11**

**DETERMINATION OF SEMIOCHEMICALS IN *Gliricidia sepium* ON THE BEHAVIOR OF LOW COUNTRY LIVE WOOD TERMITE *Glyptotermes dilatatus***

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*Gliricidia sepium* grows as a multipurpose tree in many countries, especially in tea and coconut plantation in Sri Lanka. The tree is used as a poison for rodents and flowers and leaves are utilized as food for animals including human being. The present study was aimed to investigate the semiochemicals of *G.sepium* against low country wood termite *Glyptotermes dilatatus* as one of the major pests of low country tea plantation in Sri Lanka and was found that the control of these pests are extremely difficult due to concealed habits. The analysis of *G. sepium* leaves and stems was done to find out the chemical constituents in ethyl acetate extracts of leaves and stems. TLC was performed to find out the above purpose and the results revealed that two major compounds were contained in both leaves and stem of the ethyl acetate extracts. The steam distillation was done to extract the volatile compounds in *G. sepium* leaves and it was resulted that considerable quantity of volatile compounds in leaves than the stems. The feeding effect of *G. sepium* on termites was evaluated using no choice chamber force feeding bioassay and partitioned extracts were used for that purpose. It was revealed that termites are more likely to feed on the stem extracts than the leaves extract and least feeding activity was noticed in negative controller. The highest mortality percentage was resulted in the chloroform stem extract obtained after partitioning of the ethyl acetate extract and the least mortality percentage was resulted in the chloroform extract obtained from leaves with 30 days of time period.

**Keywords:** *Gliricidia sepium*, *Glyptotermes dilatatus*, Semiochemicals

**Abstract:12**

**ANTIBACTERIAL PROPERTIES OF ENDOLICHENIC FUNGUS *Daldinia eschscholzii* ISOLATED FROM *Parmotrema* sp. FROM HAKGALA FOREST.**

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Lichens formed by a symbiotic association of fungi and algae or cyano bacteria, are recently known as hosts for endolichenic fungi that live asymptotically, much the similar way of plant endophytes live in plant

tissues. In this study the endolichenic fungus *Daldinia eschscholzii* occurring in the *Parmotrema* sp. at Hakgala montane forest was investigated for its biological activity. The fungus was grown in 36 large PDA plates and incubated at room temperature for ten days and the secondary metabolites were extracted in to ethyl acetate. The crude extract (RC/01) was then subjected to anti-inflammatory and antibacterial assays. The concentration series of crude extract (0.4 mg/mL – 0.025 mg/mL) showed moderately low anti-inflammatory activity for the HRBCs Membrane Stabilization assay compared with the standard Aspirin used. The RC/01 (10 mg/mL) showed considerable high antibacterial activity against the three bacteria strains used in the Agar Well Diffusion assay compared with the standard positive Azithromycin (0.5 mg/mL) used. Since the antibacterial activity was high the RC/01 was partitioned with hexane, chloroform and 60% methanol to obtain hexane (RC/02), chloroform (RC/03) and methanol (RC/04) fractions respectively and each fraction was evaluated for their antibacterial activities. The antibacterial activities as well as the Minimum Inhibitory Concentrations of each portion were identified using Agar Well Diffusion assay. The RC/03 that showed the highest activity was further fractionated using bio assay guided column chromatography (silica and Sephadex) and preparative TLC to isolate the compounds present in the active sub fraction.

**Key Words:** Agar Well Diffusion method, Antibacterial, Anti-inflammatory, Endolichenic Fungi

**Abstract:13**

### **CONTENTS OF SEVERAL SELECTED HEAVY METALS IN RANDOMLY SELECTED RICE VARIETIES FROM ANURADHAPURA DISTRICT**

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Rice (*Oryza sativa*) is the staple food of Sri Lanka. The per capital consumption per year fluctuate around 100 kg per year. The present study aimed to determine the heavy metal (cadmium, copper, chromium and lead) concentrations in randomly selected twelve rice samples from Anuradhapura district. Anuradhapura district is one of main areas where chronic kidney disease of uncertain origin (CKDu) suspected to cause due to consumption of rice containing some of the above metals above the their safe limits. Twelve rice samples (BG 358 (a), BG 358 (b), BG 300, BG 352 (a), BG 352 (a), BG 352 (b), BG 360, Suwandel (a), Suwandel (b), Pachchaperumal (a), Pachchaperumal (b) and Madathawalu) were collected from Anuradhapura district and microwave digested using HNO<sub>3</sub> and HCl in 9:3 ratios according to US EPA 3052 method. Copper and cadmium were determined using the flame atomic absorption spectrometry. Lead and chromium were determined using graphite furnace atomic absorption spectrometry (Hitachi ZA3000 Zeeman polarized Atomic Absorption Spectrometer). Standard reference samples IRMM-804 RICE FLOUR was analyzed to assess the validity of the methods. The copper or lead could not be detected in any of the selected rice varieties. Cadmium content in the rice samples analyzed was in the range of 0.035 to 0.077 mg/kg and chromium content in rice samples analyzed were in the range between 0.0124 to 0.21 mg/kg. The levels of cadmium and chromium found in all varieties of rice were below the toxic level reported by WHO/FAO guidelines (0.200 mg/kg and 2.3 mg/kg respectively).

**Keywords:** Rice, CKDu, US EPA 3052, Cadmium, Lead

**Abstract:14****COMPARATIVE STUDIES OF UNTREATED SAWDUST AS LOW-COST NATURAL ADSORBENT FOR REMOVAL OF Cd (II) FROM AQUEOUS SOLUTIONS****A Balachandran, C S Udawatte\***<sup>1</sup>*College of Chemical Sciences, Institute of Chemistry, Rajagiriya, Sri Lanka**\*[cudawatte@hotmail.com](mailto:cudawatte@hotmail.com)*

In the present study batch experiment was carried out to investigate the adsorption of Cd (II) on different types of sawdust such as jack (*Artocarpusheterophyllus*), rubber (*Heveabrasiliensis*), coconut (*Cocosnucifera*), albizia (*Albizia*) and rambutan (*Nepheliumlappaceum*) from aqueous solution by varying initial metal ion concentration, contact time and dose of adsorbent. The percentage adsorption of Cd (II) increased with increase in initial metal ion concentration, contact time and adsorbent dosage. The adsorption data were fitted to the Freundlich isotherm model in the following manner, coconut > albizia > rambutan > jack > rubber. The kinetic data obtained at different concentrations have been analysed using pseudo-first order and pseudo-second order equation. The experimental data of pseudo-first order kinetic model fitted very well to rubber only and pseudo-second order kinetic model fitted in the following manner, coconut > albizia > rambutan > jack. However, all types of sawdust used in this study can be used as low cost adsorbents for removal of Cd (II) from aqueous solution.

**Keywords:** Sawdust, Cadmium, Adsorption, Freundlich isotherm, Kinetics.**Abstract:15****ADSORPTION OF HEAVY METALS (Cu<sup>2+</sup> & Pb<sup>2+</sup>) BY CLAY****W.W.Vidura<sup>1</sup>, U.S.K.Weliwegamage<sup>1\*</sup>**<sup>1</sup>*College of Chemical Sciences, Institute of Chemistry, Rajagiriya, Sri Lanka**\*[weliwegama@yahoo.com](mailto:weliwegama@yahoo.com)*

The use of clay minerals is almost as old as mankind. Clay minerals are used largely in pharmaceutical formulations, in aesthetic medicine and in ceramics. Clays have a stable and rigid structures with high surface areas and good physical properties. The negative charge on clay tend to attract and bind the positively charged metal complexes. Therefore adsorption of metal occur on clay surface. In this research the adsorption of heavy metals onto ball clay was investigated. The heavy metals analyzed were copper (Cu<sup>+2</sup>) and lead (Pb<sup>+2</sup>). It was determined by varying the mass of clay and also while varying the time intervals of adsorption. Both metals were adsorbed by clay but lead (Pb<sup>+2</sup>) adsorption was higher than the adsorption of copper (Cu<sup>+2</sup>) onto clay.

**Keywords:** Clay, Heavy metals (Cu<sup>2+</sup> and Pb<sup>2+</sup>), Adsorption.

**Abstract:16****ANALYSIS OF FLUORIDE IN TOOTHPASTE AND FACTORS AFFECTING THE LOSS OF BIO AVAILABLE FLUORIDE IN TOOTHPASTE****D. C. A. Perera<sup>1</sup>, M. D. P de Costa<sup>2\*</sup>**<sup>1</sup>*College of Chemical Sciences, Institute of Chemistry, Rajagiriya, Sri Lanka*<sup>2</sup>*Department of Chemistry, Faculty of Science, University of Colombo, Sri Lanka**\* [mdpdc@chem.cmb.ac.lk](mailto:mdpdc@chem.cmb.ac.lk)*

To improve and maintain oral health, toothpaste is used as a paste or gel. Fluoride is added to some toothpastes to improve the quality and it is very essential for the improvement of the tooth enamel. Fluoride binds to the coated layer of hard material in enamel, mainly hydroxyl apatite ( $\text{Ca}_{10}(\text{PO}_4)_6(\text{OH})_2$ ) and leads to strength the enamel. Because of this unique feature, fluoride is added to some toothpaste since 1914. Sodium fluoride and monofluorophosphate added to toothpastes as fluoride source. Therefore the amount of fluoride present in toothpaste is critical. Though fluoride is essential for dental health, excess may cause dental fluorosis. Thus the study was carried out to find out the amount of fluoride available at the time when consumer is using the toothpaste and to determine the factors that affect the loss of bio available fluoride in toothpaste. Fluoride ion selective electrode was used for the determination. Four brands of toothpastes were analysed by keeping each of the samples at different conditions of exposing to sunlight, keeping in a dark place, storing in a refrigerator for a time period of three months and another set of samples keeping in the oven at 45<sup>o</sup>C for a period of month. Concentration was detected every week for three months and the results clearly showed that the concentration was decreasing with time. Highest rate of loss was shown by the samples kept at oven and samples exposed to sunlight. Samples which were kept at refrigerator and dark place showed the lowest rate of decrement. The concentration level of fluoride of some brands were very much below the recommended value even in the initial stage.

**Keywords:** Toothpaste, Fluoride, Sodium Fluoride, Monofluorophosphate, Fluoride Ion Selective Electrode,**Abstract:17****STRUCTURAL REARRANGEMENT OF A ZEOLITE-LIKE METAL ORGANIC FRAMEWORK TO A METAL ORGANIC CUBE****M.Goonatilleke<sup>1</sup>, C.Jayasundara<sup>2</sup>, H. M. M. Infas<sup>1\*</sup>**<sup>1</sup>*College of Chemical Sciences, Institute of Chemistry Ceylon, Rajagiriya, Sri Lanka*<sup>2</sup>*Department of Chemistry, Faculty of Science, University of Peradeniya, Sri Lanka**\* [infas\\_m@yahoo.com](mailto:infas_m@yahoo.com)*

A structural rearrangement of a zeolite-like metal organic framework, usf-ZMOF to a metal organic cube, MOC-M (Metal Organic Cube-M, M stands for Manisha) was observed with the change in reaction conditions. Pro-long heating in the synthetic procedure of usf-ZMOF has led to a metal organic cube with a novel structure. Single crystal X-ray diffraction studies have revealed that MOC-M belongs to the space group  $R\bar{3}$  and it comprised of a hexagonal unit cell with the parameters;  $a = 28.049(3)\text{\AA}$ ,  $b = 28.049(3)\text{\AA}$ ,  $c = 22.543(3)\text{\AA}$ ,  $\alpha = 90^\circ$ ,  $\beta = 90^\circ$  and  $\gamma = 120^\circ$ . In order to understand the structural transformation, few reactions were carried out for 12 hours, 36 hours, 48 hours and 72 hours. Products at each time duration was characterized by Powder X-ray Diffraction (PXRD) and Fourier Transform Infra-Red spectroscopic (FT-IR) methods. It was clear that the new product was obtained after 36 hours, therefore for further studies reactions were carried out for 39 hours, 42 hours and 45 hours. All the samples were analyzed and characterized using

PXRD and FT-IR techniques. The rearrangement of *usf*-ZMOF to MOC-M was studied to understand whether the ZMOF is transformed to a new structure with prolong heating or an inter-mediate is formed during the transformation. With the analysis of spectral data an intermediate was not identified which concludes that a structural transformations has resulted with prolong heating.

**Keywords:** Zeolite-like metal organic framework, Metal organic cube, Rearrangement

**Abstract:18**

**PHYTOCHEMICAL SCREENING AND INVESTIGATION OF FERMENTATION PROCESS IN HERBAL WINE USING *Woodfordia fruticosa* GROWN IN SRI LANKA**

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*Woodfordia fruticosa* belonging to family Lythraceae is a medicinal plant and all the parts of this plant have valuable properties which are ecologically as well as economically important. It is used as an ingredient in many products for its medicinal values and mainly used as a fermenting agent in “Asava” and “Arishta” which are self-generated herbal fermentations of traditional Ayurvedic systems. This medicinal wine has several advantages. Therefore there’s a heavy demand for flowers and currently dried flowers are imported to Sri Lanka. The present study was conducted with the objectives of comparing the imported and the local plants and finding out which is high in quality. Physicochemical parameters including moisture content, ash values, extractive values were evaluated. The dried flowers of both local and imported plant were extracted successively with several solvents and all the extracts were subjected to phytochemical screening. Qualitative phytochemical analysis was done for various phytoconstituents like alkaloids, tannins, flavonoids and sterols. The essential oil of *Woodfordia fruticosa* was obtained by hydro distillation and the GC analysis was carried out. Also TLC profiling of the plant extracts gives an idea about the components present in the plant material. An Arishta (Herbal wine) was prepared using imported and local *Woodfordia fruticosa* and the efficiency was compared. According to the present study the purity and the quality of the local plant material is higher than the imported plant material of *Woodfordia fruticosa*. Adulteration is a major problem in plants used in herbal drugs.

**Keywords:** *Woodfordia fruticosa*, Arishta, fermentation, Physicochemical, hydro distillation

**Abstract:19**

**SYNTHESIS AND CHARACTERIZATION OF RHO-ZMOF AND ITS VIABILITY TOWARDS AN EFFICIENT DRUG DELIVERY**

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MOFs (Metal Organic Frameworks) are the latest class of ordered porous solids. Since their discovery, many potential applications have been proposed in strategic provinces such as drug delivery, catalysis, separation, magnetism and etc. Metal Organic Framework’s (MOFs) promising potential applications in drug delivery are due to their unique structural properties such as high porosity and high surface area. By the assembly of the organic ligands and metal oxide clusters, porous MOFs can be synthesized. The research work was based on synthesis, characterize of a metal organic framework (MOF), known as rho-ZMOF, and test on its



capability on an efficient drug delivery. The synthetic pathway which was used for the synthesis was solvothermal method wherein  $(\text{NO}_3)_3 \cdot 2\text{H}_2\text{O}$  and 4, 5-Imidazolecarboxylic acid in DMF was heated under autogenous pressure usually above the boiling point of the solvent. Loading of Methyl Salicylate and Ibuprofen in to rho-ZMOF was carried out separately and the Qualitative estimation of uptake of the each drug was analyzed using FT-IR. The analysis hasn't shown any significant drug uptake in the synthesized rho-ZMOF. This may be due to several reasons such as MOF material may not have been activated, time taken for the drug uploading may not be sufficient, the drug samples used may have degraded, drug solutions prepared may be too diluted.

Future work may carry out using properly activated MOF material soaked in highly concentrated drug solutions allowing sufficient period of time for the drug loading.

**Keywords:** Porous solids, rho-ZMOF, Drug delivery

**Abstract:20**

### **BIOACTIVE COMPOUND, *IN VITRO* ANTIOXIDANT ACTIVITIES AND ANTI-INFLAMMATORY ACTIVITY OF HYBRID MANGO VARIETY IN SRI LANKA**

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In this experiment, I used a hybrid mango, which is the combination of Alphonso, Karuthakolomban and Villardvarieties. This is rich in taste, aroma and a special texture than the natural varieties. In this study the total phenolic content, flavonoid content, the antioxidant activity and the anti-inflammatory were compared. The total phenolic content was higher in the kernel (377.85 mg GAE g<sup>-1</sup>). Whereas the flavonoid content also higher in the kernel (224.46mg g<sup>-1</sup>). Same as the DPPH radical scavenging activity also higher in the kernel (IC<sub>50</sub> = 7.68 µg mL<sup>-1</sup>). The reducing power assessed by the ferric reducing assay indicated that all three samples had a lower reducing power than the standard, Ascorbic acid. The Nitric oxide radical scavenging activity is also higher in standard Ascorbic acid than the samples. The anti-inflammatory activity showed a higher value in kernel (IC<sub>50</sub> = 45.60 µg mL<sup>-1</sup>).

**Keywords:** Hybrid, Mango, Scavenging activity, Hemolysis of inhibition

**Abstract:21**

### **A STUDY ON DISSOLUTION OF ALUMINUM IN COOKING UTENSILS UNDER SELECTED CONTROL CONDITIONS**

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Since from recent past, aluminium products have been playing a major role in different fields. Among them, use vessels made out of aluminium for cooking purposes is major issue at present. In the current study to determine the extent of leaching aluminium form these cooking pots weight loss measurements during

corrosion, open circuit potential measurements and potentiodynamic polarization techniques (electrochemical techniques) were carried out under selected different conditions. Acidic solutions normally encountered during cooking were reproduced using solutions of lime, vinegar, goraka and tamarind at several pH ranges. The results of immersion tests showed that the rate of corrosion of aluminium is the highest in tamarin solutions and the lowest in tap water. The corrosion rate varied as follows; tamarind >goraka> lime >vinegar> tap water. With the increasing of the immersion time period, and the temperature used, the corrosion rate increased respectively. Also found with decrease of pH the rate of corrosion of aluminium increases. Open circuit potential measurements and Linear sweep voltammetry studies showed that the corrosion potentials and current density of samples varied respectively as; -641.81 mV, 0.005 mA cm<sup>-2</sup> for tap water, -744.47 mV, 0.0089 mA cm<sup>-2</sup> for lime, -864.36 mV, 0.0071 mA cm<sup>-2</sup> for vinegar, -874.89 mV, 0.0092 mA cm<sup>-2</sup> for goraka and -795.37 mV, 0.009 mA cm<sup>-2</sup> for tamarind. The corrosion rate varied as tamarind >goraka> lime >vinegar> tap water.

## Abstract:22

### QUALITATIVE RENAL STONE ANALYSIS BY FOURIER TRANSFORM INFRARED SPECTROSCOPY

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Urolithiasis is a multi factorial intervention at the hospital. After routine and a detailed clinical workup of all patients with urolithiasis, stone samples of 12 patients satisfying the entry criteria, were subjected to the Fourier transform infrared spectroscopic analysis. From the analysis, Calcium oxalate monohydrate was most commonly encountered in 6 out of 12 (50 %) while 4 stones contained Uric acid (33 %). There were two stones as a heterogenous mixture of Magnesium ammonium phosphate (16 %) and Penta calcium hydroxyl triphosphate. Fourier transform infrared spectroscopy allows an accurate, reliable qualitative method of stone analysis. It also helps in maintaining computerized large reference library. Better knowledge of precise stone composition and etiology help in improving the management of stone disease. This may prevent and or delay stone recurrence via prophylactic measures. Further extensive area wise studies need to be carried out to access the real picture of stone burden. The results of this project indicated that aluminium can undergo corrosion significantly in aqueous media which are containing goraka (gallic acid) and tamarind (tartaric acid). Also with vinegar (acetic acid) and lime (citric acid) solutions corrosion can be occur up to some extent. When the time and temperature increasing, and pH value decreasing (becoming more acidic) corrosion phenomena can be observed more. recurrent disease, distributed worldwide in urban, rural , non-industrial and industrial regions with different chemical composition of analyzed stones in context to various etiological and risk factors. The precise stone composition (qualitative analysis) was determined by using infrared spectroscopy. The research was carried out with patients having urinary stone disease present surgical wards at Teaching Hospital Batticaloa. The objective of the study was to qualitatively analyze the renal stones obtained by surgical.

**Keywords:** Aluminium, Cooking vessels, Corrosion, Immersion test, Potentio dynamic polarization.

**Abstract:23**

**USE OF PLANT EXTRACTS FOR CONTROLLING OF CORROSION OF COPPER IN 1 M HCl SOLUTIONS**

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Corrosion inhibition effect by Cashew (*Anacardium occidentale*) bark extract, Kahata (*Careya arborea*) and Kududawula (*Neolitsea cassia*) leaves extract and bark extract on copper in 1M HCl medium was studied by adding various concentrations of aqueous solutions using weight loss method and Tafel extrapolation. In Tafel extrapolation Cashew bark extract showed maximum inhibition efficiency of 50.9% at 200 ppm and in weight loss method maximum inhibition efficiency of 67 % at 300 C under 6 hours of exposure period. Where else Kahata and Kududawula showed less or even non inhibition effect than cashew. When the temperature was increased in weight loss measurement the corrosion inhibition declined.

**Keywords:** Corrosion, Copper, Corrosion inhibitors, Tafel plot, Weight loss, Cashew, Kududawula, Kahata

**Abstract:24**

**DEVELOPMENT OF AN ANODIC STRIPPING VOLTAMMETRY METHODOLOGY FOR DETERMINATION OF LEAD AND CADMIUM IN RICE**

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Simple, rapid and accurate method for simultaneous determination for Lead and Cadmium in rice, grown under different agricultural management systems in Sri Lanka using anodic stripping voltammetry was investigated using available laboratory facilities. Thin film mercury on a glassy carbon surface was used as the working electrode. Various experimental parameters such as pH, stirring rate, concentration of the analyte and deposition time was examined and optimized to obtain best results. Instrumental response showed a linear relationship when the deposition time varied from 1-25 minutes concluding that purging nitrogen prior to analysis is not needed. The optimized method was then validated using IRMM -804 RICE FLOUR certified reference material. Method recovery were in the range of 91% - 104% and 88% - 126% for Cd(II) and Pb(II) respectively. Detection limit for lead and cadmium was 0.09  $\mu\text{g kg}^{-1}$  and 0.08  $\mu\text{g kg}^{-1}$  respectively. The relative standard deviation was found to be less than 10% (n=10) in these measurements.

**Keywords:** Rice, Anodic stripping voltammetry, Cadmium, IRMM-804, Simultaneous determination of lead and cadmium

**Abstract:25****FINDING OUT A SUBSTITUTE FOR *Gyrinops walla* AND PRODUCTION OF A COLOGNE**A. A. S. V. Fernando<sup>1</sup>, M. D. P. de Costa<sup>2\*</sup><sup>1</sup>College of Chemical Sciences, Institute of Chemistry, Rajagiriya, Sri Lanka<sup>2</sup>Department of Chemistry, Faculty of Science, University of Colombo, Sri Lanka\* [mdpdc@chem.cmb.ac.lk](mailto:mdpdc@chem.cmb.ac.lk)

*Gyrinops walla*, known as wallapatta in Sinhala is an endangered species which is being illegally exported during last few years. The resin produced by wallapatta is considered as a valuable ingredient in many perfumes. It is widely used as a base note in perfumes. Also it is well known for its' fixative property. Fixative is a compound which can prolong the effect of the more volatile ingredients in a perfume. It is categorized as an arbitrary fixer because it has a pleasant smell. In this research, both genetically related species to *Gyrinops walla* and genetically non-related species to *Gyrinops walla* were used. Genetically related species used were *Berrya cordifolia* (Halmilla), *Thespesia populnea* (Sooriya), *Abutilon indicum* (Beheth Anoda). Genetically non-related species used were *Anacardium occidentale* (cashew), *Artocarpus heterophyllus* (jack), *Mangifera indica* (mango), *Plumeria obtuse* (temple tree), and *Murraya koenigii* (Curry tree). The fixative property of each was checked. *Artocarpus heterophyllus* was selected as the best fixative among the trees used. However, *Artocarpus heterophyllus* is not an arbitrary fixer, because it doesn't have a pleasant fragrance. A perfume formulation was developed using *Artocarpus heterophyllus* heartwood extract as the fixer, lime essential oil as the top note, jasmine essential oil as the middle note and patchouli as the base note. Above formulation received satisfactory feedback from the testers. Therefore this formulation can be further developed to make a more user attractive formulation.

**Keywords:** *Gyrinops walla*, fixative, Perfume, *Artocarpus heterophyllus*, Cologne**Abstract:26****SYNTHESIS AND CHARACTERISATION OF ZEOLITE**U.K.M. Bopitiya<sup>1</sup>, C. Jayasundara<sup>2</sup>, R. Parthipan<sup>1</sup> and H.M.M. Infas<sup>1\*</sup><sup>1</sup>College of Chemical Sciences, Institute of Chemistry, Rajagiriya, Sri Lanka<sup>2</sup>Department of Chemistry, Faculty of Science, University of Peradeniya, Sri Lanka\* [infas\\_m@yahoo.com](mailto:infas_m@yahoo.com)

Sri Lanka is a country rich in mineral resources. Kaolin is a comparatively cheap mineral found in many parts of Sri Lanka. For a country's economic growth and financial stability, it is important to produce value added products using such mineral sources. Zeolite is a value added product. The general method of synthesis of Zeolite from kaolin is known. However, the exact conditions suitable for Sri Lankan Kaolin and the types of zeolites obtainable was unknown. Different types of kaolin from Galaha were used and the following conditions were varied, the reaction duration 12 h, 24 h, 48 h, temperature 100-200°C and the concentration of NaOH from 0.5 M to 2.0 M. The synthesised products were analysed using a Powder X-Ray Diffraction, light microscope and Scanning Electron Microscope. The hydrothermal reaction of calcinated white kaolin from Galaha at 150°C for 24 h, resulted in Zeolite A. XRD results showed that the phases of zeolites synthesized are similar to LTA framework. The characteristic peaks of synthesised zeolite overlapped with the peaks recorded in literature for zeolite A; 7.21, 10.20, 12.49 and 16.13 are a few of them. SEM images confirmed that synthetic zeolite has a cubic morphology.

**Keywords:** Zeolite A, Kaolin, Hydrothermal Reaction, P-XRD Patterns.

**Abstract:27****COMPARISON AND ANALYSIS OF ELECTROLYTES CONTENT IN FRUIT JUICES VS SPORTS DRINKS****T.A Gamagedara\*, RathikaKandiah***College of Chemical Sciences, Institute of Chemistry, Rajagiriya, Sri Lanka  
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The purpose of this research was to determine & compare the electrolytes content in sport drinks and fruit juices. The main purpose of this investigation was to identify which drink contained more electrolytes, because human body need electrolytes on various occasions, the method used to investigate the electrolyte content was the conductometry experiment. The main electrolytes present in food beverages by literature are Na & K, so the determination of the Concentration of these ions were done by using Flame Atomic Absorption Spectroscopy. The main health problem related to fruit beverages was dental erosion. The latter is directly related to the pH of the fluid. The pH meter was used to make a measurement of the level of acidity. In AAS analysis Highest Na & K concentration were recorded in King Coconut water. Freshly prepared fruit juices & King Coconut indicated the highest Conductance values. In pH determination, freshly prepared fruit juices recorded the lower pH value.

**Keywords:** Electrolytes, Sport Drinks, Fruit juices, Conductance**Abstract:28****EXAMINATION OF FLUORESCENT, METALLOCHROMIC AND PH INDICATOR PROPERTIES OF *Garciniagummi-gutta*( GORAKA) LEAF EXTRACT****F. S. Nazim<sup>1\*</sup>, C. Udawatte<sup>1</sup>***<sup>1</sup>College of Chemical Sciences, Institute of Chemistry, Rajagiriya, Sri Lanka  
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The significant environmental impact and high cost of synthetic chemicals raise the need to develop cost effective, eco-friendly alternative sources of natural origin. The study aimed to examine the fluorescent, metallochromic and pH indicator properties of the *Garciniagummi-gutta*(goraka)leaf extract by spectrophotometric and fluorometric analysis. The leaf extract of *Garciniagummi-gutta* was obtained using water, ethanol, acetone and ethyl acetate as solvents. The aqueous goraka leaf extract showed positive results as a fluorescent indicator. The aqueous extract of the goraka leaf samples were scanned under UV light in a UV-Visible Spectrophotometer (Hitachi U-2910 model) and the absorption spectrum obtained was used to determine the excitation wavelength of the sample. The fluorometric analysis was carried out in fluorescence spectrophotometer (Hitachi F-2700 model) by exciting the sample at 400.0 nm wavelength and the *Garcinia* leaf extract exhibited fluorescence, which was quenched upon the incorporation of Hg<sup>2+</sup> solution in to the extract. The fluorescent intensities of the goraka leaf extract decreased as the metal ion concentration was increased. Stern-Volmer plot was constructed from the fluorescence emission data obtained and a linear correlation was observed in the plot justifying the fact that the fluorescence of goraka leaf extract is quenched by trace levels of mercury. Mercury, one of the main toxic heavy metals, is found in various forms in the aquatic environment. Therefore, various methods are researched to detect mercury in water bodies. This study is one such approach in analyzing mercury levels in aqueous solutions. The study confirms that *Garcinia* leaf extract can be used to detect trace quantities of Hg<sup>2+</sup> in aqueous solutions.

**Keywords:** *Garciniagummi-gutta*, Fluorescence, Mercury, Indicator, Aqueous extract

**Abstract:29**

**KITCHEN WASTE WATER PURIFICATION BY USING NATURAL ADSORPTION MATERIALS**

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Usable water for human is limited source and recycling of waste water is a burning issue these days. In this study various parameters of kitchen waste water was analyzed using adsorption materials. Thus the altering of the parameters; pH, conductance and chemical oxygen demand by adsorption materials were analyzed. Coconut shell char, rubber char, activated carbon, roofing tile clay, kabok were used as adsorption material. Since adsorption depend on the particle size, adsorption material of same size were taken. Two experiments (static and dynamic) were carried out throughout the analysis. Expected results were not obtained from the static experiment. Activated carbon was the best material for neutralizing pH, decreasing conductance and decreasing chemical oxygen demand in the static experiment. Out of two experiments, the dynamic test was better than the static experiment. Rubber char and activated carbon were better in neutralizing pH than other adsorption material. Rubber char and roofing tile clay were better in reducing conductance. Rubber char was the best in decreasing the chemical oxygen demand.

**Keywords:** Adsorption, COD, pH, Conductance