

Technical Sessions : A - 04

The behavior of emissive phenanthroline-iron(ii) charge transfer complex on ionic strengthP M Opallage¹, R Senthilnithy², M D P De Costa^{1*}¹Department of Chemistry, University of Colombo, Colombo 03²Department of Chemistry, The Open University of Sri Lanka, Nawala

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1,10-Phenanthroline is a versatile bidentate ligand for transition metals. Their conjugated backbones make them attractive chromophores and molecular "antennae".¹ In this study, fluorescence emission of 1,10-phenanthroline probe and 1,10-phenanthroline-Fe(II) complex were examined in the presence of NaCl and Pb(NO₃)₂, in order to study relationship of the fluorescence of 1,10-phenanthroline-Iron(II) complex with the ionic strength. The fluorescence intensity of the probe at λ_{\max} of 366 nm was decreased upon addition of Fe(II) which was mainly due to static quenching of unbound probe. A new red shifted emission band was appeared at 411 nm due to formation of probe-Fe(II) complex, which enhanced upon addition of Fe(II). The addition of NaCl and Pb(NO₃)₂ (1000 ppm) in acetonitrile medium to a solution of 1,10-phenanthroline-Fe(II) complex enhanced the emission at 411 nm, whereas no significant change was observed at 366 nm up to

a concentration of 10⁻⁷ M of the salt. The emission of 1,10-phenanthroline-Fe(II) complex is highly dependent on the ionic strength of the solution regardless of the added cation and whether it has the ability to complex with phenanthroline or not up to a concentration of 10⁻⁷ M. These observations suggest that the emissive excited complex may be a charge transfer species and becomes more stable at higher ionic strength by minimizing the ratio of back electron transfer process in the ionic environment, leading to lowering of the quenching.

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## Technical Sessions : A - 05

**Correlation of variation in the percentage of compounds responsible for mosquito repellent activity in citronella oil over time with mosquito repellent efficacy of commercial citronella oil samples and spray**N S Adhiettya,<sup>1,2</sup> C Padumadasa<sup>1\*</sup><sup>1</sup>Department of Chemistry, Faculty of Applied Sciences, University of Sri Jayewardenepura, Nugegoda<sup>2</sup>College of Chemical Sciences, Institute of Chemistry Ceylon, Rajagiriya

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In tropical countries including Sri Lanka, mosquitoes are considered as the greatest menace out of all disease-transmitting insects because of their ability to spread mosquito-borne diseases, which are responsible for millions of deaths every year. Species of mosquitoes belonging to genera *Aedes*, *Anopheles*, *Culex* are the vectors of pathogens causing deadly mosquito-borne diseases such as Dengue fever, Filariasis, Japanese Encephalitis, and Malaria. The Epidemiology Unit of Ministry of Health Sri Lanka reported 185,969 suspected dengue cases during the year 2017. The control of mosquitoes, which transmit deadly diseases, has become

a significant public health concern globally. Protection against mosquito bites is an important part of preventing mosquito-borne diseases. Using mosquito repellent products to keep mosquitoes away is currently the most trending method to prevent mosquito bites.

*Cymbopogon winterianus* Jowitt (Java type) and *Cymbopogon nardus* (L.) Rendle (Ceylon type) are the two types of closely related citronella grass cultivated to extract citronella oil. It is reported that compounds, geraniol, limonene, citronellol, citronellal,  $\alpha$ -pinene, linalool, camphor, myrcene and  $\alpha$ -terpineol show

mosquito repellent activity. The GC-MS spectrum of citronella oil isolated from Ceylon type shows the presence of all these compounds, whereas that of Java type shows the presence of these compounds excluding  $\alpha$ -pinene, camphor, myrcene, and  $\alpha$ -terpineol. Repellent action of citronella oil extracted from both types has been reported against mosquitoes. In the Sri Lankan market, there are a number of mosquito repellent products such as sprays, candles, lotions and incense sticks, which are produced using citronella oil. Citronella oil is also found in the market to be directly used as a mosquito repellent product.

In the present study, commercial citronella oil samples of brands A, B, C, D and authentic citronella oil sample were subjected to GC-MS analyses weekly for a period of sixteen weeks to investigate the variation in the percentage of compounds responsible for mosquito repellent activity with time. The mosquito repellent activity of citronella oil samples (brand C and authentic) and mosquito repellent sprays (X and Y) was determined using previously published Arm-In-Cage Method. Out of the citronella oil samples (brands A, B, C and D), only brand C was used for the mosquito repellent study as it showed geraniol and linalool in highest and lowest percentages, respectively (of the compounds under study) similar to that of Ceylon type citronella oil. For each sample the experiment was repeated weekly for a period of sixteen weeks. A gradual reduction in the percentage of compounds responsible for mosquito repellent activity was observed in all samples (brands A, B, C, D and authentic) over the period of sixteen weeks. The highest mosquito repellent activity (100%) was shown by citronella oil of brand C during the first twelve weeks and sprays X and Y during the first eight weeks of the study. The mosquito repellent activity of these samples declined over the rest of the study period. Authentic citronella oil sample showed the highest mosquito repellent activity (100%) throughout the period of sixteen weeks.

The time duration that the maximum mosquito repellent activity would persist in the tested samples of mosquito repelling agents (citronella oil of brand C and sprays X, Y) may be considerably lower than the shelf life stipulated. This effect may be due to the fact that the compounds responsible for mosquito repellent activity in the tested samples have shown a decline in their percentages with time. Therefore, one must take this in to consideration when relying on these mosquito repelling agents in order

to prevent being bitten by mosquitoes carrying deadly diseases, which have plagued many countries.

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