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Electro-Chemical And Spectral Study On Some Electrolytes Derived from CA-1 and KP-2 in Rainy

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Abstract: *Electro-chemical study, viz. potential development of Ca-1 and Kp-2 is obtained by the OCV values of electrolytes for three combinations of electrode viz. Ag-Zn, C-Zn and Cu-Zn have been measured in rainy season under normal atmospheric condition with Bioemf device. During the study, it has been found that, respective maximum potential for Ca-1 and Kp-2 are 1065 mv and 1046 mv. We have conducted the spectral analysis of these electrolytes and we obtained the most probable structure of Ca-1 and Kp-2 are 2-Propene oic-1 and salicylic acid respectively.*

Keywords: Coleus amboinicus (abbrd. as Ca-1), Kolenchoepinnata (abbrd. as Kp-2)

I. INTRODUCTION

Electrochemistry[1] acts as a bridge between thermodynamics and the rest of chemistry where ionic reactions occurring at an electrode surface. It is of enormous commercial value and of major technical importance as it may open the field of possibilities of acquiring energy through certain non-conventional source. Our country has a limited reserve of natural resources (like coal, fossils and mineral fuels). The growing demand of energy[2] has led to a crisis and the day is not far off that we would suffer entirely from it as NTPC. Atomic power stations, wind mills and solar energy cannot fulfil the growing demand in developing countries like India. We will have to search an alternative source of energy, may be non-conventional which will last forever and to some extent could solve and fight the growing challenge of energy crisis. The biosystem is everlasting source in nature. The above system is little probed and study of undertaken text is scanty. This inspired me to take up the above task for the study to extract energy from medicinal and ornamental plants to solve the forthcoming problems as well as environmental pollution.

II. EXPERIMENTAL

Materials and Methods

2.1 Materials

To study the Electro-chemical properties of electrolytes derived from leaves of two selected plants, whose details are given as under,

1. Medicinal Plant

Coleus amboinicus (Lamiaceae family) (abbrd. as Ca-1)

2. Ornamental Plant

Kolenchoepinnata (Crassulaceae Family) (abbrd. as Kp-2)

2.2 Electrodes Materials

The Electrodes employed in this study are:

1. Carbon (c)   2. Copper (Cu)   3. Zinc (Zn)   4. Silver (Ag)

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Methods

Preparation of Electrodes

Thin metallic plates of copper (Cu), Silver (Ag), Zinc (Zn) and graphite (G) were procured and cut in to strips of 2x2 cm dimension. Each electrode was connected by copper wire for circuit connections. The electrodes were cleaned, washed with distilled water and with N/10 NaoH. They were again cleaned with distilled water and finally with acetone. The dried electrodes were then treated with emery pwiaperth successive increasing fineness.

2.3 Processing of Plant Leaves

The leaves are physically treated in the following manners;

A. Untreated leaf surface

A mature plant leaf is plucked from a plant and washed with distilled water. The leaf surface is then brushed with cotton to remove excess of water.

B. Electrolyte derived from leaves

The leaves are crushed. The sap of selected plant leaves are used as electrolyte and cut the electrodes into strips of 2x2 cm dimension for the construction of Bio-emf-cell.

C. Dipping of electrodes in the leaf sap

Then the electrodes are kept in leaf sap.

2.4 Bio-emf-Device

Bio-emf-device is prepared when electrode pair are kept in leaf Sap. The system is made intact and the circuit is completed by connecting multimeter with the copper wire connected by electrode shown as pictorially in (Fig.-1)

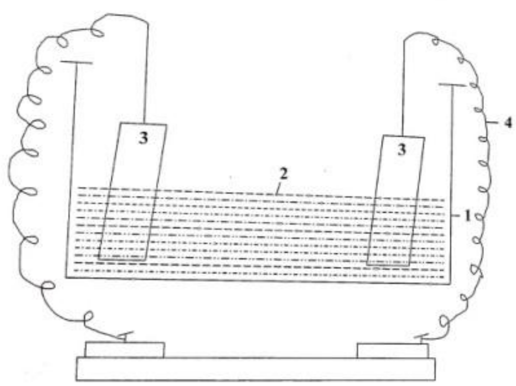

Fig.F-1 Method of BEP measurement in vitro.

1. Glass beaker 2. Leaf sap 3. Electrode
4. Copper wire for circuit connections

2.5 Electrode effect

The electrode combination of C-zn, Cu-zn and Ag-Zn were tried to study the Bioelectro potential (BEP)[3-5] of different leaf BEDs.

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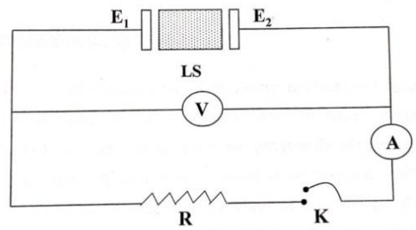

Fig. F1. Circuit diagram of Bio-erll in vitro condition
E^1 and E^2 =electrodes, R= Resistance,
K =Key, Voltmeter, A = Ammeter
V = Voltmeter, LS =Leaf Sap

2.6 Spectral Analysis of Electrolyte

The spectral analysis have been carried out for all electrolytes Viz..Ca-1, Kp-2.we obtained some IR spectrums and in order to investigate and diagnose the empirical formula and probable structure of compound many typical runs were taken.

III. RESULTS AND DISCUSSION

The Problem entitled "Electro-chemical and spectral study on some electrolytes derived from leaves" namely coleus amboinicus and Kolenchoepinnata abbreviated as Ca-1 and Kp-2 respectively, with the three pair of electrodes Viz.. Ag-Zn, C-zn, Cu-zn have been investigated for rainy season in morning noon, evening and night. The detail of experimental results so obtained clearly indicate that there is much difference between the activities of these electrolytes which have been discussed in two parts:

1. Electro-chemical study 2. Spectral study

Electro-chemical study of Electrolytes

The open circuit voltage (OCV) values of electrolytes for three combination of electrodes viz.. Ag-zn, C-zn, Cu-zn have been measured several times under normal atmospheric condition, to study the electrode effect on electrolytes of different plant leaves. During the study. It has been found that the origin of electrode potential depends upon the availability of ions. The development of high voltage in (Ca-1) indicate that it's leaf sap is comparatively showing More mobility of ions, whereas in the Kp-2 the potential development is Less because the ease movement of ions. The maximum and minimum Potential during Rainy season is also pointed out separately. which is tabulated below:

TABLE I
Summer season

S.NO.	Electrolyte	Maximum Potential				Minimum Potential			
		OCV (mV)	Time	SCC (μA)	Time	OCV (mV)	Time	SCC (μA)	Time
1	Ca-1	1065	Night	1993	Night	607	Night	872	Evening
2	Kp-2	1046	Evening	1974	Morning	635	Noon	953	Noon

Electrolytes have been recorded of different periods morning (06:00 AM) Noon (12:00 AM), evening (06:00 PM) and midnight (12:00PM) during rainy. The maximum and minimum potential through out the year has also been calculated (Table 1)

It has been observed that potential is highest during rainy season as for Ca-1 (1065mv) and Kp-2 (1046 mv) Night and Evening whereas lowest during night & Noon Ca-1 (607mv) and KP-2 (635mv) (Table-1)

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Part II

Spectral Analysis of Electrolytes

Spectral analysis of electrolytes have been carried out for two leaves Viz.Ca-1,Kp-2 powder. We obtained some IR spectrums (graph 1-2) and in order to investigate and diagnose the empirical formula and probable structure of compound many typical studies were taken. The plot of graphs of system between transmission (percent) VS wave number.

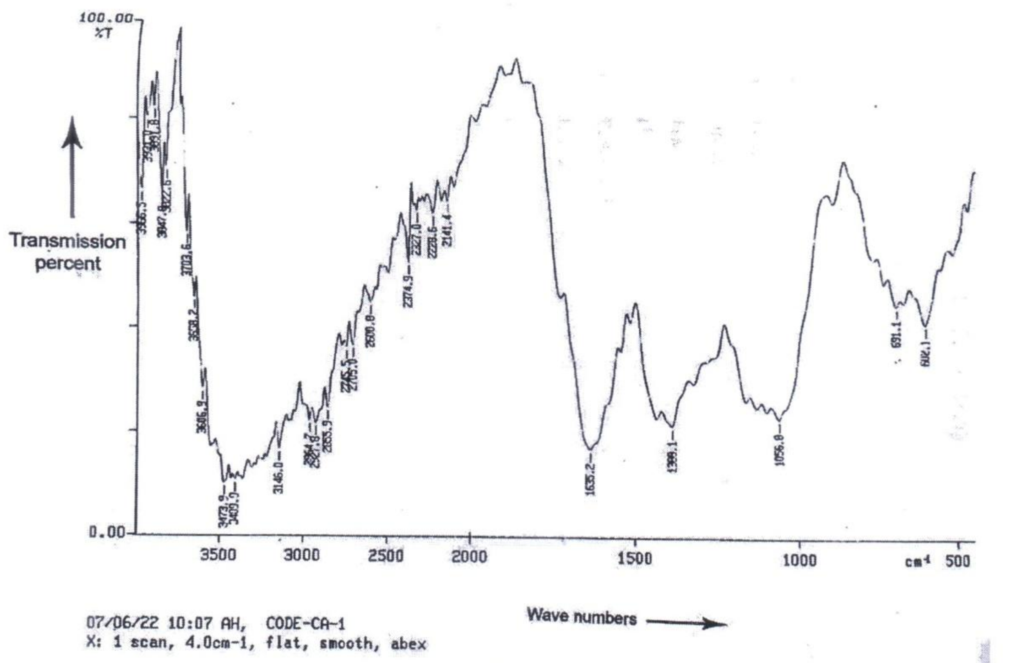
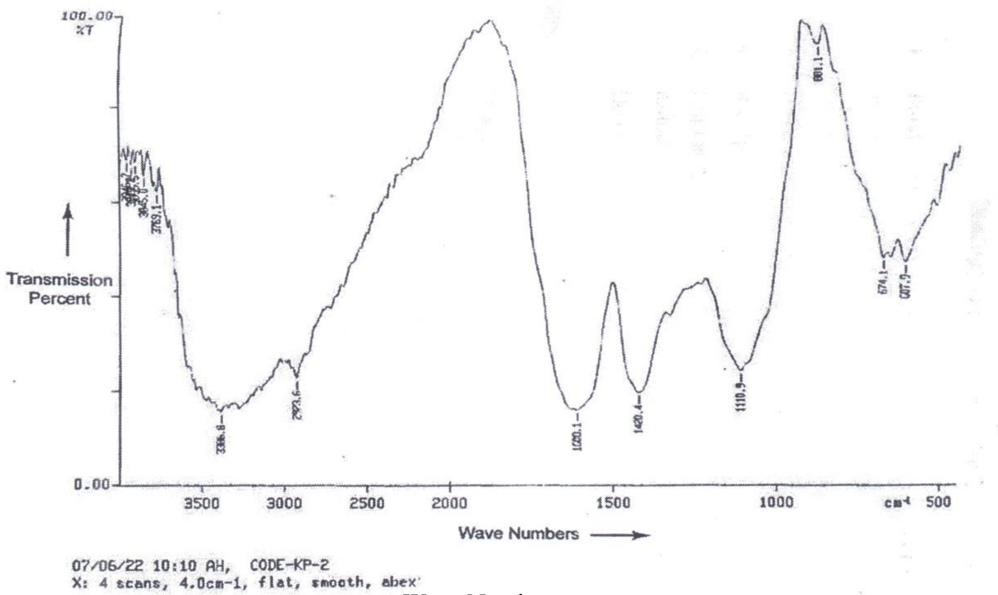


Fig. 3.10-1 (a) Coleus ambinicus (Ca-1)

According to graph-1 first typical spectral study for Ca-1 has obtained many peaks.Broad strong peak of O-H (Stretch) group found at 3400 (1/cm). The alkyl C-O-H (stretch) of aromatic rings gives the peak of 1388 (1/cm) peak of C-O (Stretch) at 1056 (1/cm). Broad Peak of C-C (Double bond stretch at 1635 1/cm). Peak of C-C (Triple bond stretch variable intensity)at 2060-2100 peak of C-H (bond) at 690 (1/cm) in alkynes

Finally the structure of Ca-1 (3.10-1 (a) graph can be described as
C-C-COOH 2 propene 1-oic acid or
2HC=CH-COOH 2 propene 1-oic acid



Wave Numbers

Fig. 3.10-1 (b) Kolenchoepinnata (Kp-2)

According to graph-2 first typical spectral study for Kp-2 has obtained many peaks. Broad strong peak of phenol O-H (stretch) group found at 3400 (1/cm). The alkyl C-H (stretch) of aromatic rings gives the peak at 2923 (1/cm). Aromatic C-H (stretch) at 1620(1/cm) as well as 1420 (1/cm).Broad peak of C-O (Stretch) at 1111 (1/cm). Peaks at 735-770 (small) 680-725 (small), 750-810 (very small..... Hence most probable structure will be 3-methyl phenol or salicylic acid.

Table – 2

Summary of Spectral Analysis

S.No	Electrolyte	Probable structure of Compound
1-	**Coleus Amboinicus (Ca-1)**	CH=C-COOH 2 Propyne 1-oic acid 2HC=CH-COOH 2 Propene 1-oic acid
2-	**KolenchoePinnata (Kp-2)**	Salicylic acid

IV. CONCLUSION

The plants are good source of ionic potential. Bio-electrical potential is generated due to redox couple present in the plants as bio-fuel cells. The promising results of study opens a new dimension of alternative source of energy i.e non-conventional form might gives a help, hope to get energy in cheaper rates by knowing these electrolytes derived from leaves. Therefore in order to know the secrets of these electrolytes the study will be fruitful in creating the new zeal about the nature and to maintain environmental ecological balance on earth planet.

The applied aspects of this study would be very useful in preparations of biocell used in calculators, wrist watches, gadgets and low voltage electronic devices, low voltage electronic communications etc. it will create new chapter for researcher electrochemist and nature loving environmentalist.

The spectral analysis[6] provides probable structure of compound. The structure of compound is focused not only the nature of compound but also on the detail study of bond type. Each bond type gives rise to several absorption bands, and the absorption spectrum of molecule is quite complex. Neverthless most of the bonds in a spectrum can be assigned to certain chemical bonds.

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