Organization

- CTD ENGINEERING SERVICES LIMITED
- A Subsidiary of Centre for Technology Development Kaduna Polytechnic

Title

- Development of Metallocene Rechargeable Battery

Introduction

- RAW MATERIAL AS DEPOSITE IN OUR NATION
- CHALLENGES THAT MANKIND FACES
- DIVERSIFICATION OF RESOURCES
- METALLOCENE BATTERY
- ADVANTAGE OF THE DEVELOPED TECHNOLOGY

Statement of the problem

The worlds agenda to eliminate fossil fuel .

The poor attitude towards the development of green energy initiation.

AIM AND OBJECTIVE

AIM

- The project was aim on using 100% of our raw material to developed power batteries for both local and foreign gadgets
- OBJECTIVES
- The battery development was focus in building huge current capacity and big batteries like mighty towers to power villages
- To developed batteries for small miniature systems to high advance machinery
- to reduce electric power shortage in the country
- To boost investment and employment opportunity in terms of energy storage
- To reduce capital flight to foreign countries

Significant of works

- Reduce air pollution to drastic level
- To meet up to the demands of power
- To save energy
- To facilitate business transaction

Literature summary

- Definition of energy
- Types of energy
- Renewable energy
- Types of battery
- Metallocene battery

Materials and Methods

- Materials : list of raw material
- Starch
- Alum
- Cement
- Cashew
- Legumes
- Alkaline
- Salt
- And other

Method

Production of the battery:

- Selection process
- Mixing process
- Boiling process
- Dissolution process
- Electrolytic process
- Formation process
- Inhibition anodic process

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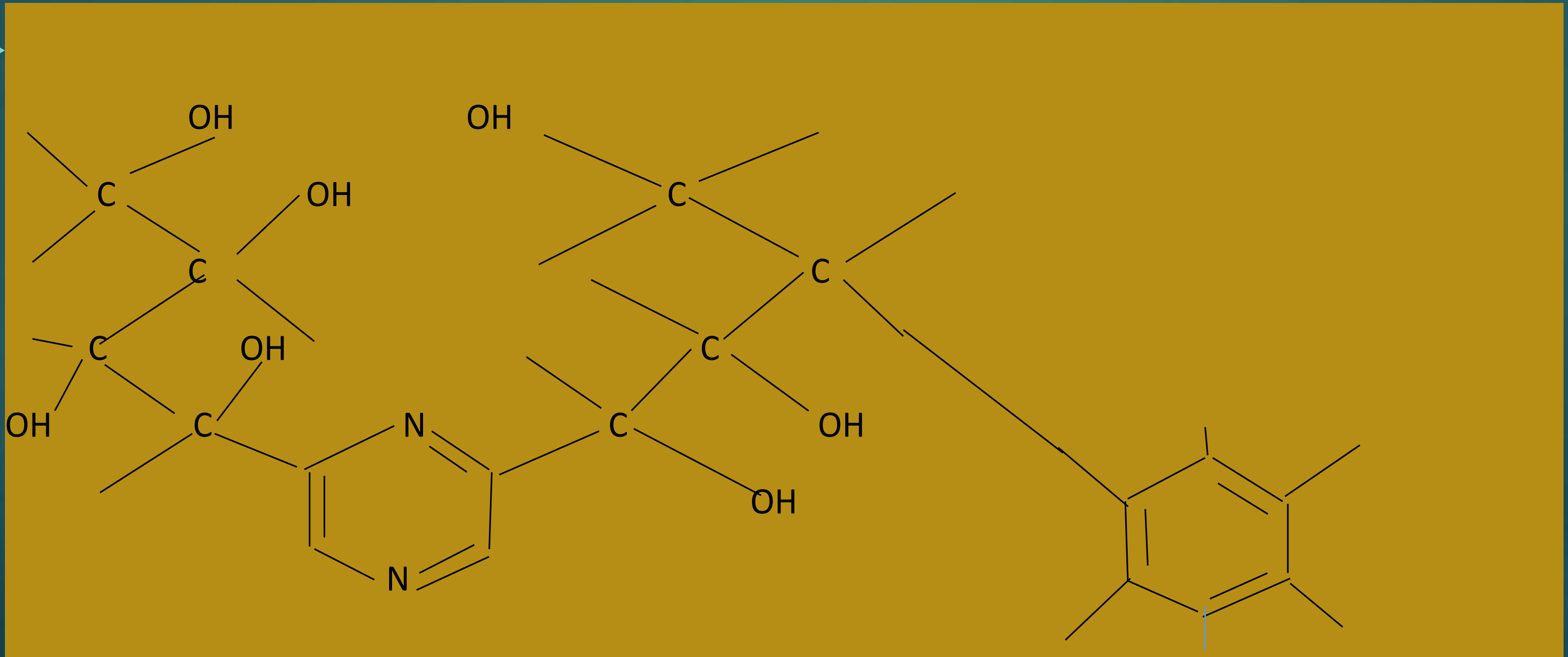
- **Selection**; this is an aspect in the production processing where different raw material are selected for the production of the battery
- **Mixing processing**; this is an aspect in production processing where the raw material are grinded and mixed with a stirrer machine.
- **Boiling process**; this is an aspect in the battery production processing where materials are reacted to produce a new product by boiling, which was monitored by a temperature and humidity sensor
- **Dissolution process**; this is an aspect in the production processing where special raw material are dissolved in the solvent and survey by a special monitoring machine to check out the saturated point in relation to its temperature at that moment
- **Electrolytic process**; this was an aspect in the production line to inhibit extraction and separation of material in the electrolyte.
- **Formation and Inhibition anodic process**, this was an aspect in the production line, where electrodes where developed by special machines using electric field perturbation process to inhibit high complex active material

Operational analysis

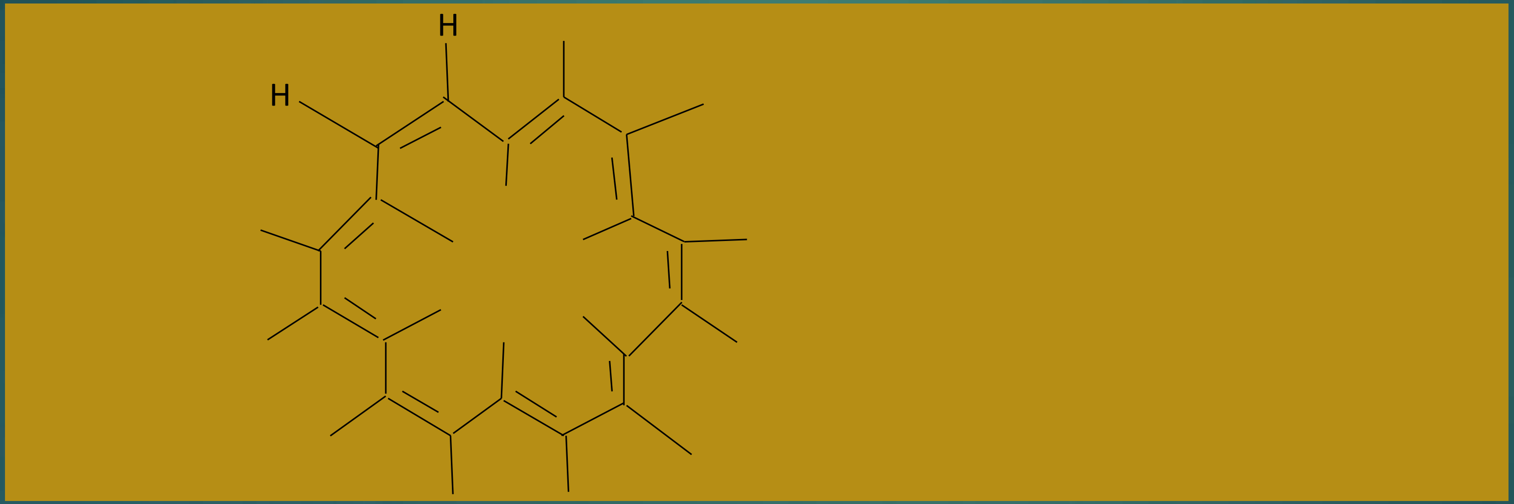
- The name glucose was coined in 1838 by jean Dumas, and the structure was discover by Emil Fischer.
- The experiment result obtain by J. V Meigo in the condensation of mole quantity of glucose and phenol showed the formation of three distinct product 1 water soluble , 2 water and benzene insoluble, 3 and benzene soluble product

- During the charging process at the positive electrode the aromatic compound developed in the active material along the positive electrode losses their hydrogen element to the negative electrode, therefore a vacant space was created in the vicinity of the aromatic compound,

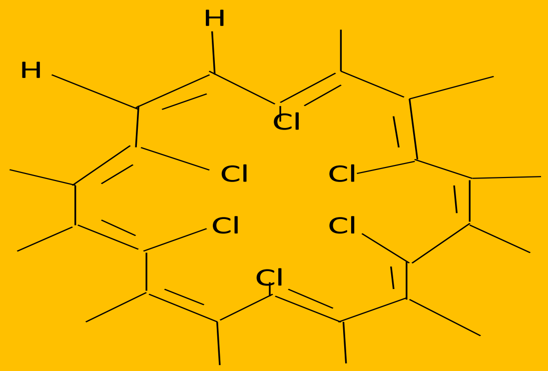


continuation

- This makes the aromatic compound to reassemble and fused together to form a complex structure of aromatic compound

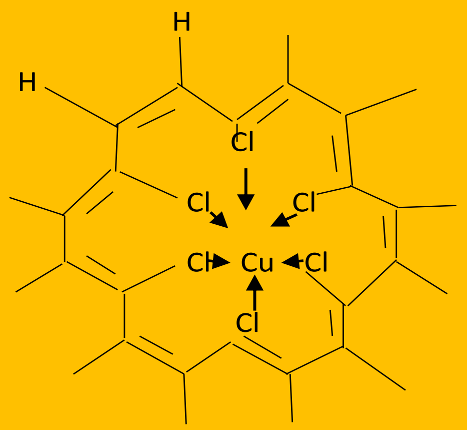


The internal complex aromatic compound will be bond with the chlorine element to Deshields the system, through halogen process/ displacement method

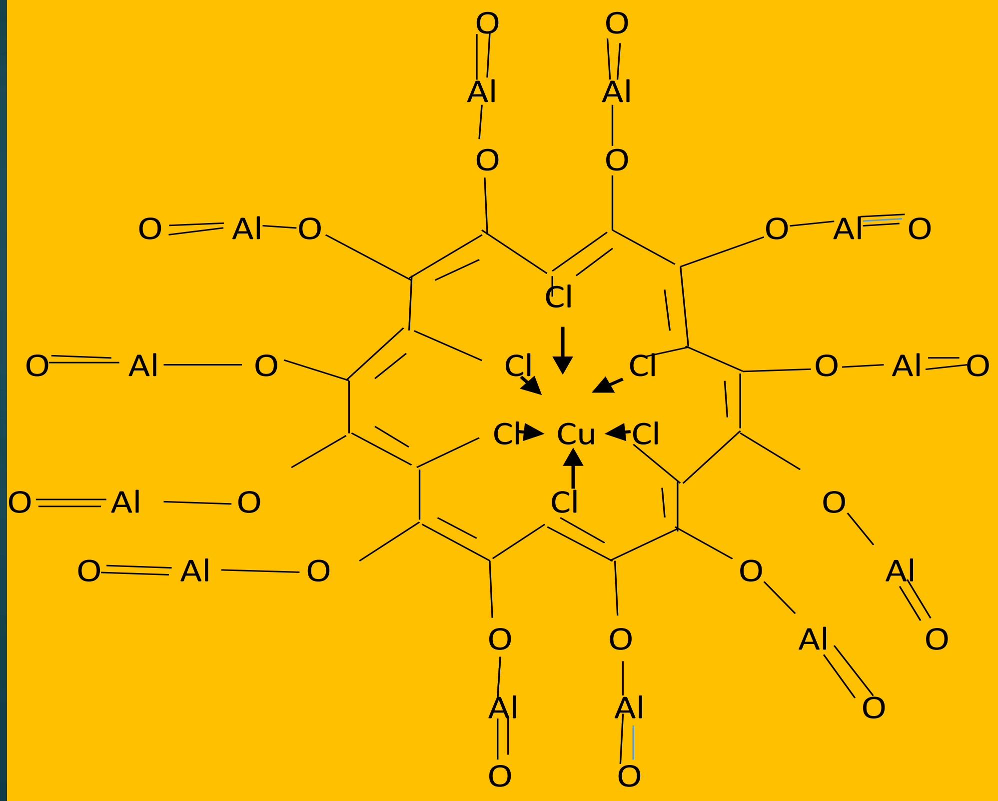


The internal complex aromatic compound will be bond with the chlorine element to Deshields the system, through halogen process/ displacement method

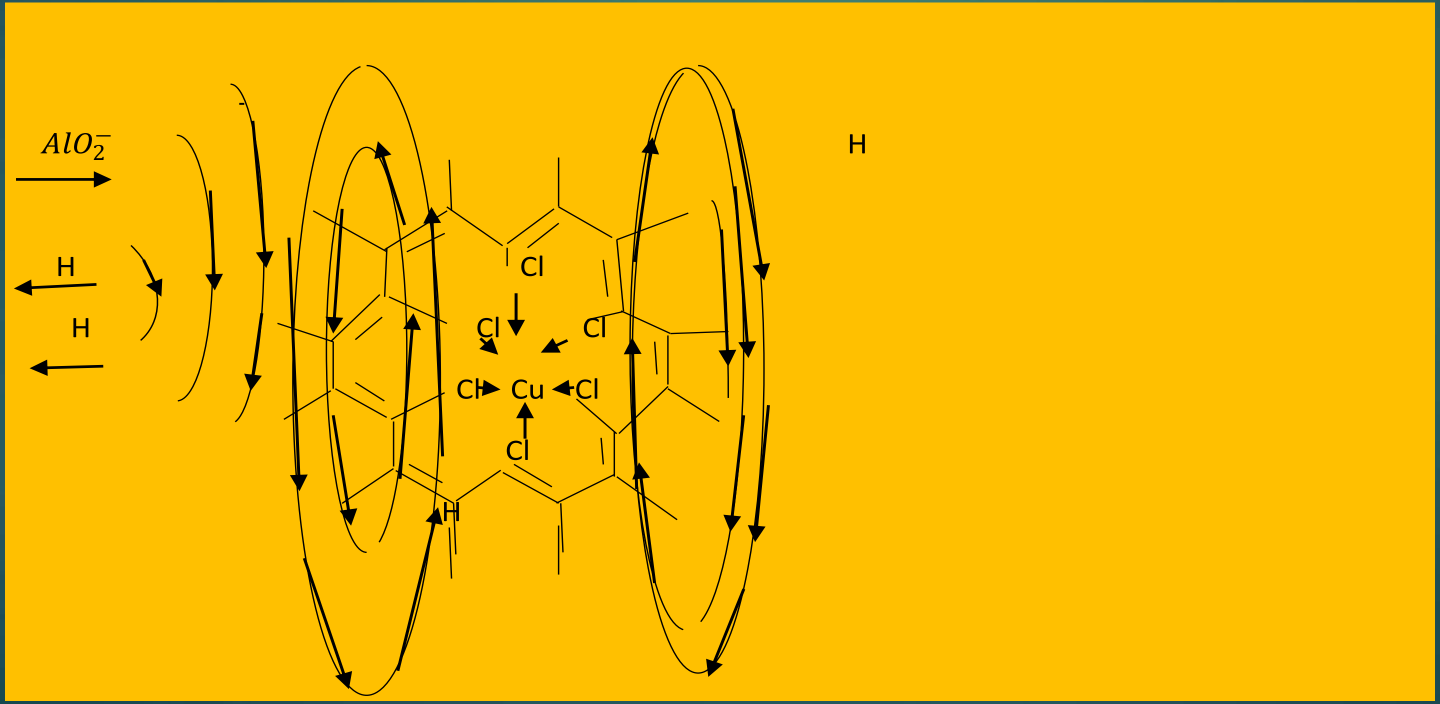
The chlorine donates their lone pair of electron to copper ion vacant space



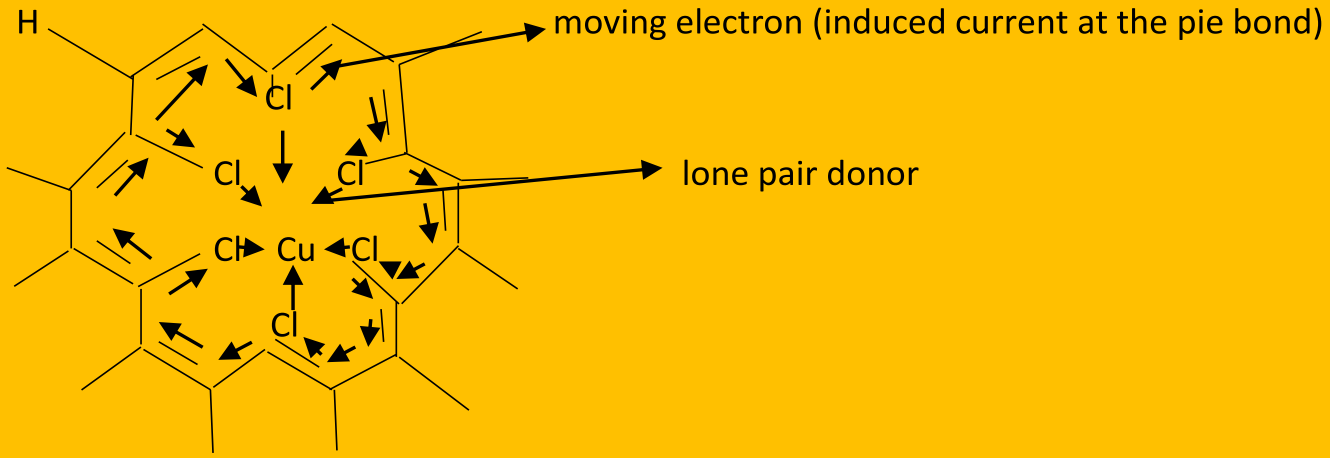
During the charging process the anodic reaction takes place where aluminum oxide was bond to the complex structure



- As a result of anodic reaction aluminum will decomposed into its oxide to form a layer around the complexes aromatic compound , due to the double – single bond in the compound electron tends to drift along the layer of the bond which generates a magnetic field in the opposite direction to the field generated by the aluminum oxide that stimulated it.(silver stein, 1981)



- The drifted electron around the aromatic compound (ring current induced in the delocalized pie electron) , will finally drift through chlorine, due to chlorine electronegativity strength, which attracts the induced current in the carbon complex

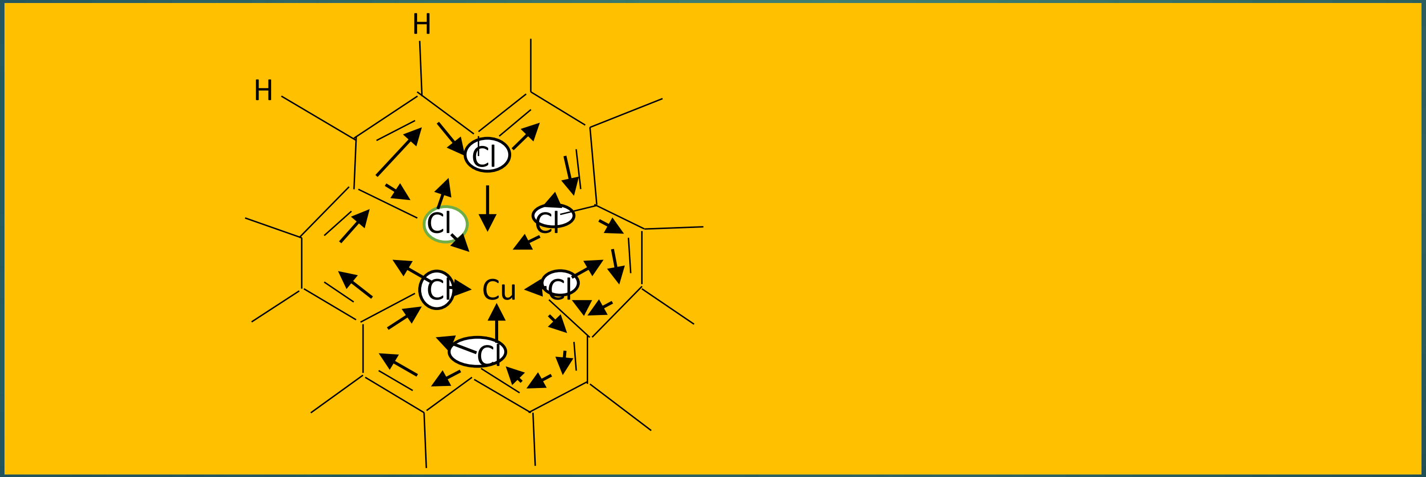


Electronegativity

- The chlorine has a large electron density around its orbit than the carbon, therefore it has a high electric potential to attract electron from the delocalize pie electron of carbon aromatic compound to itself.

Chlorine as diamagnetism

- As chlorine receive an electron from carbon atom, chlorine outer valence will be filled up, at this point chlorine possessed the characteristic of diamagnetism, thereby shielding the current induce in the aromatic compound from reaching out to copper electrode by opposing the field that produces it.



Charging process at the cathode

- At the negative electrode Potassium displace sodium from its chloride, in which sodium react with the aluminum electrode to form sodium aluminate in the presence of pectin amylose and potassium was reduce to salt, in return pectin amylose react with the sodium aluminate, in which sodium displace and replace the hydrogen in amylose there by forming the sodium ethanoate of the amylose,

2NaOH + 2Al + $2H_2O \longrightarrow 2NaAlO_2 + 3H_2$

Function Step three

$2NaAlO_2 + H_2O \longrightarrow Al_2O_3 + 2NaOH$

$Al_2O_3 + 2NaOH + H_2O \longrightarrow 2NaAl(OH)_4$

$2NaAl(OH)_4 \longrightarrow 2Al(OH)_3 + 2NaOH$

Further improvement

- in the initial time sodium hydroxide or potassium hydroxide dissolve aluminum which was converted into potassium aluminate , during the charging of the battery the sodium breaks away from the aluminate , therefore the aluminate becomes a hard coagulant around the positive electrode, with time this will reduce the conductivity of the cell as more coagulation increase at the positive electrode ,this becomes a problem for the cell to retain energy after a period of time therefore with the addition of iron metal in the presence of decomposed potassium hydroxide , aluminate and water in the electrolyte, iron will react with the aluminate ion to form iron aluminate , thus reduces excessive deposition of aluminate ion at the site of positive electrode which reduces the recharging of the cell and enhance the conductivity of the cell.

continuation

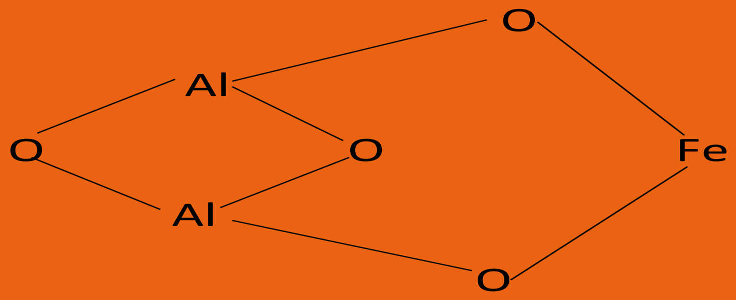
2NaOH + 2Al + $2H_2O \longrightarrow 2NaAlO_2 + 3H_2$

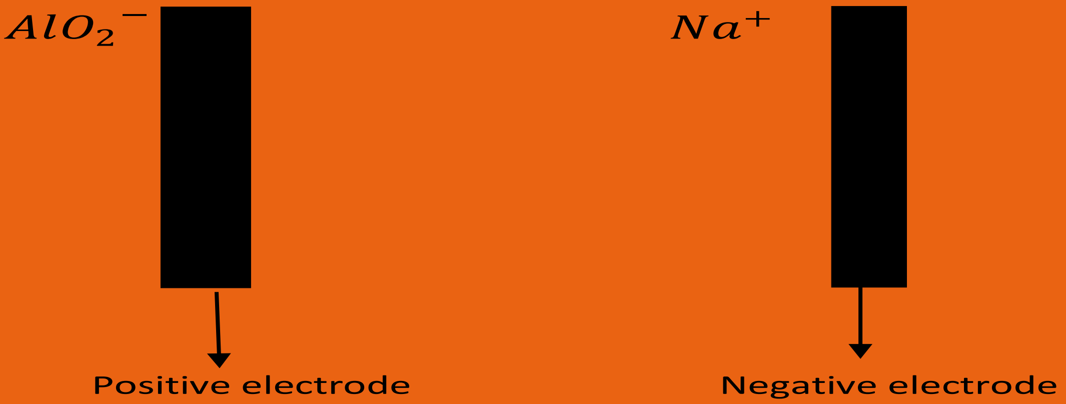
Decomposition of compound by electric field

$AlO_2^- + \quad Na^+$

AlO_2^- was migrated to anode and Na^+migrated to cathode to react with aluminum electrode

$Fe^{+2} + Al_2O_4^{-2}$ $FeAl_2O_4$




AlO_2^{-}

Na^{+}

Positive electrode

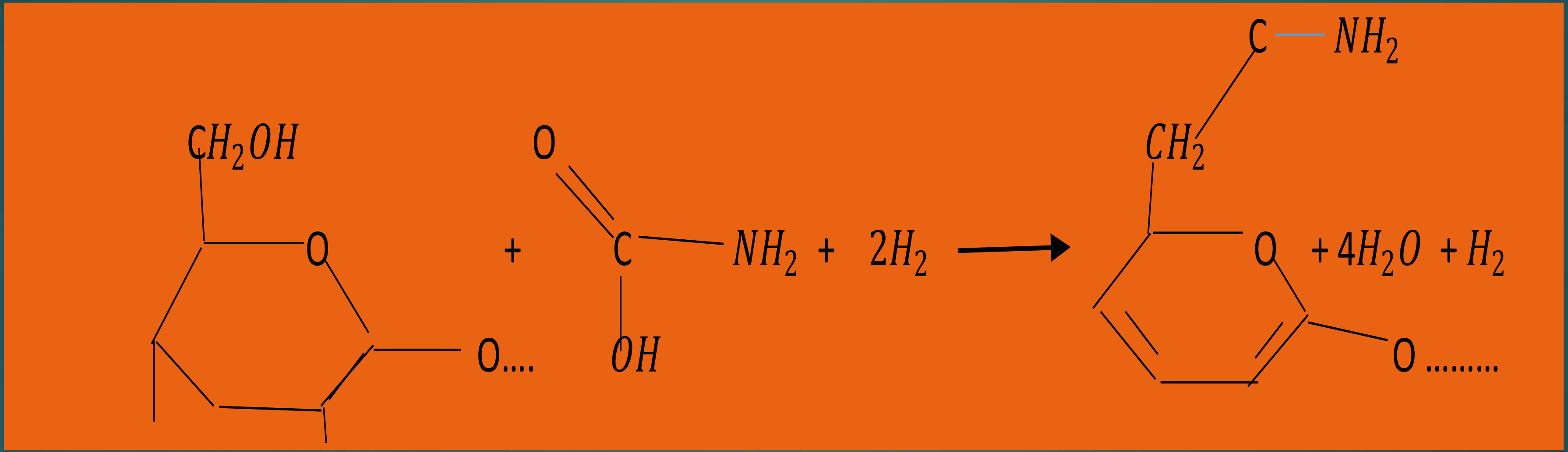
Negative electrode

Discharging Process

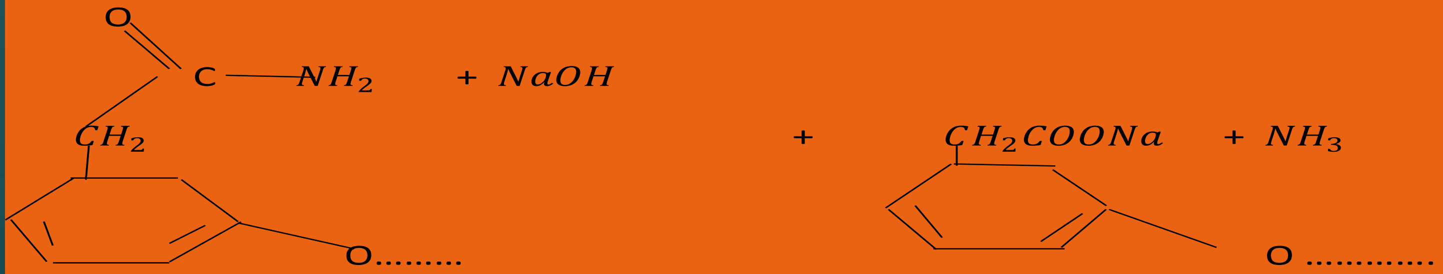
- At discharging process the aluminum oxide ion will ceased to approach the site of positive electrode, thus reduced the magnetic interference at the aromatic compound site, thereby making chlorine to Deshields itself to enable itself to transfer current to the copper metal (which is the current conductor)

Electrolyte

- This concept increases the conductance of the cell when it was reacted with anacardic acid



- The release hydrogen react with the hydroxyl of the amylose to form water, final the sodium hydroxide displace the ammonia from the amylose bond, the ammonia break away from amylose bond, thus, the ammonia goes to the cathode . This concept help to reduce the dissolution of aluminum and thereby increase the life span of the electrode, the ammonia at the cathode help to develop the structure of the cathode.
- This concept reduce local action on the negative electrode



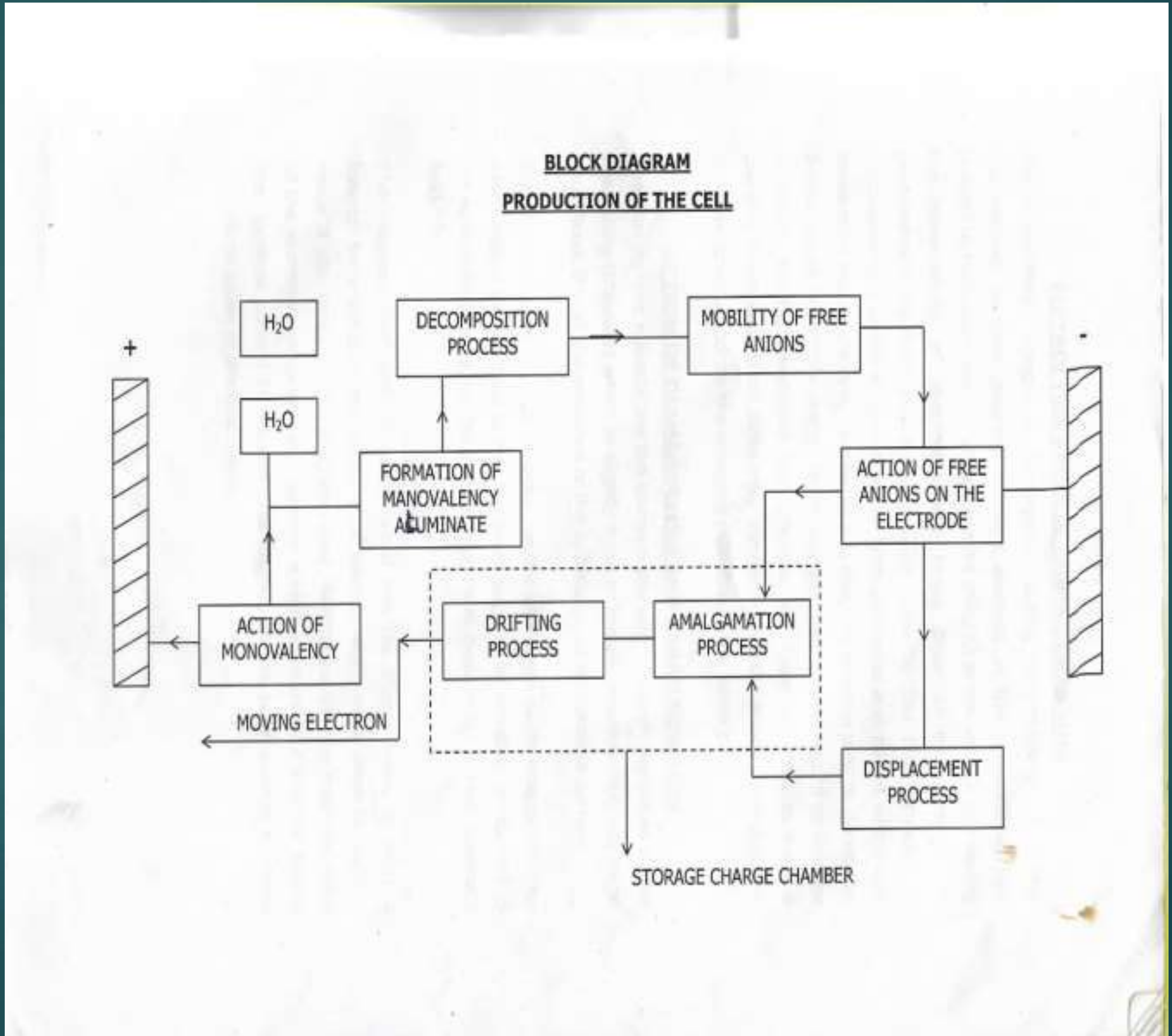
The action of electric field in cis and trans isomers of the electrolyte

- The electric field affect the cis and trans of the electrolyte, during the charging process the electrolyte will be altered to reform into cis isomers where dipoles are induced into the chemical structure of the system, developing dipole to dipole interaction between unit in the polymer, thus creating a coulomb force within the units, as a result of that ions are drifted along the direction of the coulomb force, thereby initiating high conductance in the solution (andere knoesen, 2002)

Discharge

- When the application of the electric field stops, the chemical system reform itself into trans isomers, thereby cancel the charges, and the coulomb force within each unit falls, thus initiate a high resistance in the electrolyte

Diagram of the battery operation



BLOCK DIAGRAM

PRODUCTION OF THE CELL

Mathematical analysis

Increasing dipoles in an electrolyte by using holomorphic equation

Holomorphic equation was used to determine the exponetial increament of current in the cell. A holomorphic function is a complex – valued function of one or more complex variable that is complex differentiable in a neigborhood of every point in its domain , threrfore each complex form of every point converges when differentiated $|an||z_1 - z_0|^n \leq M$ threrfore when particle $|an||z_1 - z_0|^n$= M this becomes cauchy reinman's equation. Cauchy Reinmmans equation says If F is simply connected in the domain D, there is an analytic differential function f on D with F' = f

Therefore intergral of a force on a closed is zero

Therefore

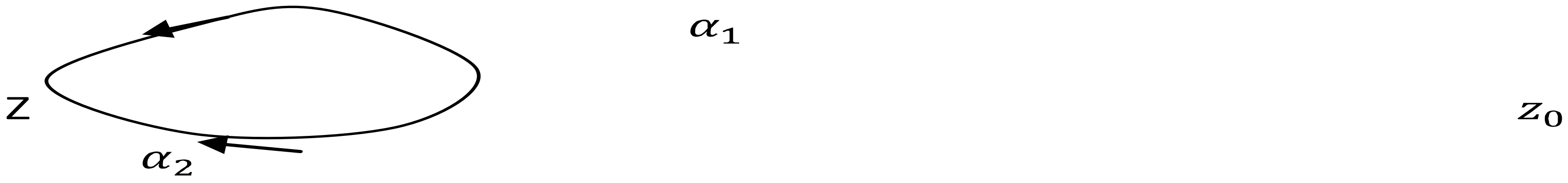


Fig 5; Cauchy Theorem

$\Gamma = \alpha_1 \; - \; \alpha_2 = 0$ is a close curve in D

$$\int_{\Gamma} f(w)dw = 0 \; = \int_{\alpha 1} f(w)dw - \; \int_{\alpha 2} f(w)dw = 0$$

Therefore a close curve is formed where $\alpha_1 - \; \alpha_2 = 0$

Thu$\int_{\alpha 1} f(w)dw - \; \int_{\alpha 2} f(w)dw = zero\ curl = \nabla E = {}^{\rho}/_{\varepsilon} = {}^{Q}/_{V\varepsilon}$

Since the system is holomorphic there will be several charge per volume existing at different point in the domain, with the existence of taylor series in the domain, will result to the total combination of charge per volume in the domain of the system, thus $f(E) + hf'(E) + h^2 f''^{(E)}/_{2!} + h^3 f'''^{(E)}/_{3!} +$,,,,,,,,,,,,,, where h is the distance between the charges in there volume, thus current increases exponentially in the domain of the system. One electrode produces 110mA, two electrode produces 220mA, three electrode produces 330mA, the more the electrodes`

In one one unit cell, the more current density increases

Mathematical derivation for particles under electric field to increase conductance

- From $Q = i \times t$, it was derived to obtain, $B^2 = {}^{F}/_{r^3 a}$,
- Thus $B^2 = {}^{F}/_{V_{OL} \times a}$
- Square both side
- $B^4 = {}^{F^2}/_{V_{OL} \times a^2}$
- Let F =ma
- Angular accelerator, a = ${}^{V_{e2}^2}/_{r_2}$

- Where linear accelerator, a = ${}^{V_{e2}-V_{E1}}/_{t}$
- Let ${}^{r^2}/_{t} = {}^{d_2}/_{t} = v_{e2}$
- $B^4 = (\frac{mv_{e2}^2}{\frac{(v_{e2}-v_{e1})\times r_2\times v_{ol}}{t}})^2$
- Therefore let ${}^{m}/_{v_{ol}} = \rho = density$
- Therefore let $B^4 = \{{}^{\rho v_{e2}^2}/_{v_{e2}}(v_{e2}-v_{e1})\}^2$
- $B^4 = \{\frac{\rho}{\frac{(V_{e2}(v_{e2}-v_{e1})}{V_{e2}^2}}\}^2$

- $B^2 \quad = \quad \frac{\rho}{\sqrt{\{\frac{(v_{e2} - v_{e2})}{v_{e2}}\}^2}}$
- Let $v_{e2} = c$
- $\quad B^2 \quad = \quad \frac{\rho}{\sqrt{\{\frac{(C - v_{e2})}{C}\}^2}}$
- $B^2 = \quad \frac{\rho}{\sqrt{\{1 - \frac{v_{e1}}{c}\}^2}}$
- $B = \frac{\rho^2}{1 - (\frac{v_{e1}}{c})^2}$
-

Result and discussion

- Positive electrode Aluminum
- Negative electrode Copper
- The electrolyte is in paste and liquid form
- Gases evolve are oxygen and hydrogen
- It is more of basic compound
- Current capacity depend on the size of the cell e.g 550mA, 780mA and 860mA per cell
- Voltage capacity of the battery per cell 1.4V
- At full charge temperature drop from 45 ^{0}C - 28 ^{0}C
- The cells can be cascaded into any capacity of current and voltage

Result and discussion

- Current drop on full load of 300mA /2.5V was noted to drop from 185mA – 134.2mA after 1hr therefore the average current was noted to be 162.6mA /hr when on full load of 300mA / 2.5V at 1hr of the cell.
- Cell internal resistance at initial time was 2.7Ohm
- After 1hr the internal resistance was 7.89Ohm when on full load
- Cell dimension; height 5.8cm

Properties of the Extractors / ion Exchange

it possessed the properties of monitoring the conductivity of the electrolyte

it possessed the properties of monitoring the temperature change of the electrolyte

It was developed using an embedded system

It possessed the capability of developing the molecular structure of th electrolyte using electric field effect

The system is been operated by using assembly language

plate III

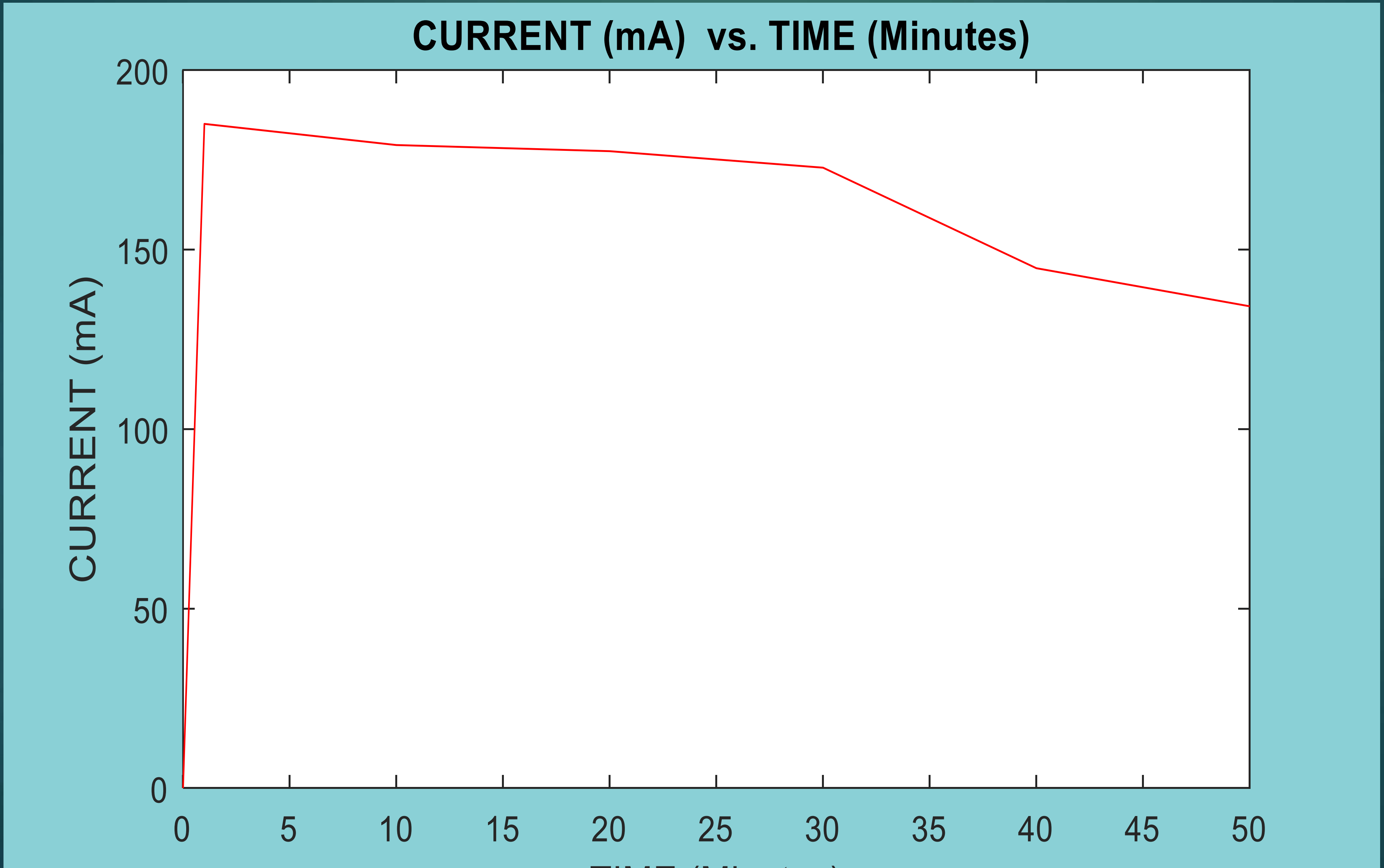
Test and Result

DURATION	ELECTROLYTE USED	THICKNESS OF ALUMINIUM ELECTRODE	INITIAL (V) AT TIME “0”	CHARGER USED	CHARGING DURATION	AFTER CHARGE (v)	DISPLAY TIME	AFTER DISPLAY (V)
10/09/2019	Anarcadic Acid,,,,,,,,,	0.5cm/4cm	1.69v	12V-1.5A	5 mins	2.88v	20mins	2.45v
10/09/2019		0.5cm/4cm		12v-1.5A	10min	2.91v	51min	2.30v
10/9/2019		0.5cm/4cm	1.79V	9V, 500MA	30mins	2.78V	1hr	2.45v
16/09/2019	CALCIUM SILICATE SOLUTION	0.5cm/4cm	1.99v	12v,300MA	10mins	2.60V	5mins	2.08v
16/09/2019	Anarcadic Acid + Solution of Aluminium Complex	0.5cm/4cm	1.79v	9v-500MA	1hr	3.18v	1hr	2.67v
17/09/2019	Pectin Amylose paste	0.5/4cm	2.64V	9V,500MA	1:30hr	3.08V	1:58hr	
18/09/2019	Pectin Amylose Paste	0.5/4cm	2.56V	12V-300MA	30mins	3.14V	1:30hr	2.58V

Test and Result

s/n	Time (minutes)	Current (mA)
1	0	185
2	10	179.1
3	20	177.4
4	30	172.8
5	40	144.8
6	50	134.2

Test and Result



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- Silverstein Bassler morrril (1981) spectrometric identification of organic compounds (9ythed) ISBN 978-0-471_09070-0
- Andre Knoesen, in photoreaction organic film 2002

Conclusion

- This paper was delivered to show case the possibilities on the production of battery for human consumption and to enhance the real value of our country Nigeria

END

- Good Bye