



CHEMICAL SOCIETY OF NIGERIA (CSN)

Anambra Chapter

**13TH ANACHEM CONFERENCE/
YOUNG GRADUATES' WORKSHOP, 2022**

Theme:

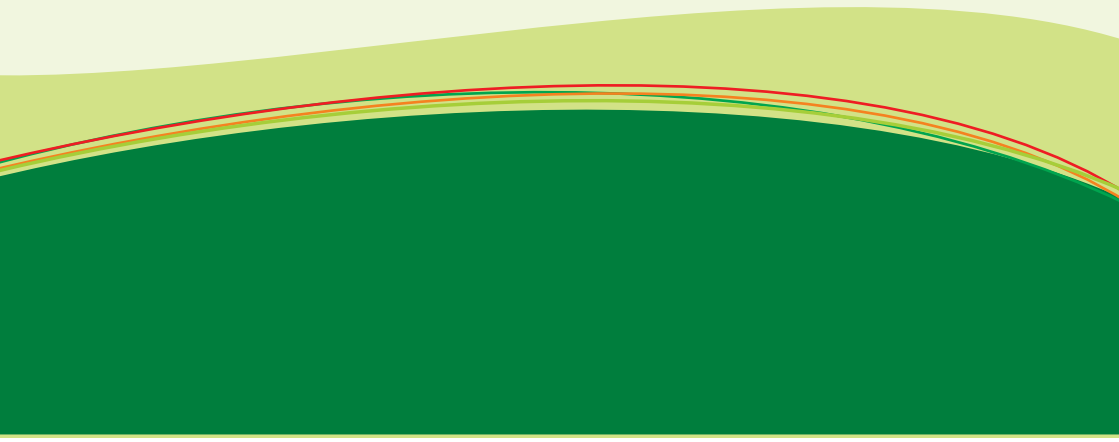
**Acquiring Effective Skills for Chemical
Production & Analysis:
A Panacea for National Development**

Venue: New Auditorium, Extension Site,
Federal Polytechnic, Oko

Date: Tues 29th November - Thurs 1st December, 2022,

Time: 10.00am

Book of Abstracts





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Analytical Chemistry

The Effect of Maize Stalk on the Mechanical and Combustion Properties of Coal Briquettes

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Abstract

In a bid to seek for renewable and alternative sources of energy from agricultural wastes, this work studied the potentials of maize stalk in the production of bio-coal briquettes. Varying samples of briquettes were produced by blending different loads of the maize stalk with coal in the ratios of 0: 100, 20: 80, 40: 60, 60: 40, 80: 20, 100:0, and by compacting them using a screw press with pressure of 12.3kPa. Proximate analyses and total sulphur content of the materials (maize stalk and coal) were determined using standard methods. The metal content of the materials were determined using Atomic Absorption Spectrometer. The physico mechanical and combustion properties of the briquettes were analyzed using standard methods. Results of the analyses showed that the bulk density, compressive strength and durability of the briquettes ranged from $1.986 \pm 0.06g/cm^3$ to $0.895 \pm 0.06g/cm^3$, $1.21 \pm 0.03N/mm^2$ to $2.72 \pm 0.14N/mm^2$ and 0.64 ± 0.01 to 0.79 ± 0.02 . The calorific value, burning time and specific heat consumption of the briquettes ranged from $28.2 \pm 0.21MJ/Kg$ to $21.0 \pm 0.98 MJ/Kg$, $66.05 \pm 0.48 min$ to $30.11 \pm 0.02min$ and $0.28g$ to $0.69g$ respectively. The results showed that the maize stalk enhanced the properties of the coal briquette. The optimum biomass concentration for enhancing the properties of the coal briquette was 60%. The results also proved that the bio-briquettes can serve as fuel for domestic and small scale industrial purposes.

Synthesis, Optimisation and Characterisation of MgO Nanoparticles Using Aqueous Extract of *Hurra crepitance* Leaf

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Abstract

The synthesis of metal oxide nanoparticles with plant extract is a promising alternative to chemical methods; therefore, there is a paucity

of knowledge on biosynthesis. This work aims to biosynthesize *MgO* nanoparticles using an aqueous extract of *Hurra creptance* leaf. The as-prepared *MgO* nanoparticles were prepared based on Response Surface Methodology (*RSM*) at varying operational conditions like *pH*, volume, concentration, and calcination temperature. The as-synthesized nanoparticle was characterized using UV-visible spectroscopy and X-ray diffraction (*XRD*). It demonstrated that the formation of *MgO* in the acidic medium (*pH* ? 7) was not visible, this results from the low amount of hydroxyl ions (*OH*⁻) in the solution, which hinders hydrolysis and condensation processes. The *XRD* results of the biosynthesized *MgO* nanoparticles confirmed their monoclinic crystallite structures at the calcination temperature of 800°C and crystallite size of 15.42 nm. The *HRTEM* and *SAED* patterns of *MgO* exhibited spherical shapes and concentric rings relating to the crystalline nature of the particles for a face-centered cubic structure, respectively. Thus, the *MgO* nanoparticles have the potential for application in catalysis.

Keywords: *MgO nanoparticles, acidic medium, crystallite size, concentric rings, catalysis*

Production of Liquid Soap Using *Aloe Barbadensis* Miller and *Cymbopogon Citratus* Extracts and Antibacterial Properties of the Liquid Soap

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Abstract

This study was carried out to determine the antibacterial activity of liquid soap produced using *Aloe vera* and lemongrass. The *Aloe vera* and lemon grass were extracted and the liquid soaps were produced using the extracts. Evaluation of some of the properties revealed *pH* of 8.3 and 8.9; remarkable foaming heights of 4.8 cm and 5.6 cm for *Aloe vera* and Lemongrass soaps respectively. The two soaps also recorded positive emulsification test results. The test organisms were confirmed by gram stain and biochemical tests and the antibacterial study was

carried out using disc diffusion method. The result revealed that the liquid soap produced using lemon grass had antibacterial effect on *Staphylococcus aureus* (30mm), *Streptococcus* spp (30mm), *Salmonella typhi* (17mm) and *Escherichia coli* (16mm) while it had no antibacterial effect on *Bacillus subtilis*. Aloe vera liquid soap had antibacterial activity on all the test organisms namely; *Staphylococcus aureus* (27mm), *Streptococcus* spp (27mm), *Salmonella typhi* (18 mm), *Bacillus subtilis* (18mm) and *Escherichia coli* (16mm). Liquid soap produced using lemongrass and Aloe vera is therefore concluded to have antibacterial activity and can be used in making antiseptic soaps.

Key Words: *Aloe barbadensis miller*, *Cymbopogon citratus*, Antibacterial, Inhibition.

Determination of the Thermal and Electrical Conductivities of Selected Tropical Woods in Southeastern Nigeria.

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Abstract

The thermal and electrical conductivities in correlation to the oven-dry density (ODD) of 35 selected tropical woods in Nigeria were determined by standard analytical methods. The thermal conductivity range was 5.43×10^{-1} W/mK to 11.168W/mK in which *Harunganamadagascarensis* (ODD of 5.32×10^{-1} g/cm³) was the least while *Spathodeacampanulate* (ODD of 7.86×10^{-1} g/cm³) was the highest. The results obtained showed that *Eucalyptus globules* and *Spathodeacampanulate* with same density had varied thermal conductivities of 1.076W/mK and 1.168W/mK respectively. *Hannoaklaineana* (ODD of 4.03×10^{-1} g/cm³) had the least electrical conductivity of 3.0×10^{-5} S/m while *Diosprosdendo* (ODD of 5.04×10^{-1} g/cm³) had the highest value of 8.52×10^{-4} S/m. Some timbers with equal electrical conductivity had varying ODD as follows: *Lophiralanceolate* and *Khaya senegalensis* (3.8×10^{-5} S/m) had ODDs of 8.9×10^{-1} g/cm³ and 1.106 g/cm³ respectively; *Anthocleistadjalonensis* and *Crescentiacujete* (4.2×10^{-5} S/m) had ODDs of 4.70×10^{-1} g/cm³ and 5.20×10^{-1} g/cm³ respectively; while *Terminaliasuperba* and

Naucleadiderichii (4.3×10^{-5} S/m) recorded ODDs of 4.78×10^{-1} g/cm³ and 8.96×10^{-1} g/cm³ respectively. On the other hand, *Eucalyptus globules* and *Spathodeacampanulate* with the same density of 7.86×10^{-1} g/cm³ had different electrical conductivities of 6.9×10^{-5} s/m and 8.44×10^{-4} s/m respectively. A significant non-linear variation in thermal and electrical conductivities of these samples is observed with respect to their densities. This could be attributed to the variation in botanical families as well as moisture and mineral content of the timbers.

Keywords: *Timber, thermal conductivity, electrical conductivity, oven dry density.*

The Effect of Storage on Antimony Concentration in Some Soft Drinks Sold at 9th Mile, Enugu, Nigeria

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Abstract

Change in sb concentration in some soft drinks under different storage conditions was investigated. Eight different brands of PET bottled carbonated drinks were sampled at 9th mile Enugu, Nigeria and used for the study. The samples were exposed to different storage times and conditions and changes in their antimony levels were monitored. Forty samples were kept at room temperature while forty samples were exposed to sunlight. The drinks were analyzed after 0, 3, 6, 9, 12 and 15 weeks of storage. Eight samples were analyzed immediately before storage and they served as control. The maximum increase in antimony concentration for samples exposed to sunlight was observed in sample1 (0.002-0.015 ppm), while the minimum increase was observed in sample 2 (0.001-0.007 ppm). However, for the samples that were not exposed to sunlight, the maximum increase in concentration of antimony was observed in sample1 (0.02-0.11 ppm), while the minimum increase in antimony concentration was observed in sample 2 (0.001-0.003 ppm). The chronic daily intake was calculated for the samples stored under different storage conditions, using the result obtained from antimony leaching. All samples were found to be below $1.0E-4$ ppm. Implying low risk of cancer from the studied samples within the study duration.

Environmental Chemistry

Assessment of Some Physicochemical Parameters of Water from Lapain Gwari and Talba Fish Pond

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Abstract

In this study, the physicochemical properties of pond water from Lapain Gwari and Talba were investigated. The physicochemical parameters such as pH, temperature, DO, BOD, conductivity, nitrate, total hardness, calcium, chloride, and magnesium of the water ponds were performed using the standard method described by APHA (2015). Some heavy metals in the water samples were analyzed using Atomic Spectrophotometer for chromium, iron, and zinc contents. From the results obtained, it was observed that there were slight variations in different water quality parameters of Lapain Gwari and Talba ponds during the study. The total hardness of Talba pond water ranging from 60 to 76 mg/L, was higher than Lapain Gwari (38 to 66 mg/L). The hardness levels corroborate with the level of Ca and Mg in the pond water. None of the samples analysed contained heavy metals above the permissible limit. The results obtained from this study suggest a non-significant risk to the population.

Keywords: *Physicochemical properties, heavy metals, pond water, permissible limit*

Treatment of an Industrial Wastewater using Modified Snail Shell

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Abstract

This research was aimed at purifying paint effluent using modified snail shell. The snail shell was modified by deproteinization, demineralization and deacetylation. The physico-chemical properties such as surface area, moisture content, ash content, density, pH and pH of zero-point charge (pH_{zpc}) were determined. The effects of the

following experimental parameters: coagulant dosage, settling time and pH on total suspended solid removal from the paint effluent were studied using the laboratory jar test technique. During the coagulation experiment, the modified snail shell dosage, settling time and paint effluent pH were varied (100-500mg/L, 5minutes-30minutes and 2 - 8 respectively) in order to determine their optimum values. The significant effect of the experimental parameters studied was determined using analysis of variance (ANOVA). The results obtained from the characterization of the sample are as follows: surface area, 64.6m²/g; ash content, 8.2%; moisture content, 11.964%; bulk density, 0.962 g/cm⁻³; tapped density, 1.389 g/cm⁻³; true density, 1.667 g/cm⁻³; porosity, 42.29%; pH, 7.9; pH_{zpcr} 6.9. The optimum values obtained from varying the operating parameters are: 500mg/L AA, settling time, 30minutes and pH 8. Modified snail shell was successfully used as an organic coagulant to remove total suspended solids from paint effluent.

Keywords: *Coagulation; Wastewater treatment; Modified Snail Shell; Optimization*

Determination of Heavy Metals and Minerals Content of Selected Green Tea Samples Sold in Kafin Hausa, Jigawa State

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Abstract

Five (5) brands of green tea commonly consumed in Kafin Hausa labeled as CH-GT, MB-GT, ALF-GT, HY-GT and HI-GT respectively were collected from the main market in the town and analysed for heavy metals and some nutrients (Zn, Pb, Cr, Cd, Al, Mg and Mn) using Flame Atomic Absorption Spectroscopy (FAAS). The solutions of the 5 minutes infusion of the five tea samples were potentiometrically determined and found to be neutral, with pH values ranging from 7.1 – 7.6. The heavy metal assay obtained after digesting the samples with concentrated HNO₃ and HClO₄ revealed that concentrations of Zn, Pb, Cr, Cd, Al, Mg and Mn to be in the ranges 0.065–0.800mg kg⁻¹, 0.774–1.429mg kg⁻¹, 0.041–1.205mg kg⁻¹, 0.120–0.240mg kg⁻¹,

0.811–1.757mg kg⁻¹, 2.396–6.354 mg kg⁻¹ and 7.0–15.0 mg kg⁻¹ respectively. Except for Pb, all the metal analysed for in the green teas samples were within the limits set by WHO/FAO.

Keywords: *Flame atomic absorption spectrometry, green tea, heavy metals, infusion, minerals.*

Mechanical Properties of Produced Waste Plastic Composite from Sawdust and Waste Pure Water Sachets Using Maleic Anhydride as Compatibilizer.

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Abstract

Compatibilized and uncompatibilized wood sawdust composites was produced using waste pure water sachets plastics as polymer matrix and sawdust coupled with maleated polyethylene (MAPE) as compatibilizing agent. Compounding of the composite was done in a brabender at a temperature of 130°C into a homogenous mixture and then molded by compression molding method at a pressure of 4pa and temperature of 150°C for 5 mins, using a mixing ratio of 0, 3 & 6 wt. % of MAPE, 0, 20 & 40 wt. % of sawdust and 100, 77, 74, 60, 57, & 54 wt. % of waste pure water sachets. The mechanical properties of the composites were determined. It was observed that the tensile, flexural properties and impact strength decreased with increasing sawdust content for the uncompatibilized composites. This could be as a result of difficulties in achieving homogeneous dispersion of the filler within the matrix structure and poor interfacial bonding between the wood and the matrix. The mechanical properties improved with addition of MAPE especially at 3 wt%, as a result of improved interfacial bonding between wood flour and the matrix.

Keywords: *Composite, MAPE, mechanical properties, Sawdust, Polyethylene.*

Mineral Composition, Nitrate and Nitrite Value in Local Drinks Consumed around Federal Polytechnic, Bida, Niger State

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Abstract

This research focus on local beverages produces and consume in Bida, Niger State and especially within the Federal Polytechnic Bida Campus, where it is highly consumed daily. The most common local beverages consumed within Federal Polytechnic Bida Campus includes Kunun-Aya, Kunun-Zaki, and Zobo drinks. Most persons especially students who consumes these products have no knowledge of the constituents present in them if they give the nutrients the body needs as well as content this that can cause harm. This research focus mainly on nitrate content, nitrite content and mineral constituents of the local beverages. The results for nitrate and nitrite was highest in Kunun-Aya sample which are 0.1013mg/l and 0.6184mg/l which are far below the risk consumption level. Also, minerals present in the Aya samples include K(4.6mg/l), Na(147.2mg/l), Fe(3.9mg/l), Zn(0.333mg/l), Cu(0.3mg/l). This shows that these local beverages is beneficial to the body as it contains both micro and macro nutrients needed by the body and it is safe consumption as it lead value is zero. Periodic checking of all studied parameters for local beverages is recommended.

Keywords: *Kunun-Aya, Kunun-Zaki, Zobo, Local beverage, Nitrate, Nitrite.*

Levels of Contamination of Natural, Packaged Water and Sediments of Nvene Spring in Udi Town of Enugu State Nigeria with Potentially Toxic Metals and Polycyclic Aromatic Hydrocarbons

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Abstract

The continuous accumulation of potentially toxic metals (PTMs) and polycyclic aromatic hydrocarbons (PAHs) in the environment is a global concern. This is because of their adverse health implications. Water sediments are the final depots for natural and anthropogenic components of the ecosystem, and the quality of sediments is a good indicator of pollution in aquatic system. This study aimed to assess the contamination levels of PTMs and PAHs in natural, packaged water, and sediments from a spring. The water and sediment samples were analysed by Atomic Absorption Spectrophotometer (AAS-Cold

Vapour) for Hg, while Pb, Cd, and Cr were determined by Flame Atomic Absorption Spectrophotometer (FAAS). Gas Chromatography coupled with tandem mass spectrometry (GC-MS/MS) was used to determine the PAHs. The results show that the range of Hg, Pb, Cd, and Cr concentrations (mg/ml) in the natural spring and packaged spring water were ND – 0.001, ND – 0.011, ND – ND, and 0.002 – 0.009 respectively. The range of Hg, Pb, Cd, and Cr concentrations (mg/kg) in the sediments were 4.0 – 4.0, 21.0 – 21.0, 1.0 – 1.0, and 19.0 – 19.0 respectively. The concentrations (mg/kg) of the ten PAHs quantified in the sediments ranged from 26.0 – 140.0. The analysis of results revealed that the concentrations of PTMs in the natural spring are within the permissible limit, while the concentrations of Hg, Pb, Cd, and Cr metals in the packaged spring water were above the permissible limit.

Keywords: *Aquatic system; Sediments; Contamination; PTMs; PAHs*

Evaluation of Physicochemical and Heavy Metal Analysis of Abattoir Wastewater from River Landzu, Bida, Nigeria

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Abstract

The evaluation of physicochemical and heavy metal analysis of Abattoir waste water upstream and downstream analysis were carried out. The triplicate results of upstream were: Temperature (28.5 ± 0.47), pH (8.7 ± 0.61), Dissolved Oxygen (6.76 ± 0.22 mg/l), Electrical Conductivity ($\mu\text{S/cm}$) (3220.5 ± 0.43), Biochemical Oxygen Demand (289.6 ± 0.35 mg/L), Chemical Oxygen Demand (698 ± 0.44 mg/l), Total Dissolve the Solid (844.7 ± 0.35 mg/l), Nitrate (29.7 ± 0.29 mg/L), Sulphate (324.5 ± 0.28 mg/L), Chloride (223.0 ± 0.33 mg/L), Zinc (0.05 ± 0.28 mg/L), Iron (1.23 ± 0.19 mg/L), Cadmium (0.03 ± 0.19 mg/L), Lead (mg/L) BLD and Nickel (0.06 ± 0.56 mg/L), While the downstream result were: Temperature (29.7 ± 0.42), pH (6.5 ± 0.59), Dissolved Oxygen (5.50 ± 0.23 mg/L), Electrical Conductivity (4394.40 ± 0.40 $\mu\text{S/cm}$), Biochemical Oxygen Demand (312.9 ± 0.33 mg/L), Chemical Oxygen Demand ($698 \pm 0698 \pm 0.44$ mg/L), Total Dissolve the Solid (768.09 ± 0.35 Lmg/L), Nitrate (41.23 ± 0.34 mg/L), Sulphate (475.7 ± 0.31 mg/L), Chloride

(251.07±0.35 mg/L), Zinc (0.07±0.28 mg/L), Iron (2.06±0.21 mg/L), Cadmium (0.04±0.19 mg/L), Lead and Nickel were beyond detectable limit. The result indicate that upstream and downstream wastewater are beyond the acceptable limit of WHO standard it is therefore important that abattoir waste water be treated before discharge to avoid pollution of environment and the destruction of entire aquatic life.

Key Words: *Abattoir, untreated, discharge, solid waste, semi-solid waste, impact on upstream and downward stream.*

Determination of the Thermal and Electrical Conductivities of Selected Tropical Woods in Southeastern Nigeria.

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Abstract

The thermal and electrical conductivities in correlation to the oven-dry density (ODD) of 35 selected tropical woods in Nigeria were determined by standard analytical methods. The thermal conductivity range was 5.43×10^{-1} W/mK to 1.185 W/mK in which *Harungana madagascariensis* (ODD of 5.32×10^{-1} g/cm³) was the least while *Myrianthus aboreus* (ODD of 7.06×10^{-1} g/cm³) was the highest. The results obtained showed that *Eucalyptus globules* and *Spathodea campanulate* with same density had varied thermal conductivities of 1.076W/mK and 1.168W/mK respectively. *Hannoa klaineana* (ODD of 4.03×10^{-1} g/cm³) had the least electrical conductivity of 3.0×10^{-5} S/m while *Diospros dendo* (ODD of 5.04×10^{-1} g/cm³) had the highest value of 8.52×10^{-4} S/m. Some timbers with equal electrical conductivity had varying ODD as follows: *Lophira lanceolate* and *Khaya senegalensis* (3.8×10^{-5} S/m) had ODDs of 8.9×10^{-1} g/cm³ and 1.106 g/cm³ respectively; *Anthocleista djalonensis* and *Crescentia cujete* (4.2×10^{-5} S/m) had ODDs of 4.70×10^{-1} g/cm³ and 5.20×10^{-1} g/cm³ respectively; while *Terminalia superba* and *Nauclea diderichii* (4.3×10^{-5} S/m) recorded ODDs of 4.78×10^{-1} g/cm³ and 8.96×10^{-1} g/cm³ respectively. On the other hand, *Eucalyptus globules* and *Spathodea campanulate* with the same density of 7.86×10^{-1} g/cm³ had different electrical conductivities of 6.9×10^{-5} s/m and 8.44×10^{-4} s/m respectively. A significant non-linear variation in

thermal and electrical conductivities of these samples is observed with respect to their densities. This could be attributed to the variation in botanical families as well as moisture and mineral content of the timbers.

Keywords: *Timber, thermal conductivity, electrical conductivity, oven dry density.*

Proximate Compositions of Plantain and Banana Peels – A Potential Additive to Animal Feed

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Abstract

Plantain and banana peels were assessed for their nutritional composition using a proximate analytical method. The protein, ash, moisture, crude fibre, fat and carbohydrate content were proximately determined on the peels recovered as waste from plantain roasted and bananas eaten at Ezioko area using standard AOAC methods. The result showcased that both peels from plantain and banana have high carbohydrate content (72.21%, 70.35%), next is crude fibre (8.80%, 8.51%), followed by ash content (7.81%, 6.66%), protein (4.58%, 7.47%), moisture (3.50%, 5.00%) and crude fat (3.12%, 2.01%) respectively. The result of the peels' nutritional composition indicated that the peels from both banana and plantain (ripened or unripened) can contribute immensely to the required nutritional composition of animal feed if well blended.

Keywords: Plantain, Banana, Peel, Proximate composition

Inorganic Chemistry

Preparation of Snail Shell Reinforced Activated Carbon for The Removal of Pb²⁺ And Zn²⁺ Ions from Aqueous Medium

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Abstract

The study was conducted to look into the removal of Pb²⁺ and Zn²⁺ ions from aqueous solutions by snail shells reinforced activated carbon as adsorbent. This was done in light of the rising lead and zinc pollution rate caused by industries discharging lead and zinc-containing effluents into the environment. In this study, powdered snail shells were carbonized in a furnace and the carbonized shells were chemically activated using a ZnCl₂ solution. The activated-carbonized shells were reinforced using dried powdered shells to produce the adsorbent. The produced adsorbent was characterised using FTIR, which showed the presence of the absorbance peaks at 1645.51 cm⁻¹ and 1474.09 cm⁻¹ indicating the presence of N-H and O-H groups that could act as active sites for the metal ions. To determine the best conditions to use for decontaminating effluents containing Pb²⁺ and Zn²⁺ ions, the effects of contact time, adsorbent dosage and stirring speed on adsorption were explored. According to the study, these substances are effective adsorbents that can remove Pb²⁺ and Zn²⁺ from an aqueous solution. Freundlich and Javonovic isotherm models were tested to show that the adsorption isotherms data for Zn and Pb using snail shells reinforced activated carbon best fitted the Jovanovic isotherm model. However, both models were shown to be consistent with the Pb²⁺ and Zn²⁺ ions adsorption by snail shells reinforced activated carbon. The use of these materials for the removal of lead and zinc ions from aqueous solution is therefore advocated.

Keywords: Snail Shell, Activated Carbon, Heavy metals, Wastewater

Production of Medicated Hair Cream Using Extract Blends of Bryopyllum Pinnatum Leaves, Curcuma Longa and Persea Americana Oils.

Anyaoora Francis Chinonye and Uzu Chinedu Aja

Abstract

This study is aimed at producing medicated hair cream using extract blends of *Bryopyllum pinnatum* (Odaa opue) leaves, *Curcuma longa* and *Persea americana* oils. The extraction was done using solvent extraction method with N-hexane as the solvent through soxhlet extractor. The percentage oil yields, were 18.30%, 22.45% and 41.05% for *B. pinnatum*, *Curcuma longa* and *Persea americana* respectively. The blended oil was used in producing the hair cream. The results of the formulated hair cream (percupinna) indicated that the pH was 5.50, specific gravity 0.89 and density 0.89. It had orange Colour with pleasant Odour. Volunteers with dandruff were treated within 12 days of application to ascertain the effectiveness. This confirmed that with local plant materials, an effective, cheap and environmentally friendly medicated hair cream was formulated hence, this product is recommended for homes, individuals, pharmaceutical companies, health organization in treating topical issues related to skin infections caused by microbes.

Keywords: *Bryopyllum pinnatum*, *Curcuma longa*, *Persea americana*, medicated hair cream, oils.

Parametric Effects and Optimization of Biodiesel Production from *Hevea Brasiliensis* Oil by The Taguchi Approach

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Abstract

For cost-effective biodiesel production, optimization of the process variables is essential to the process efficiency. Thus, a Taguchi orthogonal array was used to investigate the effects of ethanol/oil molar ratio, catalyst loading, reaction time and temperature on the transesterification of *Hevea brasiliensis* oil using a heterogeneous catalyst developed from agricultural wastes. Analysis of Variance (ANOVA) was used to conduct the regression analysis in order to evaluate the model's applicability and study how the final ethyl ester

conversion changed in response to the parameters under investigation. The F-value and p-value obtained for the model were 29.89 and 0.0327, respectively, which confirmed its statistical significance. It was observed that temperature with a contribution factor of 44.27% was the most significant parameter influencing ethyl ester yield, followed by the molar ratio of ethanol to oil (39.51%) and catalyst loading (15.11%). Reaction time has the lowest contribution factor (1.10%). The optimum conditions obtained from this study were an ethanol to oil molar ratio of 9:1, catalyst loading of 1.5 wt.%, a temperature of 60 °C and a reaction time of 40 min with an ethyl ester yield of 93.05 wt.%. This study thus shows that the selected model is capable of predicting the optimum conditions for biodiesel production.

Keywords: *Hevea brasiliensis* oil, heterogeneous catalyst, Taguchi method, transesterification

Kinetics of Naproxen Removal from Aqueous Media Using Cellulose Based Polyurethane Polymer

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Abstract

The current study is aimed at investigating the kinetics of Naproxen adsorption using a novel cellulose based polyurethane polymer adsorbent (CPPA). CPPA was synthesized by cross-linking cellulose with 4,4 methylene diphenyldiisocyanate (MDI) in the presence of dimethylformamide (DMF). The kinetics of the adsorption was studied by conducting adsorption for varying durations to understand the adsorption mechanism and the effect of time on adsorption process. The fourier transform infrared result (FTIR) confirmed successful synthesis. The relevant infrared peaks of the FTIR result indicated successful cross-linking of the cellulose. The kinetic plot of the experimental data showed that the rate of adsorption decreased with time. Analysis of the kinetic data showed that the adsorption kinetic data fitted pseudo second order model better than first order. This implies that the adsorption process was more of second order process. Overall, the kinetic study showed that adsorption equilibrium was

attained within a reasonable time of three hours. This observation is a desirable development for the engineering design of water treatment facilities which demands short adsorption time. This shows that the synthesized adsorbent has great industrial potential which can be harnessed for pharmaceutical treatment of water pollution.

Keywords: Adsorption, equilibrium, cross-linking, cellulose, kinetics.

Comparison On the Active Ingredients in The Two Commercial Toothpaste (Close-Up and Colgate) And Dental Powder (Dr. Agnes Nwamma)

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Abstract

The active ingredients in two commercial toothpastes (Close-up and Colgate) and dental powder (Dr. Agnes Nwamma) were analyzed and compared. Proximate analysis showed that close-up has a higher fluoride content (13.353 mg/l) than Colgate (11.984 mg/l) and Dr. Agnes Nwamma (11.309 mg/l). Moisture content (4.995%) and pH value (7.2) are higher in Colgate than Close –up and Agnes Nwamma while phosphate content (2.465 mg/l) is higher in Dr. Agnes Nwamma than the commercial toothpastes. This indicates that the active ingredient in toothpaste and Dental powder is fluoride. The label contents showed higher than the actual contents in Close-up, Colgate and Agnes Nwamma. Other minerals such as calcium, potassium, magnesium and sodium were tested for and the result showed that Close-up has no magnesium content.

Keywords: Active Ingredients, Cavity, Plaque, Remineralisation, Teeth Whitening

Organic Chemistry

Ameliorative Effect of Pumpkin Oil (*Cucurbita Pepo* L.) Against Tramadol-Induced Renal Toxicity in Albino Rats

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Abstract

Effect of *Cucurbita pepo* seed oil (CPSO) on some biochemical parameters of tramadol-induced toxicity were investigated using a total of fifty six (56) Albino rats. The rats were randomly grouped into seven (7) (1-7, n=8). Rats in group 1 (Normal control) were given water and feed; rats in group 2 were administered 5 ml/Kg body weight (b.w) of normal saline. Group 3-6 were administered tramadol at the dose of 100 mg/Kg in order to cause toxicity. Group 3 (TM control group) was left untreated; Groups 4, 5 and 6 (TM-CPSO treated groups) received 5, 2.5 and 1.5 ml/Kg of CPSO, respectively. Group 7 (CPSO group) received 5 ml/Kg of CPSO only. The entire group were allowed free access to water and feed without restriction and the treatments were done by oral intubation once daily for 42 days. Kidney function parameters were determined in the serum using standard methods. Serum levels of uric acid, urea and creatinine increased significantly ($p < 0.05$) following administration of TM. However, treatment with CPSO significantly restored the activities and levels of the altered biochemical parameters in a dose-dependent manner. The study reveals that TM-induced renal toxicity, however, CPSO was able to reverse the toxicity, thus could be relevant in the clinical management of renal disorders.

Keywords: Pumpkin Oil, Tramadol, Renal, Toxicity and Albino Rats

Synergistic Effects of Essential Oils from *Kalanchoe Pinnatum* (Odaa Opue) *Cymopogium Citratum* (Lemon Grass and Formulated Massaging Ointment)

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Abstract

In this present study, locally harnessed plants; *kalanchoe pinnatum* and

cymbopogium citratum leaves essential oils obtained through steam distillation method using Clevenger and cold extraction method using 80 percent methanol were used in the formulation of environmentally friendly massaging ointment. The extract blends (crude and essential oils) in different ratios (2:8, 4:6, 6:4, 8:2, 0:5, 5:0 and 5:5) g: g serially were used in the formulation of the ointments. The products were evaluated in the laboratory bioassay for using liquid paraffin negative control and deep heat standard formulation Human volunteers were rubbed with the product at the exposed area of the pain or inflammation. The results of the formulation gave positive response in 3 to 4 days. Therefore, with locally available, low cost plants *kalanchoe pinnatum* and *cymbopogium citratum*, biodegradable, environmentally friendly and cheap muscle pain product was explored. It was observed that increase in anti inflammatory properties of the product was highest in ointment formulations 6:4 blends. We recommend this product to general public to reduce muscle pain and restore the synovial fluid decrease at the joints of affected persons.

Keywords: *Cymbopogium Citratum*, *Kalanchoe Pinnatum*, Essential Oil, massaging ointment.

The Use of *Gongronema latifolium* (utazi) As A Medicinal Plant and Natural Product Chemistry: A Penacea for National Development.

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Abstract

In Nigeria, various indigenous plants are used both as food and as medicine. Information on their medicinal properties has not been fully studied and documented. Example of these plants is *Gongronema latifolium*. This work investigated and compared the phytochemical screening of twig and bark of *Gongronema latifolium* (utazi) plant. The phytochemical compositions of the sample were determined by Harborne methods. The results for the medicinal composition of twig and bark of *Gongronema latifolium* (utazi) plant show that the alkaloid, flavonoids, Saponin, glycoside phenol and tannin to be 11.80 ± 0.1 ,

7.50±0.1, 3.30±0.1, 8.79±0.03, 10.45±0.0, and 12.85±0.05 respectively while that of the bark of *Gongronema latifolium* (utazi) shows that the alkaloid, flavonoids, Saponin, glycoside phenol and tannin to be 5.30±0.1, 1.7±0.1, 9.7±0.1, 9.70±0.03, 0.044±0.02 and 19.60±0.07 respectively. The barks of *Gongronema latifolium* (utazi) are rich in Saponin, and glycosides, when compared to the twig of the same plant part. Comparatively, the twigs of *Gongronema latifolium* (utazi) are rich in flavonoids, alkaloids and phenol when compared to the flavonoids, alkaloids and phenol of the bark of *Gongronema latifolium* (utazi). The presence of glycosides and saponin at relatively high quantities in the bark of *Gongronema latifolium* indicates the potentials of the plants part in the management and treatment of atherosclerosis, congestive heart failures and lowering plasma cholesterol level.

Keywords: *Gongronema latifolium*, Medicinal Plant, Twig, Bark.

Evaluation of Fat Soluble Vitamin Contents of Four Seed Oil Crops Commonly Consumed in South Eastern Nigeria.

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Abstract

Historically, classical deficiencies of vitamins were directly correlated with several pathological manifestations such as night blindness (due to Vitamin A deficiency), osteomalacia (due to Vitamin D deficiency), oxidative stress (due to Vitamin E deficiency), and hemorrhage (due to Vitamin K deficiency). However, over the past decade vitamins, A and D, in particular, have been associated with more complex disorders such as cancer and autoimmune diseases. Hence, this research was carried out to determine the composition of fat soluble vitamin in *Treculia africana* (Breadfruit), *Artocarpus heterophyllus* (Jackfruit), *Telfaira occidentalis* (Ugu) and *Moringa oleifera* seed oil crops commonly consumed in South Eastern Nigeria. The vitamin composition was carried out using AOAC method of analysis. The results for the comparative fat soluble vitamin composition of *Treculia africana* (Breadfruit), shows that the vitamin A, vitamin D, vitamin E and vitamin K to be 30.93±0.01mg/L , 29.95±0.01 mg/L, 31.56±0.02 mg/L and

14.52±0.03 mg/L respectively while *Artocarpus heterophyllus* (Jackfruit), shows that the vitamin A, vitamin D, vitamin E and vitamin K to be 7.23±0.2 mg/L, 1.73±0.4mg/L, 9.37±0.0mg/L and 18.7±0.3mg/L respectively while *Telfaira occidentalis* (Ugu) shows that the vitamin A, vitamin D, vitamin E and vitamin K to 19.7±0.01mg/L, 8.6±0.01mg/L, 4.8±0.03mg/L and 21.1±0.04mg/L respectively while *Moringa oleifera* shows that the vitamin A, vitamin D, vitamin E and vitamin K to be 11.3±0.1mg/L, 6.12±0.1mg/L, 78.30±0.1mg/L and 30.60±0.1mg/L respectively. The research was able to validate that this seed oils are good sources of this crude vitamins. Its choice of consumption to consumers in the diet would reduce the occurrence of nutritional deficiency such as night blindness, osteomalacia, oxidative stress, hemorrhage and other associated health problem usually encountered by people of South Eastern Nigeria.

Keywords: *Treculia africana*, *Artocarpus heterophyllus*, *Telfaira occidentalis* and *Moringa oleifera*

Synergistic Effect of Extracted Oils from *Cocos Nucifera*, *Azadirachta Indica* and *Curcuma Longa* in Formulation of Natural Anti- Scabies Herbal Ointment

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Abstract

Scabies is a skin infection caused by a microscopic mite (*Sarcoptes scabiei*) that burrows into the skin. In this present study, locally harnessed plants synergistic effect of extracted oils from *cocos nucifera*, (*coconut*), (*azadirachta indica*) *neem* and *curcuma longa* (*turmeric*) in formulation of natural anti scabies herbal ointment. *Neem* Leaves essential oil obtained through steam distillation method using Clevenger and cold extraction method using 80 percent methanol, coconut and tumeric oils via solvent extraction were used in the formulation of environmentally friendly anti scabis ointments. The extract blends (crude and essential oils) in different ratios (2:8:5, 4:6:5, 6:4:5, 8:2:5, 0:5:5, 5:0:5 and 5:5:5) g: g (*neem: turmeric: coconut oils*) respectively were used in the formulation of anti-scabis ointments. The

products were evaluated in the laboratory bioassay using topical rubbing technique. Liquid paraffin negative control and ointment standard formulation were used on human volunteers, the formulations (ointments) were rubbed at the exposed area of the muscle pain. The results indicated that the mechanism of the acaricidal activity of octadecanoic acid-3,4-tetrahydrofuran diester was mainly achieved through interference with the energy metabolism of mites, thus resulting in insect death. The doses 8:2:5 formulation gave the fastest recovery response. This is in conformity to the standard sodium benzoate formulation. Therefore, with locally available, low cost plants biodegradable, environmentally friendly and cheap restorative/ pain relief ointment was explored. We recommend this organic ointment to pharmaceuticals and general public.

Keywords: Ointment, *Sarcoptes scabiei*, (coconut), (azadirachta neem and turmeric)

A Comparatives Study on the Antioxidant Properties of Leaves and Seeds of *Telfaira occidentalis* (Ugu) As Popular Vegetable Used in Southeastern Nigeria

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Abstract

Presently, the probable toxicity of synthetic antioxidants has been condemned. It is strongly believed that regular consumption of plant-derived nutrients from *Telfaira occidentalis* may drift the balance toward an adequate antioxidant status, but these claims are not well documented. Thus, in recent years, interest on natural antioxidants, especially of plant origin, has increased manifolds. Hence, this research was carried out to determine and compare the antioxidant presents in the leaves and seeds of *Telfaira occidentalis* commonly consumed in Southeastern Nigeria. The antioxidant determination was carried out using AOAC method of analysis. The results for the comparative antioxidant composition of *Telfaira occidentalis* seeds shows that the vitamin C, lycopene, flavonoids, phenols, vitamin E and β -carotene to

be $11.22 \pm 0.02 \text{mg}$, $25.86 \pm 0.1 \text{mg}$, $20.25 \pm 0.2\%$, $3.94 \pm 0.0 \text{mg}$, $5.64 \pm 0.04 \text{mg}$, and $333.16 \pm 0.3 \text{mg}$ respectively while that of the leaves of *Telfaira occidentalis* shows that the vitamin C, lycopene, flavonoids, phenols, vitamin E and β -carotene to be $16.87 \pm 0.01 \text{mg}$, $63.82 \pm 0.4 \text{mg}$, $8.75 \pm 0.2\%$, $1.44 \pm 0.0 \text{mg}$, $35.73 \pm 0.03 \text{mg}$ and $210.94 \pm 0.3 \text{mg}$ respectively. This result is summarized in 4.1, 4.2 and 4.3 respectively. The research was able to validate that *Telfaira occidentalis* seeds are good source of dietary vitamin C, essential for formation of collagen, blood and hormones, development of bones, teeth, prevention of scurvy and as antioxidants against free radicals.

Keywords: *Telfaira occidentalis*, Southeast, Antioxidant, Leaves, Seeds.

Mineral Compositions of Plantain (*Musa Paradisiaca*) Peels and Dry Beans (*Vigna Unguiculata L.*): The Effect of Their Combination on the Cooking Time of Beans

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Abstract

Bean seeds, when cooked, are commonly consumed in most parts of the world, as a cheap source of protein and other nutrients, but it takes a relatively prolonged time to cook. This study analysed plantain (*Musa paradisiaca*) peels for its metal composition and application in the reduction cooking time of beans. The black-eyed pea (*Vigna unguiculata L.*) variety of beans and peels of unripe plantain were analysed for selected metals by atomic absorption spectroscopy using wet digestion method. About 3g of the raw bean seeds in deionised water with unripe plantain peels were cooked on a large electric cooker. A control experiment consisting of the beans (3g) and deionised water was investigated. Finger pressing method was used to ascertain when the seeds were properly cooked. The average metal concentrations (ppm) in the dry bean seeds were 38.67 (K); 6.89 (Na); 11.33 (Ca); 9.71(Mg); 0.12 (Zn); 0.49 (Fe), 0.00 (Cu), 0.23 (Cr) and 0.00 (Mn). For the plantain peels, the average metal concentrations were 24.52 (K); 7.04 (Na); 14.00 (Ca); 5.29(Mg); 0.00 (Zn); 1.47 (Fe), 0.03 (Cu), 0.12 (Cr) and

0.00 (Mn). The results revealed that the beans treated with plantain peels cooked ten minutes earlier than the control experiment. This may be due to a displacement reaction in which potassium and sodium in the plantain peels displaced calcium and magnesium, the two cations which contribute to the hardening of beans. This research shows that energy and time can be saved on cooking beans with plantain peels.

Keywords: Black-eyed pea, plantain peels, finger pressing, energy, metals, atomic absorption spectroscopy.

Evaluation of Anti Diabetic and Analgesic Properties of *Cassia Occidentalis* Lin Leaves

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Abstract

Natural remedy remains the most sustainable means of tackling health problems. Diabetes mellitus is a disease caused by defect in insulin secretion in the body which results in production of oxygen free radical. In this present study, anti diabetic and analgesic properties of local indigenous plant *Cassia occidentalis* L leaves were evaluated using solvent extraction methods. Soxhlet extractor apparatus was used to extract the secondary metabolites with 80% ethanol while distillation method via apparatus was used to recover the ethanol solvent used in the extraction. Phytochemical screening was done using the ethanolic extract via Harbone methods of identification using specific solvents. Phytochemical constituents include like Alkaloids (++), flavonoid (+++), tannins (++), steroids (++), glycosides (++), phenols (+++) and saponins (++), high flavonoid were present at different intensities, these proved the use of the plant as immune enhancer and antioxidant. Also high level of alkaloid and tannins proved the efficacy of the plant as analgesics and anti inflammatory hence their anti bactericidal and antifungal properties. Their pharmacological tests on animals showed no toxic effect and reduces the hyperglycemic level in an Alloxan induced mice by an improvement in the lipid profile as well regeneration of β -cells of pancreas and so might be value in treatment of diabetes. Therefore, we recommend this project work to

pharmaceuticals to be incorporated in the requirement in the management of diabetes mellitus disease and to general public especially poor people because it is cheap, environmentally friendly with no side effect when compared with synthetic remedies that causes skin raches, dizziness, sweating.

Key words: *Cassia occidentalis*, Diabetes melitus, Phytochemical, Pharmacological studies

Synergistic Effects of Guava and Aloe Vera Leaves Extracts in Formulated Herbal Toothpaste

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Abstract

Toothpaste comes in so many formulations ranging from natural to synthetic this depend on the active ingredient in it. In this present work, synergistic effects of aloe vera and guava (*psidium guajava*) leaves in herbal toothpaste was achieved using essential oils and crude extracts from the plants. Essential oils was obtained via steam distillation technique with Clevenger apparatus using fresh samples whereas crude extract was obtained whereas crude extract was obtained using solvent extraction methods using air dried sample via soxhlet extractor apparatus. The oils obtained was used to formulate the toothpaste using blend ratios 2:4, 4:6, 6:4 , 5:0, 0:5 and 8:2 essential oils : crude extract formulations. The products were checked for microbial load using spread plate technique after of serial solutions of a sample are inoculated into broth media on different Agar Agar, MacKonkey Agar and Dextrose agar Medias and maintaining incubation conditions. The result of the total coliforms and fecal coliforms showed NO Colony and this indicates compliance with the official requirement of microbiological quality as they did not show any growth, hence within the USP Permissible limit of (<102cfu/ml). This could be due to phytochemicals present in the plant extracts (biomaterials)and combined action of the plants extracts used because research proved they possesses antimicrobial properties. The products when compared with commercial close up toothpaste showed neutral pH, homogeneity,

foamability and freshness to the mouth, therefore with natural plant extracts natural toothpaste with safe active ingredients were explored.

Keywords: Toothpaste, Microbial, Essential Oils, Natural and Synergy

Extraction and Comparison of Properties of Essential Oils from Ginger and Turmeric

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Abstract

This study extracted and compared properties of oils from ginger and turmeric rhizomes. The rhizomes of turmeric and ginger were purchased from Eke Oke market in Anambra State. Soxhlet extraction method was used in extracting the oils. The result showed that turmeric (14.8%) has a higher yield than ginger (9.58%). The physical parameters tested showed that specific gravity (0.94146 g/l), viscosity (1.593 Pa.s), density (0.9646 g/l) and refractive index (1.4406) were higher in ginger than Turmeric while Turmeric has a higher flash point value (121°C) than ginger (102.2°C). The results of chemical composition showed that ginger has higher saponification value (263.67 mg/KOH). Acid value (16.972 mg/KOH), Iodine value (50.135 g/gI₂/100g), and Ester value (73.433) than Turmeric. Turmeric has higher peroxide value (11 meq/kg) than ginger. The results showed that these oils are stable and will stand oxidation. It is therefore recommended that these oils will be good for paints industries as they are non-drying.

Keywords: Essential oil, Antimicrobial, Chemical Composition, Solvent, Extraction, Antioxidants

Synergistic Effects of Essential Oils from *Cymbopogium Citratum* (Lemon Grass and *Occimum Graticimum* (Scent Leaves) In Mosquito Repellent Spray and Ointment

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Abstract

In this present study, locally harnessed plants; cymbopogium citratum

and *Ocimum gratissimum L.* Leaves essential oil obtained through steam distillation method using Clevenger and cold extraction method using 80 percent methanol were used in the formulation of environmentally friendly mosquito repellent products. The extract blends (crude and essential oils) in different ratios (2:8, 4:6, 6:4, 8:2, 0:5, 5:0 and 5:5) g: g serially were used in the formulation of mosquito repellent sprays and ointments. The products were evaluated in the laboratory bioassay for repellent activity against host seeking female *Aedes Aegypti* mosquito using liquid paraffin negative control and 13% DEET standard formulation (N, N-diethyl 3 -methyl benzamide). Human volunteers and animal (rat) with test samples (spray and ointment) were rubbed at the exposed area of the harting from wrist to finger. The results of the spray and ointment bioassay gave percentage repellence of 70.50% and 88.00% respectively in synergy for 4: 6 formulation doses at landing times of 90 minutes and 100 minutes. This is in conformity to the standard 13% DEET formulation with 99 percent protection whereas the negative control response tests with female *Aedes. Aegypti* mosquito showed no activity in repellency. Therefore, with locally available, low cost plants *cymbopogium citratum* and *Ocimum gratissimum L.* biodegradable, environmentally friendly and cheap mosquito repellent products were explored. It was observed that increase in percentage repellence of the products was highest in ointment formulations than in spray formulation which brought about decrease in the number of bites and delay of landing of female *Aedes. aegypti* mosquitoes on tested animals and human volunteers. We recommend this to general public to reduce mosquito attack.

Keywords: *Mosquito Repellent, DEET, Cymbopogium Citratum, Occimum Graticimum*

Analysis of Proximate and Vitamins Content of Beetroot (Beta Vulgaris L)

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Abstract

The continuous neglect of the importance of the nutritional composition of some of our fruits could be detrimental to the

sustenance of good health. In this study, proximate and vitamins A, B complex, C, D, E and K content of beetroot fruit were determined using standard analytical methods. The results of the proximate analysis showed that beetroot fruit contained 16.308% of moisture, 1.805% of ash, 2.024% of fat, 9.352% of fiber, 4.55% of protein and 65.961% of carbohydrate. Beetroot fruit also contain some important vitamin nutrients in good amounts which includes vitamin A (0.379mg/kg), vitamin B1 (0.014mg/kg), B2 (0.306mg/kg), B3 (1.452mg/kg), B5 (5.680mg/kg), B6 (0.134mg/kg), B7 (17.093mg/kg), B9 (18.011mg/kg), vitamin C (657.043mg/kg), vitamin D (86.80mg/kg), vitamin E (0.082mg/kg) and vitamin K (70mg/kg). The significance of the results is that beetroot fruit can provide the body with required amount of vitamins that are needed for the proper functioning of the body.

Keywords: Beetroot, proximate composition, vitamins contents

Determination of the Quantitative Phytochemical Compositions of The Aqueous Seed Extract Of *Hura Crepitans*

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Abstract

The quantitative phytochemical analysis of the aqueous seed-extract of *Hura crepitans* was carried out using spectrophotometric method. The seeds were dried under laboratory temperature for a period of three weeks, ground to powdered form. It was then soaked in water and allowed to stand for 24 hours with interval stirring. The active ingredient was extracted using rotary evaporator. The result showed the presence of the following in mg/100g: tannins (633.65±5.2), phenol (764.63±6.43), flavonoids (287.74±2.41), alkaloids (522.44±1.8), terpenoids (844.22±0.8) and glycosides (386.78± 1.8). The results indicate that *Hura crepitans* seeds are very rich in phytochemicals and this could be useful in the management of stress associated disorders.

Keywords: Phytochemicals, *Hura crepitans*, Quantitative and Spectrophotometric

Effects of Ethanol Extract of *Ocimum Gratissimum* Leaves On Red Blood Cell and White Blood Cell Concentration in Wistar Albino Rats

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Abstract

This work was centered on determination of effects of ethanol extract of *ocimum gratissimum* leaves on white blood cell (WBC) and Red blood cell (RBC) concentration in wistar albino rats. The leaves were collected and authenticated by a taxonomist, dried under room temperature and ground to powdered form before the extraction using ethanol. Fifteen male wistar albino rats were used for the experiment. The rats were randomly divided into three groups of five rats each. Group one which served as the control was fed normal feed and water only, group two was administered 200mg/kg of the *ocimum gratissimum* extract, group three was administered 400mg/kg of the extract through oral intubation for one week. The result showed that there was a significant increase in the concentration of the white blood cell count for graded doses of 200mg/kg and 400mg/kg when compared to the control group. However, there was a slight decrease in the red blood cell count for the groups administered 200mg/kg and 400mg/kg of the extract. These results show that extract of *ocimum gratissimum* stimulates the formation of leucoproteins which gives rise to leucocytes (white blood cell) production. However, the extract showed reduction in red blood cell count, hence does not stimulate production of red blood cells.

Serum Sodium and Chloride Ion Concentrations of Wistar Albino Rats Fed Ethanol Extract of *Ocimum gratissimum* Leaves

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Abstract

This study was carried out to determine the effect of ethanol extract of *Ocimum gratissimum* leaves on sodium and chloride ions in wistar albino rats. Fifteen rats were used for this experiment, they were divided

into three groups in separate cages and allowed to acclimatize for one week. Group one was the control and was fed normal feed and normal saline only, Group two was fed 200mg/kg of *Ocimum gratissimum* leaf extract, Group three was fed 400mg/kg of the leaf extract. The route of administration was by oral intubation which lasted for one week. The result showed a slight reduction in Na⁺ concentration in the group administered 200mg/kg and 400mg/kg of the extract when compared to the control. The serum chloride ion decreased significantly for the group administered 200mg/kg of the extract when compared to the control. Hence showing a hypochloremic effect of the extract when compared to the control group. These results indicate that ethanol extract of *ocimum gratissimum* helps in the maintenance of sodium concentration as well as having a hypochloremic effect as a result of the reduction in chloride ion concentration.

Keywords: Hypochloremic, Oral intubation, acclimatize

Proximate Compositions of Plantain and Banana Peels – A Potential Additive to Animal Feed

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Abstract

Plantain and banana peels were assessed for their nutritional composition using a proximate analytical method. The protein, ash, moisture, crude fibre, fat and carbohydrate content were proximately determined on the peels recovered as waste from plantain roasted and bananas eaten at Ezioko area using standard AOAC methods. The result showcased that both peels from plantain and banana have high carbohydrate content (72.21%, 70.35%), next is crude fibre (8.80%, 8.51%), followed by ash content (7.81%, 6.66%), protein (4.58%, 7.47%), moisture (3.50%, 5.00%) and crude fat (3.12%, 2.01%) respectively. The result of the peels' nutritional composition indicated that the peels from both banana and plantain (ripened or unripened) can contribute immensely to the required nutritional composition of animal feed if well

blended.

Keywords: Plantain, Banana, Peel, Proximate composition

Optimising Fuel Properties of Cow Tallow Biodiesel Using Multi-Objective Optimization (MOO)

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Abstract.

The use of multi-objective optimization (MOO) to obtain high quality biodiesel suitable for diesel engine operation using cow tallow feedstock was carried out in this study. The quadratic model was the preferred model used in the multi-objective optimization due to the high R^2 values obtained when compared to other models. Experiments were carried out combining different variables prescribed by experimental design and artificial neuro-fuzzy interference system (ANFIS). Yield (Y) and fuel properties such as kinematic viscosity and cetane number were designed to be the objective parameters to be optimized. The process requires that the yield be maximized for profitability while the viscosity and cetane number were minimized and maximized respectively to obtain biodiesels conforming to ASTM standards. The trends in the design objectives informed the decision to use genetic algorithm to solve the multi-optimisation problem. The optimal results of yield (83.39%), viscosity (1.95cp) and cetane number (50.92) ensured that the biodiesel produced not only met required fuel standard but can be produced in high enough quantity from limited feedstock. The results when compared with parameters obtained in a one-objective (yield) optimization shows trade-offs in yield with the desirable fuel properties (viscosity and cetane number) where a higher yield (92.33%) and less desirable kinematic viscosity and cetane number were obtained. The preference of a higher quality biodiesel to the slightly higher yield obtained in a one-objective optimization further highlights the relevance of multi-objective optimization in biodiesel production processes.

Determination of The Effect of Storage on the Properties of Commercial Alkaline Drinking Water.

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Abstract

This study was carried out to determine the effect of storage on the properties of alkaline water. 5 bottles of alkaline water were collected from Kangeen alkaline water company in Awka, Anambra state and were taken to the laboratory for analysis. Standard method for water analysis was used. The result of the analysis showed that sample D has pH of 8.50, conductivity of 0.016ohm/cm, total solid 0.0011mg/L, total dissolved solid 0.0010mg/L, total suspended solid 0.0001mg/L, total acidity 125.0mg/L and hardness of water 98.0mg/L. Sample C has pH of 8.47, conductivity of 0.015ohm/cm, total solid 0.0014mg/L, dissolved solid 0.0013mg/L, total suspended solid 0.0001mg/L, total acidity 898.9mg/L and hardness of water 53.25mg/L. Sample B has pH of 8.43, conductivity 0.015ohm/cm, total solid 0.0021mg/L, dissolved solid 0.0020mg/L, total suspended solid 0.0001mg/L, total acidity 809.4mg/L and hardness of water 94.25mg/L. Sample A has pH of 8.39, conductivity of 0.024ohm/cm, total solid 0.0023mg/L, total dissolved solid 0.0021mg/L, total suspended solid 0.0002mg/L, total acidity 746.9mg/L and hardness of water 85.0mg/L. Storage time affected the pH of alkaline water produced through electrolysis. The longer the alkaline water stays, the lower the pH value. The process of electrolysis has no effect on the total solid, dissolved solid, total suspended solid, total acidity and on the hardness of water but storage time has little effect on these factors.

Keywords: Alkaline, water, pH, electrolysis, storage.