



Book of Abstracts

14th ChemClass Conference

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CSN ZARIA CHAPTER is inviting you to a scheduled Zoom Conference meeting.
Topic: **The Roles of Chemical Sciences and Technology in Accomplishing SDG 3:
GOOD HEALTH AND WELL BEING**

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Chemclass Virtual Conference, Thursday, 17th June, 2021

Programme of Activities

9:00 am	Introduction of Dignitaries
9:05 am	Keynote Address by Prof. Ahmed Uba (UDUS)
9:10 am	Goodwill Messages
9:15 am	(National President of Chemical Society of Nigeria) Dignitaries Chendo and Declaration of the Conference Open by Prof. M. N
9: 30 am	Goodwill message
9:40 am	Welcome Address by Dr. S. E Abechi (CSN Zaria Chapter Chair)
10:00 am	National Anthem
10: 20 am	Opening Prayers
10: 25 am	Citation of Prof. Haruna Musa Plenary
11: 00 am	Lecture by Prof. Haruna Musa (BUK)
11: 05 am	Vote of Thanks by Prof. K.I. Omoniyi (LOC Chair)
11: 10 am	Closing Prayers
11:30 noon	National Anthem BREAK
5:00 pm	Technical Sessions

Technical Sections	Chairmen	Rapporteurs	Period
Analytical/Environmental/ Others	Prof. V.O. Ajibola	Dr. I. Akawu	11:30 am– 1: 30 pm
	Prof. C.E. Gimba	Dr. Z. Garba	1:30 pm– 3: 30 pm
	Prof. K.I. Omoniyi	Dr, E.D. Paul	3:30 pm– 5:00 pm
Organic/Inorganic/ Physical/Polymer	Prof. S.O. Idris	Dr. I. A. Bello	11:30 am– 1: 30 pm
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MA Lawal^{1*}, MT Bankole¹, JO Tijani¹, JA, Areo¹, AS Abdulkareem²

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^{1*}Menkiti Nnamdi. David, ²Abayomi Adedayo Deewon. ²Isanbor Chukwuemeka Ignatius, ¹Musa Suleiman.

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¹Zakiya Nasuru, ²Ahmed Salisu, and ³Umar Lawal

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Saheed Ademola Ibraheem^a, Ephraim Akuaden Audu^b, Mas'ud Jaafar^a, Jeffrey Tsware Barminas^a

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Apampa Sulaiman Ayodeji, AbdulAzeez Isah and Lawal, Hadiza Mohammed

PROXIMATE, VITAMIN A AND VITAMIN C PROPERTIES OF BEETROOT (*beta vulgaris*) AND SOUR SOP (*annona muricata l.*) EXTRACTS AND THE BLEND

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ABSTRACT

The study investigates the proximate composition of beetroot (*beta vulgaris*) and sour sop (*annona muricata l.*) extracts, their blend and the vitamin A and C of the blend. About 500 g of beetroot was washed properly with distilled water and the pulp was introduced into a sterile juice extractor. The juice obtained was filtered using a clean muslin cloth into a sterile conical flask. The same procedure was performed using sour sop pulp; the two juice extracts were examined to ascertain their proximate composition. The results for the proximate composition of beetroot and sour sop extracts showed that moisture content ranged between 47.00 to 42.2%, ash content 6.4 to 6.9% crude protein 1.53 to 1.71%, crude lipid 0.64 to 0.52%, crude fibre 0.06 to 0.04%, carbohydrate 44.37 to 48.98% respectively. Also, the proximate analysis, vitamin A and vitamin C contents of the blend of beetroot 75% and sour sop 25% extract were examined. The results revealed that moisture content 43.16%, ash content 6.50%, crude protein 1.05%, crude lipid 1.23%, crude fibre 0.08%, carbohydrates 47.98% were present. Vitamin A (0.24ug) and vitamin C (40.86mg/100) were seen. The results suggest that the extracts of beetroot and sour sop contained valuable nutrients. It therefore may be a good choice for human nutrition.

Keywords: blend, extract, juice, nutrient proximate, vitamin

ANA 002

**REVIEW ON THE CONTEMPORARY CHALLENGES OF WATER QUALITY
AND AQUATIC ENVIRONMENT**

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Abstract

An appraisal on water environment has been demonstrated due to the facts that industrial development is fast increasing and is mostly associated with urbanization, the rate of growth is flattering high with consequences of reducing the availability of clean water. This review focuses on water resources management and the appropriateness of water to sustain various uses or processes, because any precise use will have certain requirements for the physical, chemical or biological characteristics. Quantity and quality demand of different uses will not always be compactable; the increasing recognition of our natural ecosystem has a legitimate provision in the consideration of options for water quality management. This is both for their intrinsic values and because of their sensitive indicators of every change or deterioration in overall water quality, providing a useful addition to physical, chemical and other information. The continuous enlightenment on the present and future consequences of polluting our water environment and the value of our aquatic and ecological life will greatly assist in conserving our future water environment.

Keywords: appraisal, ecology, environment, quality, water.

PROXIMATE, MINERALS AND FUNCTIONAL PROPERTIES OF *Bombax buonopozense* CALYX

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ABSTRACT

The nutritional constituents of *Bombax buonopozense* calyx were determined using standard methods. Results obtained for proximate analysis were moisture (4.70±0.51 %), ash (5.50±0.47 %), crude protein (7.20±0.29 %), crude lipid (3.10±0.14 %), crude fibre (18.00±0.18 %), carbohydrate (66.20±0.27 %) and caloric value (279.85±0.31 kcal/100g). Mean concentrations of sodium, potassium, magnesium, calcium and phosphorus were 25.00±0.09, 160.00±0.13, 48.10±0.47, 28.13±0.33 and 163.00±0.21 mg/100g respectively. Measured values for functional properties were bulk density (0.52±0.01 g/cm³), water absorption capacity (2.35±0.35 %), oil absorption capacity (2.20±0.19 %), foaming capacity (13.72±0.27 %) and foaming stability (5.88±0.41 %). These results indicate that *Bombax buonopozense* calyx has the tendency of being a source of nutrient.

Keywords: *Bombax buonopozense*, proximate, functional properties, nutrient

EQUILIBRIUM ISOTHERMS MODELLING OF 2,4,6-TRICHLOROPHENOL ADSORPTION FROM AQUEOUS SOLUTION USING OPTIMAL ACTIVATED CARBON

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ABSTRACT

The optimal activated carbon produced from *Prosopis africana* seed hulls (PASH-AC) was obtained using the impregnation ratio of 2.70, activation temperature of 800 °C and activation time of 58 mins with surface area of 1071.89 m²/g for the removal of 2,4,6-Trichlorophenol (2,4,6-TCP) from synthetic wastewater which yielded monolayer adsorption capacity of 433.66mg/g. The adsorption data were also modelled using five various forms of the linearized Langmuir equations as well as Freundlich and Temkin adsorption isotherms. In **comparing the legitimacy of each isotherm model, chi square (χ^2) was incorporated with the correlation coefficient (R^2) to justify the basis for selecting the best adsorption model.** Langmuir-2>Freundlich>Temkin isotherms was the best order that described the equilibrium adsorption data.

Keywords: *Prosopis africana* seed hulls; Activated carbon; Isotherms modelling; Adsorption; 2,4,6-Trichlorophenol.

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**INFLUENCE OF CITRIC ACID ON Zn²⁺INDUCED STRESS IN SORGHUM
(*Sorghum bicolor L.M*)**

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ABSTRACT

The effects of Zn²⁺ have been investigated in Sorghum (*Sorghum bicolor L.M*) grown in a controlled environment in hydroponics containing modified Hoagland's nutrient solution. Zinc (II) ion was supplied as ZnSO₄ alone (5, 25, 100, 200 mg/L), or in combination with citric acid (20 mg/L). The plants were allowed to stand in the solutions for four weeks, during which the stress induced proline pigment was formed, which protected them against further oxidative damage. They were harvested, washed with tap water, rinsed with deionized water and then dried. The Root and shoot Zn²⁺ uptake, translocation factor (TF) and proline content of the plants were determined. The results revealed that Zn²⁺ uptake in roots and shoots, the translocation factor (TF) and proline content significantly increased with increasing Zn²⁺ level. Visual toxicity symptoms such as yellowing of leaves, appearance of radish coloration on leaf lamina and drying of older leaves were observed. The toxicity increased with increasing Zn²⁺ dosage and the highest effect was observed at 200 mg/L Zn²⁺ application. Addition of citric acid enhanced Zn²⁺ uptake and the translocation factor, which was less than one in all plants. Zinc-induced toxicity and accumulation of proline were significantly decreased in presence of citric acid. Thus, citric acid could be used for enhanced phytoextraction of Zn²⁺.

Keywords: Hoagland's Nutrient Solution, Proline, Zinc, Citric acid, Translocation factor, Sorghum

***EFFECTS OF Cd⁺² INDUCED STRESS ON CHLOROPHYLL AND CAROTENOID
CONTENT OF HYDROPONICALLY GROWN JUTE MALLOW
(*Corchorus olitorius*)***

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ABSTRACT

The aim of the investigation was to determine the potential of citric acid for accumulation and translocation of Cd⁺² ion and their effects on Jute mallow (*Corchorus olitorius*) growth and pigments production. The plants were grown under controlled conditions in hydroponics containing modified Hoagland's nutrient solution. Cadmium (II) was applied as Cd(NO₃)₂ .4H₂O alone (1, 5, 10 and 20mg/L) or in combination with 5mM citric acid. After 4 weeks exposure, the plants were harvested, washed with tap water, rinsed with deionized water and then dried. The root and shoot Cd⁺² uptake, the chlorophyll and carotenoid contents of the plants were determined. The results showed that Cd⁺² accumulated more in roots than the shoots and application of citric acid depressed Cd⁺² uptake at all concentrations. Production of chlorophyll and carotenoids reduced with increase in Cd⁺² uptake, while addition of citric acid enhanced the pigment production. Jute mallow (*Corchorus olitorius*) has been found to be an accumulator for Cd⁺² ion.

Keywords: Jute mallow (*Corchorus olitorius*), Cd⁺² ion, Citric acid, Chlorophyll, Carotenoid

**SUITABILITY OF GROUND AND SURFACE WATER IN KWALKWALAWA
FADAMA AREA, SOKOTO STATE, NORTHWESTERN NIGERIA FOR
IRRIGATION PURPOSES**

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Abstract

The study was conducted to assess the suitability of the ground and surface water currently being used for irrigation in the Kwalkwalawa Fadama area of Sokoto State, Northwestern Nigeria. The parameters used to assess the irrigation suitability of the groundwater are: pH, TDS, EC, SAR, SSP, PI, MAR and TH. The average pH is 6.50 and 6.60 for ground and surface water respectively, the average TDS is 379.00mg/l (groundwater) and 64.40mg/l (surface water) the average value of EC is 875.00 μ s/cm (groundwater) and 128.00 μ s/cm (surface water) SAR average is 0.12meq/l (groundwater) and 0.01meq/l (surface water), MAR average is 57.91 % (groundwater) and 44.63% (surface water), SSP average is 10.81 % (groundwater) and 17.50% (surface water), the average value of PI is 3.33% (groundwater) and 0.91% (surface water) while the average value of TH is 272 mg/l (groundwater) and 199.84 mg/l (surface water). The high MAR and TH in the groundwater can be attributed to the geology of the area (Kalambaina Formation), which is composed mainly of Limestone. These limestones coupled with application of agrochemicals could also be responsible for the high EC and TDS of the groundwater in most locations. Generally, the study reveals that the surface water in the study area is generally more suitable for irrigation than the groundwater.

Keywords: Hydrogeochemistry, Irrigation water quality, Kwalkwalawa, Fadama.

EFFECT OF CALCINATION TEMPERATURE ON THE CRYSTALLITE SIZE AND MORPHOLOGY OF ZINC OXIDE/POLYVINYL NANO-COMPOSITE SYNTHESIZED VIA SOL-GEL METHOD

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Abstract

ZnO/ polyvinyl pyrrolidone nanocomposites were synthesized from zinc nitrite (as a precursor) and polyvinyl pyrrolidone as a stabilizing by sol-gel method at pH of 11 and ambient synthetic temperature. The synthesized ZnO/polyvinyl pyrrolidone (ZnO/PVP) nanocomposites were subjected to different calcination temperatures (ambient 300 °C, 500 °C, and 700 °C). The synthesized ZnO/ polyvinyl pyrrolidone nanocomposites were characterized by X-ray diffraction (XRD), High resolution Scanning electron microscopy (HRSEM), Energy-dispersive X-ray spectroscopy (EDS), and X-Ray Photoelectron Spectroscopy (XPS). The XRD results revealed the crystallite size calculated using the Scherrer equation was 160.96 nm, 10.74 nm, 13.33 nm, and 16.52 for the ambient, 300 °C, 500 °C, and 700 °C respectively. The result indicates the synthesis of the hexagonal wurtzite structure of ZnO. The HRSEM shows spherical structures of the nanocomposites. It is observed that at a low temperature, the stoichiometric ratio between Zn and O atoms has a significant deviation from the perfect ratio of 1:1 and becomes optimized as the temperature increases as shown by the EDS result.

Key words: ZnO/ polyvinyl pyrrolidone, nanocomposites, sol-gel, and calcination.

ANA 009

**HUMAN RISK INDEX OF ORGANOCHLORINE PESTICIDES IN
WASTEWATER ALONG RIVER GETSI, KANO STATE.**

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ABSTRACT

Contamination of water with pesticides residues, industrial, domestics and agricultural wastes poses a significant health risk to the public through its exposure. The study is aimed at assessing the concentration level associated with organochlorine pesticides (OCPs) in wastewater along River Getsi. **Wastewater samples were collected with clean sampling containers, extracted, cleaned up before determination of organochlorine pollutants. Gas chromatograph equipped with an electron capture detector (GC-ECD) was used for the analysis.** Twenty OCPs were present in the water samples result obtained. δ -BHC recorded the least concentration of 0.18 mg/kg while Endosulfan1 had the highest concentration of 92.15 mg/kg, followed by Endrin aldehyde and gamma-chlordane whose concentrations are 89.10 mg/kg and 82.90 mg/kg respectively. **The total concentrations of the OCPs in wastewater determined in the study were 0.18 μ g/L and it is consequently below the WHO permissible limit of 2 μ g/kg.**

Keywords: Contamination, organochlorine pesticides, **Gas chromatograph**, River Getsi

Seasonal Variation of Heavy Metals in Groundwater and their Health Implications

By

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Abstract

The variation in heavy metals concentration in groundwater with respect to two major seasons (Rainy and Dry) in Birnin Kebbi and environs were investigated in this study. Water samples were collected from 35 boreholes in the two seasons and analyzed for heavy metal concentrations using standard operation procedures. The results of analyses showed that metals such as Cu (0.39 mg/L), Mn (0.71 mg/L) and Ni (0.04 mg/L) have their highest concentrations in the rainy season, others Co (0.41 mg/L), Cr (0.47 mg/L), Fe (0.79 mg/L) and Zn (0.88 mg/L) were observed to have highest mean concentration in the dry season, while the concentration of Pb (0.04mg/L) remain relatively constant in the two seasons. The results obtained in this study simply implies that as climate becomes either wetter or drier due to phenomenal changes concentrations of heavy metals are likely to respond appropriately. The mean values of heavy metal evaluation index (HEI) and degree of contamination (C_{deg}) indices indicated that the groundwater samples were contaminated more in the dry season than the rainy season. The less than unity values of C_{deg} observed for all the studied metals indicates low degree of pollution of the selected metals in the areas.

Keywords: Concentration, Groundwater, Rainy, Degree of contamination, Seasons

Comparative study of ferriin and inductively coupled plasma methods for analysis of boron in water

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Abstract

Boron is found in water bodies as boric acid or tetrahydroxyborate(1-) ion in water depending on pH. A number of guidelines have proposed permissible levels of boron in portable and irrigation water due to its benefit and toxicity. Owing to this, there is growing interest in assessment of boron in water to ensure its safety for use. A number of analytical methods have been employed for routine analysis of boron. In this work, ferriin and ICP-AES methods were employed for analysis of boron in water. The results obtained indicate that ICP-AES gave higher sensitivity of boron with lower limits of detection and quantification over ferriin method. A t-Test on data generated showed that results of the two methods were statistically significantly different ($p < 0.05$) with percentage variance of 34.24 % and 0.74 % obtained for ferriin and ICP-AES respectively.

Keywords : *boric acid, tetrahydroxyborate(1-), ferriin, ICP-AES*

ANA 012

PHYTOCHEMICAL SCREENING AND NUTRITIONAL ANALYSIS OF
Leptadeniahastata (Asclepiadaceae)

BY

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ABSTRACT

Leptadeniahastata which belongs to the family Asclepiadaceae is found in sub Saharan Africa. It is mostly used as an alternative medicine in African orthodox medicine. Phytochemical screening and nutritional composition were carried out on the leaves of the plant. The result obtained indicated the presence of flavonoids, cardiac glycosides, tannins, alkaloids, glycosides, steroids and saponins. Furthermore, the results of the nutritional analysis indicated; moisture content of 5.17 ± 0.289 , ash content of 10.83 ± 0.289 , crude lipid 9.5 ± 0.50 , crude fibre 6.67 ± 0.58 , crude protein 6.71 ± 0.10 , carbohydrate 60.05 ± 0.93 , sodium 0.033 ± 0.001 mg/g, potassium 1.33 ± 0.153 mg/g, calcium 1.183 ± 0.058 mg/g, magnesium 3.067 ± 0.058 mg/g and phosphorus 4.698 ± 0.0186 mg/g respectively. This therefore suggests that the leaves of the plant could serve as an alternative medicine due to the presence of the chemical compounds and a good source of energy. However, the phytoconstituents present could be isolated and tested against their pharmacological activity.

Keywords: proximate analysis, *Leptadeniahastata*, phytochemistry, mineral composition, elemental analysis.

ANA 013

**PHYTOCHEMICAL SCREENING AND TOXICITY PROFILE OF
HAEMATOSTAPHIS BARTERI (JAN DAYA)**

BY

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ABSTRACT

This research was aimed at the phytochemical screening and toxicity profile of *Haematostaphis barteri*. The extraction was carried out using n-Hexane and methanol. The extracts were tested for alkaloids, saponins, tannins, and glycosides. From the results obtained for the phytochemical screening of the extracts of *Haematostaphis barteri* (stem bark), alkaloids, tanins, carbohydrates and glycosides were detected. Saponins were detected in the methanol extract but were absent in the n-hexane extract. The toxicology study was undertaken to evaluate the toxicological effects of *Haematostaphis barteri* and subsequently determine the LD₅₀, to establish the safety of the extracts in *Haematostaphis barteri*. All rats, three per set, were sequentially administered methanol and n-Hexane extracts, in the first group, a dose of 10mg/kg, 100mg/kg and 1000mg/kg of body weight was administered to the rats, to determine acute toxicity. And in the second phase, a dose of 1600mg/kg, 2900mg/kg and 5000mg/kg was administered to the rats, to determine acute toxicity. Both phases showed no signs of mortality and acute toxicity. However, in phase two, some of the acute toxicity signs were seen such as diarrhea, restlessness, fatigue. It is recommended that other pharmacological tests are conducted on the plant.

Keywords: *haematostaphisbarteri*, phytochemistry, toxicity, n-hexane, methanol extract.

ANA 014

Geochemical Investigation of Topsoil from the Playground of Some Selected Public Primary Schools in Minna Metropolis, North - Central Nigeria

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ABSTRACT:

This study aimed to investigate concentration, distribution and children's health risk of potentially toxic elements (Pb, Zn, Cu, Cd, Cr, As, Mn, Fe, Ni and Co) in playgrounds soils of some selected primary schools within Minna metropolis, North- Central Nigeria. Total of eleven (11) surface soils samples were collected from ten (10) playground soils and a control sample. An XRF (X-ray fluorescence) analytical technique was used to determine the elemental composition of the soil samples. The results for concentration values showed that the Dutch target values were exceeded for Pb in 8 schools; Zn, Cu, and Ni in all schools including control sample; Cd in control sample; As in one school; and Co in all schools. The results of enrichment factor were higher than 1.5 in all the schools indicating anthropogenic sources. Health risk assessment revealed ingestion as the major path of exposure then followed by inhalation. Hazard Index (HI) had values less than 1 for all the observed potentially toxic elements in all the playground soils and control station, except for Kuyanbana, Makama, Marafa and Waziri soils, where values exceeded 1 in 1 or 2 elements, which may be of concern for potential non-carcinogenic effects.

Keywords: Potentially toxic elements, Enrichment Factor, Children's Health Risk, Playground, Urban Top-Soils, Primary School Learners, Geogenic/Anthropogenic Sources

Environmental Impact of Artisanal and Small-Scale Gold Mining on Surface Water and Stream Sediments around Gwagwalada Mining Sites, Abuja, North-central Nigeria

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ABSTRACT

Gold mining all over the world is associated with environmental problems. Geological mapping of the area revealed that the area is underlain by granite-gneiss with quartz veins. A total of 20 surface water samples and 20 stream sediments were collected and sent for analysis. The physical parameters were determined insitu in the field using the HI9811-5 portable pH/EC/TDS/C multi-metre. The results of the the physical parameters, major cations and anions were found to be within the permissible limits of Nigerian Standard for Drinking Water Quality. Among the PTEs analyzed, the concentrations of mercury, chromium, manganese and iron in some locations slightly exceed their respective maximum permissible limits of 0.001 mg/L, 0.05 mg/L, 0.2 mg/L and 0.3 mg/L respectively. Similarly, results of the stream sediments showed that the mean concentration of mercury, chromium, manganese and iron were slightly above their respective crustal abundance signifying contamination. Artisanal gold mining in the area aided the liberation of chromium, manganese and iron from their host rock into the surface water through rock-water interaction and runoff. Use of mercury in processing of gold is responsible for the enrichment of mercury. The use of mercury in gold processing by artisanal miners should discontinue immediately.

Keywords: Impact Assessment, Artisanal Gold Mining, Surface Water, Stream Sediments, Gwagwalada, North-central Nigeria

**COMPARATIVE EXTRACTION PERFORMANCE OF SOLVENT SYSTEMS IN
THE EXTRACTION AND CHARACTERIZATION OF PECTIN FROM
PROSOPIS AFRICANA SEED GUM**

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ABSTRACT

Pectin was separately extracted in warm water bath from sun-dried and crushed *Prosopis africana* seed gum, using 0.05 M solutions of HCl, H₂SO₄, CH₃COOH, C₆H₈O₇ and a 3:2 blend of (H₂SO₄ and C₆H₈O₇). The physicochemical properties of pectin extracted from the *Prosopis africana* seed gum shows the following: colour varied from beige-brown to wheat brown, equivalent weight (1,818.18 mg/mol to 25,000 mg/mol), methoxyl content (0.124 % to 1.705 %), moisture content (12 % to 38 %) and ash content (2 %) for all the solvent system used. Also, the comparative solvent performance using different solvents shows that the H₂SO₄:C₆H₈O₇ solvent blend was the most effective solvent for pectin extraction and this was followed by the solvent HCl and H₂SO₄, while C₆H₈O₇ was the least effective. The comparative pectin yield of *Prosopis africana* seed gum using selected acid solvent ranged from 6.94 % to 15.28 %. Among the solvents under study, the H₂SO₄:C₆H₈O₇ solvent blend gave the highest pectin yield (15.28 %) with beige-brown, low methoxyl pectin of high purity and could be used as a functional food ingredient domestically and industrially.

Keyword: Pectin, *Prosopis africana*, seed gum, food

ANA 017

**ASSESSMENT OF SELECTED PESTICIDES LEVELS IN SOME RIVERS IN
BENUE STATE-NIGERIA AND THE CAT FISHES FOUND IN THEM**

BY

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ABSTRACT

The levels of selected pesticides in some rivers in Benue State-Nigeria and the cat fishes in them, were assessed. QuEChERS method was used for sample clean-up and GC-MS was used for the actual quantitation of the analytes. Whereas in the water samples collected from the rivers, pesticides levels ranged between Not detected to 0.005 ppm, in the cat fish samples, pesticides residues ranged between Not detected to 0.024 ppm. The results obtained show that, where pesticides were present, they were present only in trace amounts, that were below their respective guideline values in drinking water or their maximum pesticide residue limit in food. Hence, there are no immediate risks of the toxicities associated with these pesticides if water or cat fish from rivers in the study area were consumed. However, fishes from River Otobi are more likely to be associated with a wider spectrum of pesticides toxicity following a prolonged bioaccumulation than fishes from River Royongo, seeing as the former contains the highest number of pesticides residue types (7) while the latter have the least (4).

Keywords: pesticides, water, pesticide residues, cat-fishes, rivers

WASTE MANAGEMENT AND PUBLIC HEALTH RISK OF ABATTOIR PRACTICES IN ZANGO ABATTOIR ZARIA, KADUNA STATE NIGERIA

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ABSTRACT

The challenges posed by poor abattoir waste management on public food safety, meat inspection service, risk of consuming unhygienic meat and quality in Zaria have been a serious concern. This research study aimed at investigating the challenges posed by poor waste management in Zango abattoir Zaria, Kaduna State. A pre-tested **semi**-structured questionnaire was used to obtain relevant data from the individuals who were involved in processing different abattoir by-products. The data obtained was analyzed using descriptive statistics. The results of the study show that over many years of the Zango abattoir establishment, it has not been expanded to accommodate the increasing population and demand for meat, resulting in over-use and deterioration of the facilities and poor waste management. The waste generated in this studied abattoir are hide, bones, horns and hooves, blood, intestinal content, waste tissue and bones. On average, about 50-60 cattle are slaughtered daily, translating to high volume of waste such as blood, intestine contents, bones, waste tissues discharged into the environment. Blood and intestine content were seen being discharged into a small narrow drainage which produced bad odour, pollute agricultural land, contaminate sources of potable water supply and later drains into the nearby stream affecting aquatic life around the area. Handling and transporting carcasses to various places for sale is generally done under unhygienic conditions. Meat transportation to the market was majorly (90%) done using motorcycles posing threat to the health of consumers. The problem of abattoir waste disposal in the area includes obsolete facilities, poor inspection of activities by the relevant agencies responsible for establishment and management of abattoirs, poor funding and lack of effective waste disposal systems. The study therefore, recommends the use of international techniques for animal waste management, meat handling and transportation.

Key words: Abattoir, Waste Management, Blood and Intestine Content, Public Health Risk, Zango

EVALUATION OF SILICA CONTENT IN SOME SELECTED AGRICULTURAL WASTE-PRODUCTS AND THEIR EFFICACIES FOR THE REMOVAL OF HEAVY METAL FROM CONTAMINATED WATER

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ABSTRACT:

Heavy metals are bioaccumulated through both natural and anthropogenic sources. Most water comprising heavy metals is of greatest significance worldwide because of their possible threat to both aquatic and soil environments. This study used water samples collected from Katsina youth Craft Village (KYCV) and Gambarawa Paint Cottage (GPC). These samples were analyzed for Copper (Cu) and Iron (Fe) using Atomic absorption spectrophotometry (AAS). While the silica content was evaluated using X-ray Fluorescence (XRF). The XRF results: (1.60% for RH, 0.34% for MH and 0.58% for GCH) showed the presence of silica in both agricultural wastes, while the AAS results (0.1695 mg/L for GPC and 0.1191 mg/L for KYCV) showed that the concentration of Cu is below the permissible limit of 2.0 mg/L given by World Health Organization (WHO) in both the waste water samples, while the concentration of Fe (3.5209mg/L for GPC and 2.3246mg/L for KYCV) is above the permissible limit of (1.0mg/L) set by WHO. The result also indicate the presence of the heavy metals in the agricultural waste having [0.08mg/l (RH and GCH), & 0.06mg/l (MH) with respect to Cu(II)] and [3.97mg/l (RH), 2.86mg/l (MH) & 5.56mg/l (GCH) with respect to Fe(II)]. The results indicate the presence of the metals (Cu and Fe) in all the waste water as well as the agricultural wastes. The agricultural wastes (Rice, Millet and Guinea corn Husks) were cleaned, dried and then soaked in the contaminated water. After removal, they were oven dried, digested and analyzed by AAS. The result shows the presence of heavy metals in all the agricultural wastes used. Thus, indicating their ability to remove the heavy metals from the contaminated water. Though, the XRF and AAS results indicate the presence of the heavy metals (Cu and Fe) in all the samples before testing for the removal of heavy metal. However, the rise in the concentration of thus heavy metals in all cases proves for its removal from the wastewater. Finally, this study confirmed that, all the husks used were effective for the removal of various heavy metals and can be used as low cost bio-sorbents for the removal of heavy metals from industrial effluents.

Keywords: evaluation, silica content, heavy metals, contaminated water, Agricultural waste.

ANA 020

**SYNTHESIS AND CHARACTERISATION OF REACTIVE DYE-SWEET
POTATO PERICARP CATION EXCHANGE RESIN**

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ABSTRACT

Five triazine based reactive dyes were synthesized having a yield 45-60 % and were characterized by melting point (230-270 °C), thin layer chromatography, infrared and ultra violet-vissible spectroscopic techniques. The synthesized dyes were then applied on sweet potato pericarp producing dye modified cellulosic substrate. Dyeing property of dyes was good which is attributed to the chemical bond formation between the reactive dyes and the sweet potato pericarp substrate. Test were carried out for fixation and fastness (acid, alkali and water). The dyes' % fixation was good and ranged from 40-72%. The fastness test was equally satisfactory as there was no colour change in the acid, alkali and neutral solutions respectively, which is an important feature in the preparation of **stable and efficient dye-modified cellulosic ion exchange resins**.

Keywords; triazine, dye-modified, cellulosic ion exchange resins

ANA 021
LEVELS OF SOME ANIONS IN WATER SAMPLES SOURCED FROM SOME LOCAL GOVERNMENT HEADQUARTERS OF JIGAWA STATE, NIGERIA

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ABSTRACT

The levels of some anions (NO_2^- , NO_3^- , SO_4^{2-} , PO_4^{3-} and Cl^-) in water (surface and groundwater) samples from some parts of Jigawa state, Nigeria, have been quantitatively determined using titrimetric and spectrophotometric methods. Samples were randomly collected from the sampling locations (Kiyawa, Jahun, Birnin Kudu, Dutse and Gwaram) local government headquarters and analysed for their anions. Results obtained show the range of mean concentrations of the anions in the water samples as; nitrite (2.59 ± 0.80 to 18.19 ± 1.08 mg/kg), Nitrate (3.50 ± 0.17 to 24.52 ± 1.17 mg/kg), sulphate (11.15 ± 1.72 to 180.28 ± 1.45 mg/kg), phosphate (00.0 ± 00.0 to 6.50 ± 1.34 mg/kg) and chloride (52.50 ± 1.50 to 542.50 ± 1.83 mg/kg). Nitrite, nitrate, phosphate and chloride levels were found to be within the permissible limit set by FAO/WHO, while sulphate was lower than the permissible limit. Generally, it can be concluded that the water samples analysed are safe for human consumption.

Keywords: Anions, groundwater, spectrophotometry, surface water, titrimetric method

ADSORPTION OF RHODAMINE B FROM AQUEOUS SOLUTION USING ALKALINE MODIFIED BIOCHAR DERIVED FROM THE PYROLYSIS OF MUNICIPAL SOLID WASTE.

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ABSTRACT

This study aims at the utilization of Municipal Solid Waste (MSW) prepared from the pyrolysis at 450 °C for the removal of cationic dye (Rhodamine B) in aqueous solution. The

effects of contact time and reaction temperature were modified using KOH as activating agent in a batch setup. Scanning Electron Microscopy (SEM) and Fourier Transform Infrared (FTIR) Spectroscopy were used to characterize the fresh and spent adsorbents in order to predict the morphological properties and structural modification respectively. It was found that initial dye concentration (10mg/L), adsorbent dosage (0.3g) and contact time (100minutes) were found to give the highest removal of dye from the adsorbents. Subsequently, it was observed that an increase in the reaction parameters showed an increasing trend for the removal of dye. SEM analysis showed distinct morphology for the fresh and spent adsorbent which was linked to potential clogging resulting from uptake of pore sites by the dyes. FTIR result showed that the adsorption equilibrium data obeys Langmuir adsorption Isotherm with the maximum monolayer adsorption capacity of 20.30 (mg/g) and Pseudo Second Order kinetic model best described the experimental findings. Moreover, thermodynamic study reveals that the adsorption is a spontaneous and exothermic process.

Keywords: Adsorption, Adsorbent, Biochar, Pyrolysis, and Rhodamine B

**CHEMICAL INFORMATION FROM GCMS OF *TERMINALIA CATAPPA*
EXUDATE AND ITS CORROSION INHIBITION POTENTIAL FOR
IMPROVISED BIOMATERIAL STEEL IMPLANT**

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ABSTRACT

Inhibition efficiency of *Terminalia catappa* on corrosion of improvised biomaterial implant has been investigated by conventional weight loss and thermometric. The elucidation of chemical structures by gas chromatography mass spectroscopy indicated that present of phytochemical constituents predictably responsible for inhibitory capacity of TC. The inhibition efficiency increases with increasing the inhibitor concentration, implied phenomenon of physical adsorption was proposed for the inhibition and the process followed the Langmuir adsorption isotherm with very high negative values of the free energy of adsorption. Both the weight loss and thermometric results are in good agreement with each other while Quantum chemical computations of parameters associated with the electronic structures of specific components of the exudate supported their inhibiting potentials.

Keywords: *Terminalia catappa*, implant, inhibition efficiency, improvised.

ANA 024

**HEAVY METALS AND PHYSICOCHEMICAL EVALUATION OF SOIL IN SOME
SELECTED AUTOMOBILE WORKSHOPS IN OGWASHI-UKU**

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ABSTRACT

The evaluation of heavy metals contamination of soil as a means of monitoring the status of the environment for the good of the ecosystem is crucial. Soil samples were collected from three selected automobile workshops in the study area at the depths of 0-15cm. A total of six soil samples were collected in three different locations in the town of Ogwashi- Uku. A control sample was also collected in an area where there are no auto mechanics activities. The soil samples were analysed for heavy metals concentrations and physicochemical parameters. Seven heavy metals (Cd, Zn, Cu, Cr, Pb, Fe, and Ni) were analysed using AAS techniques. The concentrations of the seven heavy metals determined in soil was in the order; Fe > Zn > Pb > Ni > Cu > Cr > Cd. The physicochemical parameter: pH, nitrate, phosphate, and ammonium were within the USEPA permissible limits in all the sites. Comparing the results of the study area with the control shows that the study area is moderately contaminated; the values obtained were below the USEPA permissible limit for soil. It is therefore recommended that a separate portion of land be set apart for automobile workshops in Ogwashi-Uku.

Keywords: Physicochemical, automobile workshop, heavy metals.

**THERMAL AND CHEMICAL PRETREATMENT OF *TERMINALIA MANTALY*
SEED HUSK BIOSORBENT TO ENHANCE THE ADSORPTION
CAPACITY FOR Pb²⁺**

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ABSTRACT

A novel biosorbent, modified Terminalia mantaly seed (TM) husk was explored for its potential in removing Pb²⁺ from aqueous solutions. The biosorbent was prepared by pulverizing the husk oven-dried for 1 hour at 110°C. The ground husk was modified at 550°C and then activated with NaOH and H₃PO₄ to give four different adsorbents. The adsorbents were characterized by FTIR, TGA, and SEM. The FTIR result showed that there were new functional groups as a result of the activation/modification with heat, NaOH and, H₃PO₄. The TGA revealed that the modified TM biosorbents were thermally stable up to 400°C, while the unmodified TM is only thermally stable up to 40 – 45°C indicating the differences in the degree of thermal stability. The TGA also revealed that the thermal decomposition of the adsorbents assumed three or less well-pronounced stages, with appreciable mass losses. The SEM image showed that TM possessed the right percentage of carbon content to be used in adsorbent synthesis (>74%). It also showed that the outer surfaces of the adsorbents were rough and discontinuous in their formation; they cannot be considered as pores but connecting channels to the interior of the adsorbent. Observation revealed that the TM, NaOH and, H₃PO₄ modified TM activated carbon were well described by the Freundlich isotherm model which suggests multilayer Pb²⁺ binding mechanism onto the adsorbents. TMTM was experimentally the best adsorbent having the highest adsorption capacity (99.95 mg/g) as predicted by the experimental design result. Performance evaluation of the adsorbents revealed that they are capable of removing Pb²⁺ ions from aqueous solutions efficiently.

Keywords: adsorbents; aqueous solution; Pb²⁺; isotherm model; Terminalia manthaly; mechanism

GREEN SYNTHESIS OF SILVER NANOPARTICLES USING PECTIN FROM *P. BIGLOBOSA* PULP

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ABSTRACT

Silver nanoparticles were synthesized via a one-step green approach using pectin obtained from the pulp of *P. biglobosa* as reducing agents. The nanoparticles synthesized were analyzed using characterization techniques such as uv-vis Spectrophotometer, Fourier Transform Infra-Red (FTIR) and Energy Dispersive X-ray Fluorescence (EDXF). Uv-spectra of the sample were characteristic of silver nanoparticles while the FTIR results indicated the role of different functional groups from pectin in the synthesis. Findings from EDXF also confirmed the presence of silver. It can be implied that pectin from *P. biglobosa* pulp exhibits potentials to boost green approach in nanotechnology for industrial applications.

Keyword: surface plasmonic resonance, pectin, capping, green synthesis.

RESPONSE SURFACE METHODOLOGY APPROACH FOR THE ADSORPTION OF BISPHENOL A (BPA) WITH ACTIVATED CARBON FROM BOVINE HORNS

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ABSTRACT

In this work, activated carbon was prepared from Bovine horns and was characterized using FTIR and SEM. The prepared activated carbon was used to adsorb Bisphenol A from simulated solutions. Design of Experiment was carried out using Box Behnken Design (BBD) and adsorption experiment was carried out as arranged in a design matrix obtained from Design Expert software. The factors considered were, pH, adsorbent dose, contact time and initial concentration. Percentage removal of BPA was taken as the response of the design. The factor levels which was responsible for highest removal of BPA from the experimental solutions was initial concentration of 20mg/L, adsorbent dosage of 0.07g, contact time of 20 minutes and pH 5. A model was predicted by the design expert software and optimization solutions were pulled out from the design expert software with conditions which could give maximum adsorption. A plot of predicted against actual values was gotten too and from the R^2 value of 0.8824, less variation between the predicted percentage removal and actual percentage removal was confirmed. Revealing that the predicted values agree reasonably with the experimental values. Activated carbon from bovine horn has demonstrated to be effective in BPA adsorption from solution.

Keywords: bovine horns; Bisphenol A; BBD; adsorption.

HYDROPHOBIC DEEP EUTECTIC SOLVENTS (HDES), A GREEN ALTERNATIVE FOR TREATING CONTAMINATED WATER- A MINI REVIEW

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ABSTRACT

In this mini review, emphasis will be on the emergence of substitute methods for treating contaminated water hence the introduction of deep eutectic solvents (DES) as novel, green and safe alternatives. The unique properties that make them a better and cheaper approach over conventional procedures, combinations of hydrogen bond donors (HBD) and hydrogen bond acceptors (HBA) that make up HDES as extractants of contaminants in water, and applications as extractants in contaminated water from different sources will be highlighted.

Keywords: Hydrophobic deep eutectic solvent (HDES), Hydrogen bond acceptor (HBA), Hydrogen bond donor (HBD), extractants, contaminants.

ANA 029

SYNTHESIS AND CHARACTERIZATION OF B₂O₃/NiO NANO COMPOSITE VIA HYDROTHERMAL ROUTE

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ABSTRACT

Nickel Oxide (NiO) is a metal oxide and a p-typed semiconductor with a wide band gap of 3.6- 4.0eV and its excellent optical, electrical, magnetic properties and photocatalytic features has enhanced its potential use in catalysis, battery cathode and electro-chromic films amongst others. Boron oxide (B₂O₃) is one of the additives widely used to modify textural and acid-based properties of metal oxides, excellent anti-wear and reducing friction additive. Therefore, doping NiO with B₂O₃ will significantly enhance its active surface area, pore morphology and its electronic conductivity. In this novel study, NiO/B₂O₃ nanocomposite was prepared via hydrothermal route. The synthesized nanocomposite was characterized by scanning electron microscope (SEM), x-ray diffraction (XRD) and UV-visible spectroscopy. The morphological studies of NiO/B₂O₃ revealed densely dispersed wire-like structure, with orthorhombic crystallite size of 3.26 nm at surface plasmon resonance ranged 233nm and 385 nm. Hence, it can be concluded that hydrothermal synthesis is visible and efficient for the development of NiO/B₂O₃ nanocomposite.

Keywords: NiO/B₂O₃, Metal oxide, Nanocomposites, Hydrothermal, SEM

**STUDIES OF PYROLYSIS PROCESS USING MODEL FREE KINETIC METHOD
OF PALM OIL EMPTY FRUIT BUNCH FIBER**

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ABSTRACT

Nigerians mono-economy poses serious economic challenges. The current government is putting more efforts to diversify its economy from non-oil sector to agro-based economy. Palm oil production is one of the exporting commodity (cash crop) in Nigeria. Several interventions and support are given to its farmers by current government. The world is searching for sustainable clean energy. Empty fruit bunch (EFB) fiber is one of the waste or residue generate during palm oil processing activities which can be potential source for sustainable fuels. The most common and favorable thermochemical processes to produce these fuels is through pyrolysis process. The experimental studies done on effectiveness of using native EFB fiber to bio-oil through pyrolysis are limited. Although there are numerous information on the fiber worldwide but few or limited information are available for the native fiber. This research aimed to determine the suitability of conversion of the fiber into fuels. Model free methods were used to study the solid-state kinetic models of its pyrolysis process. The results showed that, the activation energy, pre-exponential factor, activated Gibbs free energy, Enthalpy and Entropy change were calculated using the best result. The FD, KAS and FWO iso-conversion methods were used to calculate the apparent activation energy. The model also provided the data for the proper design of equipment for the EFB fiber conversion. Similarly, the apparent activation energy values of the degradation process was predicted.

Keywords: Agriculture; Palm Oil Residue; EFB Fiber; Models Free Methods; Pyrolysis.

**IMPLICATION OF SOIL DEGRADATION IN SUSTAINABLE FOREST
PRODUCTION**

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ABSTRACT

Forests support the livelihood of more than a billion people living in extreme poverty worldwide and provide paid employment for over 100 million people. They are home to more than 80 percent of the world's terrestrial biodiversity and help protect watersheds that are critical for the supply of clean water to most of humanity. However, soil degradation is a global phenomenon with 78% of totality already degraded, which has diminished the biodiversity and ecosystem functioning that have negative impacts on the provisioning of ecosystem services and ultimately impedes poverty eradication and sustainable forest production. Soil degradation is caused by human activities and natural processes and is being exacerbated by the adverse impacts of climate change which has posed threat towards sustainable forest production, thereby reducing socio -ecological resilience and food security. Therefore, this paper highlights the impact, consequences and importance of rehabilitation of degraded soils to enhance sustainable forest production.

Keywords; Soil degradation, Rehabilitation, Ecosystem, Sustainable, Forest production

ASSESSMENT OF DOMESTIC AND SOCIAL EFFLUENTS IN SURFACE WATER USED FOR IRRIGATION PURPOSE IN SABON GARI LGA KADUNA STATE

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ABSTRACT

The physicochemical and heavy metals concentration of surface water from some selected irrigation areas of Sabon Gari Local Government Area of Kaduna State were analyzed to assess its quality and suitability. A total of six (6) sampling points were selected for the study, the surface water samples were collected and analyzed for physicochemical and heavy metals concentration. Levels of various physicochemical parameters which include Temperature, pH, Electrical conductivity (EC), Total Dissolved Solids (TDS), turbidity, suspended solids (SS) and Total suspended solids (TSS) were determined using standard analytical methods. The concentration of F-, Fe, Cu, Cr, Mn, Pb and PO³⁻, were determined using standard methods. The results indicated that almost all the parameters analyzed are within the maximum permissible limits (MPL) recommended by Nigerian Standard for Drinking Water Quality (NSDWQ) and world Health Organization (WHO) with exception of turbidity level at all the sampling station, EC concentration at A, D, and F sampling point and TDS concentrations at D sampling point. The results also showed that, the concentration of Cr, Cu, Fe, Mn and Pb in some sampling sites were slightly above the maximum permissible limit (MPL) recommended by NSDWQ and WHO. Thus, it is concluded that the current status of the water in most of the sampling sites considered for this study is fit as a source for irrigation. This paper also recommended that, the agencies concerned should provide a basis for regular monitoring of water quality status of the study area.

Keywords: *Anthropogenic, Environment, Pollution, Heavy Metals, physicochemical parameters.*

ANA 033

DETERMINATION OF SOME HEAVY METALS FROM MECHANIC WORKSHOPS AS AN ENVIRONMENTAL POLLUTION INDICATOR WITHIN POTISKUM TOWN, YOBE STATE

BY

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ABSTRACT

The concentrations of As, Cd, Cr, Pb and Zn in some selected auto mechanic workshops along the highways of Potiskum town were determined with Buck Scientific 210 VGB Atomic Absorption Spectrophotometer (AAS) AVG. Pearson's correlation coefficient was used to determine the relationship between the metals. Correlation is significant at the 0.05 level (2-tailed). The mean concentrations in mg/kg of the metals found in soil samples were in sequence of Pb (56.186 ± 0.031) > Zn (34.418 ± 0.029) > Cd (21.822 ± 0.029) > Cr (18.947 ± 0.031) > As (2.764 ± 0.027) while concentrations of heavy metals on roadside dust is Zn (37.653 ± 0.028) > Pb (33.645 ± 0.029) > Cr (0.504 ± 0.026) > Cd (0.170 ± 0.027) > As (0.081 ± 0.028). The concentration of Cd in soil samples were above the permissible limits set by WHO while As, Cr, Pb and Zn were below the permissible limits set by WHO in this study. Concentrations of heavy metals found on auto mechanic workshop may be greatly influenced by anthropogenic activities such as dump site areas, metallic wastes, disposal battery wastes, car tyres, and presence of iron benders, organic and inorganic particles used in oil additives, burning of fossil fuels, presence of metal works and indiscriminate dumping of refuse to the soil of auto mechanic workshops might also contribute significantly to the heavy metals pollution.

Keywords: Heavy Metals, Mechanic Workshop, Anthropogenic Activities, Indicators, Pollution

ANA 034

EFFECT OF ORGANIC MATERIAL ON THE IMMOBILISATION OF HEAVY METAL IN ABANDONED MINEFIELD SOIL IN MISTA ALLI, BASSA LOCAL GOVERNMENT AREA OF PLATEAU STATE

BY

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ABSTRACT

One minefield actively being used for farming in Mista Alli, Bassa Local Government Area was selected for the study, while the control field (non mined) was from Jos North Local Government Area. The concentrations (mg/kg) of some heavy metals Mn, Cu, Fe, Zn, Ni and Pb in the mined soil were determined in 2018 and 2019 using Atomic Absorption Spectrophotometry (AAS). The composition of organic manure was determined. The results of the particle size analysis showed that clay (%) was in the range 13.180 – 32.430. Cation-exchange Capacity (CEC) (Cmol/kg) with range 5.330 – 7.620. Organic matter (OM) (%) with the range 0.32 – 6.200 was in the order G > M > Z while the pH values with the range 5.990 – 6.480 all in the order of G > M with lower values in 2018. The fertilizers A (CD only), B (PM only), C (NPK only), D (NPK + CD), E (NPK + PM) and F (No fertilizer) where CD is cow dung and PM is poultry manure were used. The highest concentration of the metals were found in M with the use of fertilizers A, B, C, D, E, F in 2018 while the least were found in soil G with the same set of fertilizers in 2019. The total values of the metals in both absorbed and exchangeable (total extractable) were in the order M > G. About 60% of all the metals in the soils were in 4 M HNO₃ (residual fraction). The levels of pH, Clay, Cation-exchange Capacity (CEC) and Organic Matter (OM) content were discovered to have high significant effect on immobilization of the heavy metals. a concluding sentence to signal the relevance of the findings.

KEYWORDS: Organic Materials; Cation- Exchange Capacity (CEC), Clay content; Minefields; Immobilization and Mimeralization.

Adsorption study on the treatment of local dyeing wastewater with undoped, monodoped and multiple doped SnO₂ nanocomposites

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ABSTRACT

Green synthesis of undoped, mono-doped and multiple doped SnO₂ nanocomposites were synthesized using *Cyperus esculentus* extract as reducing and capping agents and SnCl₂ as precursor while polyvinylchloride (PVC) Polyethylene glycol (PEG) and Polyvinyl pyrrolidone (PVP) as dopants. The nanocomposites were investigated by HRSEM and XRD. The XRD analysis showed that the obtained SnO₂ nanocomposites crystallite size was average of 15nm and the doped PVC/SnO₂, PEG/SnO₂, PVP/SnO₂ and PVC-PEG-PVP/SnO₂ crystallites size were of the average 12nm, 10nm, 9nm and 8nm respectively which showed that multiple doped crystallite size is the best. The SEM showed the spherical shape cassiterite which confirmed the presence of SnO₂ nanocomposites in the PVC, PEG, PVP and PVC/PEG/PVP matrix and multiple doped has less agglomerated particles than PVC/SnO₂, PEG/SnO₂, PVP/SnO₂

The nanocomposites to be used as adsorbents for the treatment of wastewater, adsorption capacity of the materials is to be tested on pollutant containing dyes and heavy metals. The EDS results showed O, Sn as the dominant elements in the produced undoped, mono-doped and multiple doped SnO₂ nanoparticles. This study shows that doped synthesized SnO₂ nanoparticles have good phase characterization which will be good for adsorption due to large surface area.

The nanocomposites to be used as adsorbents for the treatment of wastewater, adsorption capacity of the materials is to be tested on pollutant containing dyes and heavy metals

Keywords: Green synthesis, Undoped, Mono doped, Multiple doped, SnO₂ nanoparticles

ANA 036

SYNTHESIS AND PHYSICO-CHEMICAL CHARACTERIZATION OF ARABIC GUM AND METHACRYLIC ACID MODIFIED MICROGEL PARTICLES AS DRUG CARRIER

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ABSTRACT

Carbohydrate polymers microgels are non-toxic and biocompatible which can be used readily in application such as drug delivery, medicine and pharmacy. This work synthesized Arabic gum microgel and Arabic gum methacrylic acid microgel using emulsion system. The microgels were characterized using the various physicochemical methods. Fourier Transform Infrared spectroscopy, thermal stability using Differential Scanning Calorimetry, diffraction pattern analysis using X-Ray Diffraction and the morphology using Field Emission Scanning Electron Microscope. Rheometer was used to analyze the mechanical strength and the rate of deformation was higher in Arabic gum microgel compared to modify methacrylic acid microgel. Zeta sizer was used to analyze the size and potentials, methacrylic acid modify microgel are bigger in size with more negative zeta potentials but on coating the microgels with magnetic nanoparticles, Arabic gum microgels shows increase in zeta-potentials, mobility, and conductivity values. The microgels particle size and zeta potentials were found to be dependent on the amount of methacrylic acid used as the modifying agents. The microgels were encapsulated with doxorubicin drug through the swelling method and the in-vitro release was studied in medium with pH 4.2 and 7.4. The encapsulation efficiency and release results suggest the potential of these microgels for target drugs delivery.

Keywords: Microgel, Arabic gum, Mechanical strength, Nano particles, Encapsulation

ANA 037

**THERMODYNAMIC AND TRANSPORT PROPERTIES OF SELECTED
TERNARY LIQUID MIXTURES STUDIED AT DIFFERENT TEMPERATURES**

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ABSTRACT

Thermodynamic properties are useful parameters which provides the vital information useful in the design of industrial separation processes. They also give knowledge about the component interaction in binary and ternary liquid mixtures. Thermodynamic and transport properties for ternary liquid mixtures of Nitrobenzene + n-Butanol + Benzophenone and Chlorobenzene + n-Pentanol + Benzophenone were measured at the absolute temperature of 308.15K and 318.15K over the entire range of composition. From the measured values of Density (ρ) and viscosity (η), various parameters such as excess volume (V^E), excess molar volume (V_{Mix}), Deviation in viscosity ($\Delta\eta$) and excess Gibbs free energy of activation of viscous flow (ΔG^{*E}) were calculated. The experimental and predicted excess parameters were determined and the results fitted with Redlich-kisters type polynomial equation. Furthermore, Heat of mixing and FT-IR Spectrum of equimolar concentrations of the studied liquids were investigated. The observed results indicate the existence of molecular interactions in the pure liquids as well as in the ternary liquid mixtures.

Keywords: Thermodynamic, industrial separation, molecular interactions

ANA 038

**ANALYSIS OF YAM PEELS COMPONENTS FOR BIOREFINERY
OPPORTUNITIES**

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ABSTRACT

The potential of yam peels for bioethanol production was investigated through an understanding of their compositional profile. The yam peels dried powder was subjected to XRD, and it was examined for proximate and biochemical composition. The result of the biochemical analysis of the yam peels showed the following: holocellulose (57.93 %) [cellulose (29.02 %) + hemicellulose (28.91 %)], and lignin (27.43 %), while the proximate analysis showed the following: moisture (11.11 %), ash (5.93 %), volatile matter (68.4 %), protein (10.14) and fat (0.57 %). Consequently, the diffractogram shows the presence of amorphous region in high proportion. The result showed that the yam peels possesses low lignin and high holocellulose content which is a good indication that the biomass sample is suitable to be used for the production of bioethanol. This study indicate that yam peels are potential candidates for bioenergy production.

Keywords: Holocellulose, lignin, proximate analysis, bioethanol

ANA 039

**CHARACTERIZATION OF BIOETHANOL PRODUCED FROM BIOMASS
WASTE**

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ABSTRACT

Bioethanol has a long age history as an alternative fuel. Because of its ability to be used as an alternative automotive fuel, ethanol has gain worldwide attention. The present study is aimed at the characterization of bioethanol from yam peels. The bioethanol produced from yam peel was characterized to determine its density, specific gravity, refractive index, and flash point. The results obtained revealed that the properties of the bioethanol produced correspond to the properties of bioethanol recommended by American society for testing and materials (ASTM). Therefore, the agricultural waste can serve as a source of alternative fuel.

Keywords: biomass waste, fuel properties, bioethanol.

In Vitro Evaluation of Total Phenolic and Flavonoid Contents, and Phytochemical Screening of Crude Extracts of the Leaves of Papaya (*Carica papaya* L.).

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ABSTRACT

The ethanolic leaves extract of *Carica papaya* was investigated for total phenolic and flavonoid contents using standard methods. The total phenolic and flavonoid content of the extract was determined using the Folin- Ciocalteu assay and aluminium chloride (AlCl₃) methods. The results obtained showed that the total phenolic content is 13.71 ± 0.80 gallic acid equivalents/g, while 9.55 ± 0.20 quercetin equivalents/g was recorded for total flavonoid content respectively.

The aqueous, ethanolic and hexane extracts were screened for their phytochemical constituents. The results shows that the aqueous and ethanolic extracts contained the same secondary metabolites. Both extracts contained alkaloids, flavonoids, saponins, glycosides, reducing sugar, combined reducing sugar, balsam and phenols. Similarly, hexane extract contained tannins and sterol while terpene is absent in all the solvent extracts. In conclusion, the findings of this studies shows that ethanolic extract is a valuable source of phytoconstituents and natural antioxidants.

Keywords: *Carica papaya*, Phytochemicals, Flavonoids, Phenolic, Antioxidant.

ACTIVATED CARBON ADSORBENTS PRODUCED FROM BITUMINOUS LAFIA-Obi NASSARAWA COAL BY CHEMICAL ACTIVATION WITH PHOSPHORIC ACID

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ABSTRACT

In this study a look into the production of an activated carbon (AC) from bituminous Lafia-Obi |Nasarawa coal via chemical activation with phosphoric acid is carried out. The influence of carbonization temperature and time on its porosity was investigated. A preliminary proximate analysis put the fixed carbon of the raw coal sample at 63.6 % thereby effectively placing it within the bituminous rank of coals. Chemical activation using phosphoric acid in a coal to acid mass ratio of 1:4 was carried out. As carbonization temperatures were varied between 550 and 700 °C, and carbonization times of 2 and 3 hours, the influence of these two process variables on surface characteristics such as surface area, micropore volume and pore size was studied. The AC sample produced at 550 °C and 2 hours carbonization time had a Brunauer–Emmett–Teller (BET) surface area of 331.3.2 m²/g, Dubinin-Radushkevich (DR) micropore volume of 0.125 cm³/g and (Horvath Kawazoe) HK pore size of 9.237 Å, while that of the sample produced at 700 °C and 3 hours had a BET surface area of 596.2 m²/g, DR micropore volume of 0.173 cm³/g and HK pore size of 9.435 Å.

Keywords: Bituminous coal, Activated carbon, Chemical activation

Heavy Metal Levels in Cattle Egrets (*Bubulcus Ibis*) Foraging in some Abattoirs in Lagos State Metropolis

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ABSTRACT

Heavy metal accumulation in the ecosystem constitutes a potential toxic effect which is hazardous to human health. Increasing environmental pollution has necessitated the use of cattle egrets to evaluate the levels of heavy metal contamination, to establish their use in biomonitoring of heavy metals and to provide data for monitoring pollution in the environment. The present study assessed the utilization of *Bubulcus ibis* in monitoring pollution in five abattoirs, namely Agege, Bariga, Kara, Itire and Idi-Araba, all situated in Lagos State. The concentration of five (5) heavy metals, cadmium (Cd), copper (Cu), nickel (Ni), lead (Pb) and zinc (Zn) were determined in the liver, muscle and feather of *Bubulcus ibis* using the atomic absorption spectrophotometer. The trend of metal accumulation was in the order: Zn>Cu>Pb>Cd>Ni for all the sampled tissues. The mean tissue concentrations of the metals were significantly different ($p < 0.05$) among the sites. The highest levels of metal concentration were reported in the liver in all the locations. Mean concentration of Cd in Kara (0.003 ± 0.00058) was significantly ($p < 0.05$) higher than those found at Agege (0.0013 ± 0.00058) and Idi-Araba (0.001 ± 0.001). A significant difference ($p < 0.05$) was also observed between the mean concentrations of Cu in Bariga (0.01 ± 0.001) and Idi-Araba (0.003 ± 0.001). All the studied heavy metals were present in the liver, muscle and feathers of the cattle egrets. The contamination levels were ascertained from the study which indicated that cattle egrets are useful in biomonitoring studies and the generated data will serve as baseline data which could be compared with data from other locations for monitoring heavy metal pollution.

Keywords: Heavy metals, Pollution, Abattoir, Cattle Egret

INHIBITORY POTENTIALS OF SOME PHYTOCHEMICALS FROM NIGERIAN MEDICINAL PLANTS AGAINST CYTOCHROME P450 17-ALPHA-HYDROXYLASE PATHWAY OF PROSTATE CANCER

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ABSTRACT

Prostate cancer (PC) remains one of the drug-resistant cancer-related diseases affecting the human well-being globally, thereby necessitating effective therapeutic strategy. Androgen steroidal signaling is strongly implicated in the onset proliferation and metastasis of PC through the production of CYP17A1. Thus, inhibitors of CYP17A1 enzyme such as abiraterone and bicalutamide represent medications expressing this pathway, however, challenged by various aftereffects and affordability. These make the search for alternative therapeutic candidates essential. This study is aimed at identifying potent anti-PC from cheaper and safer phytochemicals from Nigerian medicinal plants through strategic inhibition of CYP17A1. The mechanistic inhibitory potentials were demonstrated against CYP17A1 (PDB 3RUK) using ligand-receptor Maestro Glide suites. The physicochemical, pharmacokinetics and toxicological parameters of the selected phytochemicals were predicted using Swiss ADMET server and VEGA ToxRead 0.23Beta. From the docking simulation, the phytochemicals **7**, **15**, **18** and **19** demonstrate strong inhibitory potentials of -8.917, -8.578, -8.207 and -8.062 kcal/mol against the receptor compared to abiraterone (**R1**) and bicalutamide (**R2**) reference drugs with -9.297 and -7.730 kcal/mol respectively. They show good ADMET, drug-likeness and mutagenic properties ideal for bio-applications. The study poses the phytochemicals as potential candidates worthy of further translational processes into therapeutics for effective prevention and treatment of PC.

Keywords: Prostate cancer, CYP17A1, inhibitory mechanism, molecular docking, ADMET, natural products

**PHYTOCHEMICAL AND EX-VIVO SNAKE VENOM DETOXIFYING ACTION
OF THE AERIAL PART EXTRACT OF TACAZZEA APICULATA OLIV
(PERIPLOCACEAE)**

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ABSTRACT

Tacazzea apiculata (Olive) is a woody climber indigenous to tropical Africa used ethnomedicinally for the treatment of pain, inflammation and snakebite among others. This study therefore is aimed at screening the phytochemical constituent(s) and to evaluate the snake venom detoxification action of the aerial part extract of *T. apiculata* in mice. Pulverized aerial part of *T. apiculata* was extracted with methanol using maceration method to yield the crude methanol extract (ME). The preliminary phytochemical screening was conducted in accordance with procedures as described by African Pharmacopoeia. The LD₅₀ of ME was conducted using Lorkes' method. The LD₉₉ of the venom was carried out using the methods of Theakston and Reid. Venom detoxification effect was investigated at the doses of 80, 170, and 260 mg/kg extract, 0.2ml of LD₉₉ was reconstituted with doses of extract and incubated, 0.2ml of incubated mixture was then injected into each animal in the treatment group. The number of deaths were recorded within 24h. The Preliminary phytochemical screening of ME *T. apiculata* revealed the presence of secondary metabolites. The LD₅₀ of ME and the LD₉₉ of the venom were estimated to be 894mg/kg and 4.6mg/kg, respectively. Antivenin studies suggest that ME possess significant activity against venom *ex-vivo*; maximum protections were observed at the doses of (80mg/kg), (170mg/kg) with 100%, 83.3% survival, respectively. ME *T. apiculata* demonstrated significant *ex vivo* antivenin activity in mice and lends credence to traditional use of the plant in the management of snakebite.

Keyword: *Tacazzea*, *ex-vivo*, snake-venom, detoxifying, LD₉₉, phytochemical

ORG 003

**PHYSICOCHEMICAL CHARACTERIZATION OF BIODIESEL PRODUCED
FROM *Azadirachta indica* SEED OIL**

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ABSTRACT

Azadirachta indica seed oils were extracted, characterized and transesterified using methanol in the presence of Ba(OH)₂ as an heterogeneous catalyst. Results showed that the optimum oil yield was 38.50%. While the physicochemical characterization of the produced oil revealed an acid value, iodine value, peroxide value, ash content, specific gravity, kinematic viscosity and saponification value of 11.82 mgKOH/g, 83.03, 2.38 meq/g, 1.04, 0.92, 48.78 mm²/s and 198.11 mgKOH/g respectively, that of the produced biodiesel revealed a viscosity, flash point, density, pour point and cloud point of 6.71 mm²/s, 175 °C, 890 kg/m³, 12 °C and 16 °C respectively. The findings revealed that *Azadirachta indica* seed oil is a good feedstock for biodiesel production for diesel engine when compared with ASTM D6751 and EN 14214 standards

Keywords: *Azadirachta indica*, seed oil, characterization, biodiesel.

ORG 004

**Extraction, Physicochemical, Fatty Acid and Antioxidant Properties of
Citrillusanatus (Egusi Melon) Seed Oil**

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ABSTRACT

Citrillus lanatus (egusi melon) is grown in Nigeria as a source of oil as well as dried and grounded for use as soup condiment. Its seed oil is believed to be rich in antioxidants as well as an important source of essential amino acids, vitamins, and minerals. This study focused on the physicochemical characteristics, fatty acid and antioxidant properties of the extracted seed oil. Procured seeds were dried, grounded into fine powder using a manual grinder before being stored in an airtight container. The seed oil was extracted using petroleum ether as a solvent and analysed for its physicochemical properties: refractive index, specific gravity, iodine value, saponification value. Fatty acid and antioxidant properties was also analysed using standard procedures. *Citrillus lanatus* seeds produced yellow-odourless oil with yield 31.92%. The seed oil also possessed a specific gravity of 0.97 and refractive index of 1.51 indicating that the oil is more thick compared to most drying oil with refractive indices between 1.48 and 1.49. Its acid, iodine, peroxide and saponification values are 3.72, 117.02, 9.24 and 189.75 respectively. These values are within the recommended range of edible oil. The seed oil contained essential fatty acids with a higher proportion of saturated fatty acids mostly methyl tetradecanoate (41.91%) and hexadecanoic acid, methyl (21.20%). The seed oil possesses free radical scavenging activity (39.72%) lower than the 61.84% obtained for the ascorbic standard at the highest investigated concentration of 60 µg/mL. The present findings revealed that the oil from egusi melon an agricultural product is valuable as table oil which could further be explored for nutraceutical and pharmaceutical uses especially in combating free radical implicated disease condition.

Keywords: Antioxidant, *Citrillus lanatus*, Egusi Melon Oil, Physicochemical

ORG 005

**EXTRACTION AND CHARACTERIZATION OF CASHEW SHELL LIQUID
(Anacardium Occidentale) AND CASHEW KERNEL OIL**

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ABSTRACT

This study was carried out to extract oils from cashew shell and its kernel and to characterize the oils, with the view to find out their suitability for consumption, industrial and other uses. Soxhlet apparatus was used for the extraction using hexane as solvent. The properties (physical and chemical) of the extracted oils on analysis shows that the percentage of oil extracted from the shell of the cashew was found to be 27.5% while that extracted from the kernel was 14.5% oil. The results of the physical analysis shows the cashew kernel oil (CKO) is light yellow while the Cashew Nut Shell Liquid (CNSL) is dark brown. The boiling points for shell and kernel oil were 97^oC and 94^oC respectively. The cashew kernel oil is non-toxic. The properties of CNSL conformed, to a greater extent, to that exhibited by castor seed oil. This suggests its application in the processing and manufacturing industries. The kernel oil complies with standards, both in its physical and chemical properties to those of groundnut and melon oils and could be used in the food and pharmaceutical industries. The iodine value obtained (184.01) for CNSL and (94.10) for CKO indicates low degree of unsaturation in CKO.

Keywords: Cashew kernel oil, cashew nut shell liquid,

Gene Amplification of Glutathione Synthetase and Glycerol Kinase of *Trypanosoma brucei brucei*

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ABSTRACT

African Trypanosomiasis is a neglected tropical disease that has been of public health concern in Sub-Saharan Africa. The treatment and control have been difficult due to drug toxicity, parasites resistance to chemotherapy and migration of livestock. Glutathione synthetase and Glycerol kinase of African Trypanosomes are important enzymes due to their involvement as glycolytic enzymes and enzymes of the glutathione and glycerol metabolism in the generation of energy. The necessity of Glutathione synthetase and Glycerol kinase to the survival of African trypanosomes in mammalian host has been chemically validated as a promising target for therapy and possible vaccine development. This work reports the purification of the blood stream form (BSFs) of *Trypanosoma brucei brucei* from infected blood of rat, the genomic DNA (gDNA) extraction and gene amplification of glutathione synthetase and glycerol kinase towards the development of new therapeutics for African trypanosomiasis. Pure parasites were isolated from infected blood using the ion exchange chromatographic method (DEAE cellulose chromatography). Genomic DNA of the blood stream forms of *T.b.brucei* was extracted using the phenol-chloroform and kit method and DNA concentrations quantified using a nanodrop spectrophotometer. The full coding sequences of *T.b.brucei* Glutathione synthetase (*T.b.bGS*) and *T.b.brucei* Glycerol kinase (*T.b.bGK*) genes were amplified by subjecting the gDNA to a hot start PCR amplification technique. Pure parasites were obtained and gDNA extracted using kit method gave a concentration of 358.7 ng/ μ L and the phenol chloroform method gave 1590.5 ng/ μ L. GTS and GK gene were amplified and agarose gel electrophoreses revealed the band size of gene at 1600 bp and 1500 bp respectively. Successful purification of parasites, extraction of gDNA of *T.b.brucei* and amplification of the GTS and GK gene will be discussed.

Keywords: Trypanosomiasis, *Trypanosoma brucei brucei*, Glutathione synthetase, Glycerol kinase, Polymerase chain reaction

**PHYTOCHEMICAL SCREENING AND THE ANTIEPILEPTIC STUDY OF THE
ROOT BARK METHANOL EXTRACT OF *DIOSPYROS MESPILIFORMIS***

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ABSTRACT

The methanol root bark extract of *Diospyros mespiliformis* contain important phytoconstituents revealed the presence of alkaloids, flavonoids, tannins, carbohydrates, cardiac glycosides saponins and combined anthracene type of anthraquinones. The free type was however found to be absent. LD₅₀ values were found to be 673.6 mg/kg intraperitoneally. The methanol root bark extract of *Diospyros mespiliformis* showed significant antiepileptic activity against pentylenetetrazole induced seizure in mice. From 50% protection with a dose of 50 mg/kg of extract to 75.00% protection at both 100 mg/kg and 200 mg/kg doses. Result were expressed by mean of ± SD. The activity was found to be significant using student's t-test, where a 'p' value less than 0.05 is significant.

Keywords: *Diospyros mespiliformis*, antiepileptic, penntylenetetrazole, albino mice, antiepileptic activity.

**ISOLATION ON CATECHIN FROM THE n- BUTANOL FRACTION OF CRUDE
ACETONE EXTRACT OF THE LEAF OF *OCHNA RHIZOMATOSA*
OCHNACEAE**

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ABSTRACT

The extract of the leaf of *Ochna rhizomatosa* (van Tiegh.) Keay [Ochnaceae], a plant used in the treatment of malaria in Northern Cameroun, was subjected to preliminary phytochemical screening. The result revealed the presence of carbohydrates, steroids, cardiac glycosides, terpenoids, flavonoids, tannins, fatty acids, proteins and saponins. Alkaloids were however absent. Column chromatography of the methanol fraction of water insoluble portion of the extract afforded compound BND. The structure of this compound was elucidated using chemical tests, spectroscopic techniques (NMR) and by comparison with reference data. BND was identified to be a Catechin, with IUPAC name 2-(3, 4-dihydroxy-phenyl)-chroman-3,5,7-triol.

Keywords: *Ochna rhizomatosa*, phytochemical screening, malaria, column chromatography

ORG 009

EMPIRICAL MODELING OF THE PRECIPITATION FORMATION OF NAPHTHENIC ACID FROM NIGERIAN CRUDE OIL

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ABSTRACT

Empirical modeling of the precipitation formation of Naphthenic acid from Nigeria crude oil was study. The aim is to conduct a comprehensive investigation of main the factors that affect the precipitation formation of naphthenic acids from crude oil with a view of minimizing the formation of naphthenate precipitate. Response surface design methodology based on Box-Behnken statistical design was used for the analysis. Empirical model results obtained shows that naphthenic acid concentration, calcium ion concentration, pH and water cut has significant effects on the naphthenate precipitate yield. It was found out that the Calcium ion and Naphthenic acid concentrations has the stronger effect than the pH and water cut. The results of the predicted yield by the optimizer were 1.88%, 3.09% and 8.40% and validation experimental results obtained were 2.41 ± 0.31 ., 4.00 ± 0.24 and 9.18 ± 0.20 respectively. Optimization and validation experiment of the factors investigated agree very closely with the empirical model developed. Yield of 2.41 ± 0.31 obtained under the optimal condition of 5000 mg/L, 2000 mg/L, 9 and 5% (Naphthenic acid concentration., Calcium ion concentration, pH and water cut) respectively, was the best option for the minimizing the naphthenate precipitate. This further indicates that the empirically model obtained from the response surface design is highly reliable and a very good representation of the process.

Keywords: Naphthenic Acid, Precipitation, Modeling, Crude oil, Box-Behnken, Optimization

ORG 010

Extraction and application of natural dyes (*Terminalia Catappa*) Almond leave on synthetic fabric (Polyester) using FeSO₄ (ferrous sulphate) and K₂Cr₂O₇ (Potassium dichromate) as mordants.

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ABSTRACT

Natural dye from *Terminalia Catappa* (tropical almond), was extracted with soxhlet extractor using methanol as the solvent. Extraction time was five hours, at 55 °C for each extraction. Purification of the natural dye was done with a rotary evaporator for two hours. Total yield of dye obtained was 40.5 g. Polyester fabric was dyed using the natural dye at a liquor ratio of 1:50, for 30 minutes and at varying temperature of 40 °C, 60 °C, 80 °C, 100 °C, 120 °C using mordants, potassium heptaoxidichromate (vi) (K₂Cr₂O₇) and ferrous sulphate (FeSO₄) as mordants. Light fastness test was carried out using the blue wool scale and also the wash fastness test was conducted on each fabric . Results indicated that simultaneous mordanting with (FeSO₄) gave good to excellent light fastness properties of 7, similarly mordanting with (K₂Cr₂O₇), gave moderate to excellent light fastness properties 4 and 7, as the volume concentration of mordant is increased. Wash fastness test results using (FeSO₄) indicated a rating of 4-5, which shows very good to excellent wash fastness properties, in the same vein, result of wash fastness using (K₂Cr₂O₇) as mordant indicated a rating of 1-4, which implies poor to very good wash fastness properties.

Keywords: Almond leaves, Extraction, Fastness, Mordant, Natural dye, Soxhlet.

Phytochemical Investigation and *In-Vitro* Antiplasmodial Assessment of Ethanol Extract of Whole Plant of *Crotalaria arenaria* (Benth)

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ABSTRACT

Crotalaria arenaria (Benth) is a native plant from Northern part of Nigeria which is employed as antimalarial herb in traditional medicine in the community where it occurred. The phytochemical composition and in vitro antiplasmodial activity and of the extract and fractions of the whole plant of *Crotalaria arenaria* were investigated. The mature and fresh whole plant of *C. arenaria* were collected, air dried and pulverized. The pulverized form of the plant were soaked in ethanol for two weeks and later decanted, filtered and concentrated using rotatory evaporator at 40°C and evaporated to dryness and labeled CRA-1. The dried ethanol solid extract (CRA-1) was partitioned/fractionated using n-hexane, chloroform, ethyl acetate, methanol and which afforded an n-hexane fraction (CRA-1-05), a chloroform fraction (CRA-1-08) and methanol fraction (CRA-1-03) which were dried and tested for their phytochemical and in vitro antiplasmodial activity against *Plasmodium falciparum* strain (K1). The ethanol extract and its fractions were found to significantly inhibit/suppress multi-drug resistant strain of *P. falciparum* (K1) in the range of 86.73% - 65.31% at varied concentrations of 5000 µg/ml, 2000 µg/ml, 1000 µg/ml and 500 µg/ml. The ethanol extract and its fractions showed the presence of tannins, saponins and alkaloids which could be responsible for the in vitro antiplasmodial activity of the whole plant extract of *C. arenaria* and each of its fractions. These findings demonstrated that the extract of *C. arenaria* (whole plant) and fractions have significant in vitro antiplasmodial activity and this justifies the traditional use of the whole plant extract of *C. arenaria* in the folklore medicine to cure malaria disease. The study recommends in vivo antiplasmodial assay of the extract of the whole plant of *C. arenaria* to further substantiate the findings obtained in this present study.

Keywords: *Crotalaria arenaria*, phytochemical composition, antiplasmodial activity

ORG 012

**PHYTOCHEMICAL AND ANTIMICROBIAL SCREENING OF EUPHORBIA
POLYCNOMOIDS**

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ABSTRACT:

The preliminary phytochemical screening of methanolic crude extract of *Euphorbia polycnomoides* revealed the presence of Alkaloids, Flavonoids, glycosides, Sterol/Terpenes, and Tannins, but absent of Saponins and Anthraquinone. These constituents have been reported to have different pharmacological activities. Furthermore, the zone of inhibition of n-Hexane, Chloroform, Ethyl acetate and n-Butanol illustrated in table revealed the antimicrobial activities of different fractions ranging from 10-30mm against test microorganisms. *Staphylococcus aureus* was the most active organism with zone of inhibition of 30mm for the ethyl acetate fraction compared with control (standard) of about 24mm. However, *Escherichia Coli* on the other hand was the less active organism with zone of inhibition of 10mm for the n-Butanol fraction, while n-hexane and chloroform fractions showed no significant activity against the test microorganisms.

Keywords: Phytochemical, Antimicrobial, *Euphorbia polycnomoides*

Antiulcer activity of aqueous pulp and peel extracts of unripe *Musa paradisiaca* (plantain) at different inclusion in ulcer induced Wistar albino rats.

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ABSTRACT

Ulcer is a gastrointestinal disorder resulting due to mucosal membrane breach of the alimentary tract, which passes through the muscularis mucosa into the sub-mucosa to cause deeper peptic ulcer diseases. *Musa paradisiaca*, in addition to its folkloric use in the treatment of peptic ulcers, is also effective in the treatment of diarrhea and vomiting.. This present study is aimed at assessing the antiulcer efficacy of unripe *Musa paradisiaca* (plantain) aqueous pulp and peel extracts at different inclusion in ulcer-induced Wistar albino rats. The plant was extracted using cold extraction method. Forty two Wistar albino rats weighing 105-115g was starved for 24 hours and grouped into seven groups (n= 6) according to their weights. Their abdomen was slightly opened under mild chloroform anaesthesia, and their pylorus carefully lifted and ligated, avoiding any damage to the vascular tissues. After ligation, the stomachs were quickly replaced and the abdomen sutured. Immediately after suturing, groups A, B, C and D received intra peritoneal injection of distilled water (2.0mg/kg body wt.), cimetidine (50.0mg/kg body wt.), pulp extract(100mg/kg body wt.), peel extract (100mg/kg body wt.) respectively, while group E, F and G received different inclusion of pulp extract and peel extract. Acute toxicity test, ulcer index (UI), gastric juice volume, gastric pH and gastric mucus were carried out employing standard methods. The result revealed that doses of the peel and pulp aqueous extract of *Musa paradisiaca* up to 5000mg/kg resulted to no behavioural changes and mortality to the experimental animals. The result also showed that 75 + 25mg/kg body weight of pulp and peel had the highest percentage ulcer Inhibition followed by 50mg/kg cimetidine, 100mg/kg body weight of pulp, 50 + 50mg/kg of pulp and peel and 100mg/kg body weight of peel extract while 25+ 75mg/kg body weight of pulp and peel extract had the lowest percentage of ulcer Inhibition. The treated groups significantly reduced the gastric juice volume and pH of the experimental animals when compared to the untreated group except for 25+75mg/kg body weight of pulp and peel extract. Hence, a better reduction of gastric juice volume and pH was peculiar to 75+ 25mg/kg body weight of pulp and peel extract. However, the gastric mucus lowered in 75+ 25mg/kg body weight and 25+75mg/kg body weight of pulp and peel extracts respectively, when compared to other treated groups. This study demonstrates that Inclusion of pulp and peel extracts of *Musa paradisiaca* at 75+ 25mg/kg body weight exerts antiulcer activities and could be used as pharmaceutical ingredients in the synthesis of antiulcer agents.

Keywords: Antiulcer, *Musa paradisiaca*, gastro intestine disorder, albino rats.

PHYTOCHEMICAL SCREENING AND ANTIFUNGAL STUDY OF THE ETHYL ACETATE LEAVE EXTRACT OF *Indigofera nummulariifolia* (Linn.)

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ABSTRACT

Indigofera nummulariifolia (Linn.), is an annual herb used locally to cure cough, chest pains, epilepsy, nervous disorders, asthma, bronchitis, fever and complaints of stomach, liver and kidney in Tropical Africa and Nigeria. The preliminary phytochemical screening and antifungal study of the ethyl acetate leave extract were investigated in order to evaluate its medicinal properties. Antifungal study was determined against two fungal. The antifungal screening result of the ethyl acetate leave extract showed that it had activity against *Candida albicans* and *Aspergillus niger* respectively. The ethyl acetate extract showed highest zone of inhibition of growth at 24mm and 21mm against the test organisms (*Candida albicans* and *Aspergillus niger* respectively) at a concentration 100mg/ml. The minimum inhibitory concentrations and minimum fungicidal concentrations values were found at 12.5mg/ml and 25mg/ml against *Candida albicans* and 25mg/ml and 50mg/ml against *Aspergillus niger* respectively. The Phytochemical screening of the ethyl acetate leave extract, gave positive results for alkaloids, flavonoids, saponins, tannins, terpenoids and phenols. Proton NMR result review signals at 4.0-7.8ppm, 2.1-2.5 and 1.0-5.0ppm typical of aromatics. This study establishes the effective ethnomedicinal use of these plants in the treatment of fungal diseases. In conclusion the result of this study justified the use of this plant in ethno-medicinal treatment of ailments.

Keywords: *Indigofera nummulariifolia*, leaves, antifungal study, inhibitory.

PHY 001

MOLECULAR MODELING STUDIES OF SOME NON-SMALL CELL LUNG CANCER THERAPEUTIC AGENTS.

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ABSTRACT

The development of NSCLC agents/EGFR inhibitors to treat non-small cell lung cancers is an important medical necessity due to persistent development of resistance by the mutations. In view of this, a model with a very high predictive ability on thirty five (35) NSCLC agents was built using QSAR molecular modeling technique. Density Functional Theory method at B3LYP/6-311G* level of theory was used to identify the optimum conformation of the thirty five (35) NSCLC agents. A Multi-linear regression Genetic Function Algorithm method (MLR-GFA) was used to build the five models. The described model among others was selected and reported since it has passed the requirements for good model validation with resulting parameters: R^2 of 0.8764, R^2_{adj} of 0.8370, Q_{cv}^2 of 0.7655, R^2_{test} of 0.7024 and LOF of 0.3312. The described model was moreover subjected to applicability domain and found to be significant.

Keywords: QSAR; NSCLC; Data set; Applicability domain.

PHY 002

MOLECULAR DOCKING INVESTIGATION OF SOME POTENTIAL DRUGS AGAINST CORONA VIRUS DISEASE (COVID-19)

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ABSTRACT

The Molecular docking investigation results on six existing COVID-19 potential drugs and the SARS-COV-2 main protease (6LU7) have shown that all the drugs have favorable binding affinity toward the chosen target receptor. Ivermectin has the highest binding affinity of -10.3 kcal/mol followed by Remdesivir with binding affinity of -7.2 kcal/mol, then Nitaxozanide with binding affinity of -6.7 kcal/mol, then Hydroxychloroquine with binding affinity of -5.9 kcal/mol, then Favipiravir with binding affinity of -5.3 kcal/mol and Chloroquine with binding affinity of -5.1 kcal/mol. Ivermectin with highest binding affinity of -10.3 kcal/mol. Considering the high binding affinity of Ivermectin toward the target receptor (SARS-COV-2 main protease) the fact that this drug is under clinical trial in many countries across the globe, this research further affirms the possibility of using this drug as anti-covid-19 after finding its suitability in clinical trials.

Keywords: Molecular docking, Covid-19, Remdesivir, Ivermectin and Nitaxozanide

Rational design of novel 4-(quinolin-2-yl) pyrimidin-2-amine derivatives as *V600E-BRAF* inhibitors with Prediction of their Drug-Likeness and Pharmacokinetic Properties

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ABSTRACT

The resistance of *V600E-BRAF* to the vemurafenib and the side effects of the identified inhibitors trigger the research for a novel and more potent anti-melanoma agents. In this study, virtual docking screening and scaffold growth along with drug-likeness and pharmacokinetic predictions were combined to design novel 4-(quinolin-2-yl)pyrimidin-2-amine derivatives as *V600E-BRAF* inhibitors. The docking result demonstrates that compound 5 best inhibit *V600E-BRAF* when compared with other compounds within the dataset. This compound was used as a template in designing novel anti-cancer compounds by attaching some favourable substituents. The docking results of the designed compounds revealed a good MolDock score ($< -90 \text{ Kcalmol}^{-1}$), which showed that all the compounds can efficiently bind with the active sites of the target, out of which two analogous (N1 and N3) were considered optimal that outperformed vemurafenib, the FDA-approved *V600E-BRAF* inhibitor. Furthermore, these compounds passed the drug-likeness criteria (Lipinski's rule) successfully and were found to be orally bioavailable. Thus, this study identified compounds (N1 and N3) as the best hits against *V600E-BRAF* kinase with enhanced pharmacological properties and recommends their synthesis, in vivo and ex-vivo evaluation, to validate our hypothesis.

Keywords: Melanoma, *V600E-BRAF*, Virtual screening, docking simulation, ADMET.

**Comparative Analysis of Adsorption and Corrosion Inhibitive Properties of
Clindamycin for Mild Steel in 2M H_2SO_4 .**

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ABSTRACT

Adsorption and corrosion inhibitive properties of clindamycin compound for mild steel in 2.0M H_2SO_4 was studied using the gravimetric and electrochemical method. The results showed that the clindamycin compound is a good corrosion inhibitor for mild steel in 2.0M H_2SO_4 . The inhibition efficiency was found to increase with increase in the concentration of clindamycin compound up to a maximum of 91%, but at the same time it decreased as the temperature was increased, a study revealed that clindamycin is a mixed-type corrosion inhibitor.

Keywords: Adsorption, corrosion inhibitive, clindamycin

**COMPUTATIONAL AND ELECTROCHEMICAL STUDY OF CORROSION
INHIBITION OF MILD STEEL USING CEFUROXIME DRUG AS AN INHIBITOR**

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ABSTRACT

The corrosion inhibition behavior of cefuroxime was investigated on mild steel in 2 M H₂SO₄ solution using electron impedance spectroscopy measurement and Quantum chemical studies. The inhibitive effects of the studied compound increases with increasing concentration and the study revealed that cefuroxime is a mixed-type corrosion inhibitor. The adsorption of cefuroxime on mild steel surface obey Langmuir adsorption isotherm and involve physical adsorption mechanism. Quantum chemical studies corroborate experimental results.

Keywords: Corrosion Inhibition, EIS, cefuroxime and Adsorption

Thermodynamic and electrochemical study of clindamycin as corrosion inhibitor for mild steel in acidic media

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ABSTRACT

Thermodynamic and corrosion inhibitive properties of clindamycin compound for mild steel in 2.0M H₂SO₄ was studied using the gravimetric and electrochemical method. The results showed that the clindamycin compound is a good corrosion inhibitor for mild steel in 2.0M H₂SO₄. Thermodynamic consideration revealed that adsorption of the clindamycin compound on mild steel surface is an exothermic and spontaneous process that fitted the Langmuir adsorption isotherm. The values of activation energy and Gibb's free energy were found within the range of limits expected for the mechanism of physical adsorption.

Keywords: Corrosion, inhibitor, mild steel, adsorption isotherm

**EFFECT OF SODIUM DODECYLSULPHATE AND
CETYLTRIMETHYLAMMONIUM BROMIDE ON THE REDUCTION OF N,N'-
PHENYLENEBIS(SALICYLIDENEIMINATO)IRON(III) BY OXALIC ACID IN
MIXED AQUEOUS MEDIUM: A KINETIC STUDY**

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ABSTRACT:

The effect of sodium dodecylsulphate (SDS) and cetyltrimethylammonium bromide (CTAB) on the reduction of N,N'-phenylenebis-(salicylideneiminato)iron(III) ([Fesalphen]⁺) by oxalic acid was studied in mixed aqueous medium under pseudo-first order conditions at 26 ± 1 °C, $\mu = 0.2 \text{ C}^2 \text{ mol dm}^{-3}$ (NaCl) and $\lambda_{\text{max}} = 435 \text{ nm}$. The reaction data was analyzed using Piskiewicz model and the existence of premicellar aggregates was proposed. The cooperativity index and binding constants obtained were $n = 1.61$ and $K = 1.08 \times 10^7 \text{ dm}^3 \text{ mol}^{-1}$ in SDS and $n = 1.72$ and $K = 2.49 \times 10^7 \text{ dm}^3 \text{ mol}^{-1}$ in CTAB. The binding constants obtained suggest significant electrostatic and hydrophobic interactions.

Keywords: Sodium dodecylsulphate (SDS), Cetyltrimethylammonium bromide (CTAB), Kinetics, N,N'-phenylenebis(salicylideneiminato)iron(III), Oxalic acid, Premicellar, Piskiewicz model.

INORG 002

Green Synthesis and Characterization of Gold nanoparticles using Aqueous Extract of *Agerantum conyzoides*

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ABSTRACT

In this study, *Agerantum conyzoides* leaf extract was used for the green synthesis of gold nanoparticles (AuNPs) via reduction method. AuNPs were formed by reducing an aqueous HAuCl₄ solution using the extract of *Agerantum conyzoides* as reducing agent in a ratio of 5:1 at room temperature and stirring speed of 180rpm, for about 10minutes with a vivid visible colour change (pale yellow to ruby). The green synthesized gold nanoparticles were characterized to determine the surface plasmon resonance, the morphology and the particle size using UV-visible spectroscopy, HRTEM, EDS, and Zetasizer respectively. The UV-Visible spectroscopy analysis of gold nanoparticle revealed a sharp peak at 533nm, the HRTEM micrograph showed varying structural shapes (spherical, hexagonal, icosahedral), higher dominance of gold in the elemental composition as presented in the EDS analysis and the AuNPs has particle size of 60nm as revealed by the zetasizer in the dynamic light scattering analysis. Hence, gold nanoparticles can be effectively synthesized using *Agerantum conyzoides L* extract and HAuCl₄.

Keyword: Green, Synthesis, Nanoparticles, *Agerantum conyzoides*

INORG 003

SOLVENT EFFECT ON THE UV/VISIBLE ABSORPTION SPECTRA OF N-METHYL-2,4-DINITRO-N-PHENYLANILINE

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ABSTRACT

The solvatochromic response of N-methyl-2,4-dinitro-N-phenylaniline in ten solvents of different polarities have been investigated at room temperature. The UV/Vis absorption spectra shifts were analyzed by the Linear solvation energy relationship and Kamlet–Taft equation. A bathochromic shift was observed as solvent polarity increased and was highest in solvent with highest proton acceptor ability and polarizability.

Keywords: Solvatochromism, Linear solvation energy relationship, polarizability

INORG 004

SYNTHESES AND EVALUATION OF Fe (II) , Ni (II) COMPLEXES WITH DERIVATIVES OF QUERCETIN-BETA ALANIN SCHIFF BASE LIGANDS

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ABSTRACT

In this research, Fe (II) and Nickel (II) complexes with quercetin- β -alanine ligands were synthesized and their biological activities was evaluated. One schiff base (quercetin- β -alanine) ligand and two metal complexes {Fe (II) and Ni (II)} were synthesized in aqueous basic medium. Bothe the complexes and the schiffbase were characterised by melting points, solubility, molar conductivity measurements magnetic susceptibility, FTIR. The solubility test shows that, DMSO is the most suitable solvent for dissolution of the complexes, the FTIR results indicated the imine bonds and meta-ligand bond ($400 - 350\text{cm}^{-1}$) has been formed between the ligand and metal ions used for the study. Molar conductivity measurements showed that the complexes are non-electrolytic, suggesting a metal-ligand ratio of 1:2 for the complexes, with respect to the amino acids. Electronic spectra and magnetic susceptibility measurements suggested a tetrahedral geometry for Ni (II) and octahedral for Fe (II) complexes. Magnetic susceptibility studies also revealed that the complexes are paramagnetic, which revealed that, the ligand is a weak field ligand as they formed high spin complexes. Gravimetric analyses shows that the complexes contained water of crystallization. The agar diffusion antimicrobial studies revealed that quercetin- β -alanine ligands are biologically active while their metal complexes shows a significantly enhanced activity against the studied microbial strains under study.

POL 001

GREEN POLYMERS FOR SUSTAINABLE DEVELOPMENT AND THE WAY FORWARD

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ABSTRACT

Polymer products present a series of excellent properties such as impermeability to water and microorganisms, high mechanical strength, low density, and low cost due to manufacturing scale and process optimization. However, the chemical, physical and biological inertness, and durability of these products result in their accumulation in the environment if not recycled. This accumulation of plastics, along with other materials, is becoming a serious problem for all countries in the world. Today, these plastic materials were dumped in large volume in landfills, streams seas and oceans. In addition, Fossil fuels consumption further increase emissions of the greenhouse gases, water vapor, methane, and carbon dioxide. The reckless depletion of our natural resources by human activities and the increase in industrial activity further trigger global warming, which potent a serious threat to the biosphere. This bring in to focus, a very strong movement, in all countries of the world, to use materials that do not harm the planet, that is, low environmental impact materials. The UN Earth Summit 2012 in Rio de Janeiro (“Rio+20”) endorsed the concept of building a prosperous and strong “greenish” world economy within the context of sustainable development. This paper tends to make a review of some importance of polymers derived from fossil fuels. Materials derived from plants and microorganisms are presented, as well as biodegradable materials obtained from fossil fuels for a sustainable development. Important green principles of polymer production were highlighted. In conclusion it is clear that there is not a single ideal material or solution adequate for all possible situations on Earth, which always presents the lowest environmental impact. A solution for the plastic material could be the conventional polyolefin materials formulated with good oxidant additives, used as many times as possible. Another interesting solution is the use of agricultural and other organic waste as raw materials for the manufacture of biodegradable polymers. Recycling and composting units should be encouraged in all countries of the world. It is recommended that renewable energies should substitute the fossil fuels, which should be designated as a carbon source for the chemical industry.

Keywords; polymers, biomers, environment, renewable, biodegradable.

POL 002

EFFECTS OF RAW/CALCINED BALL CLAY FILLER ON MECHANICAL PROPERTIES OF HIGH DENSITY POLYETHYLENE COMPOSITE USED FOR MAKING AUTOMOBILE PARTS

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ABSTRACT

The thesis describes the preparation of the composite materials of high density polyethylene (HDPE) as the base mixed separately with raw ball clay and the same calcined at 600°C under the same variation in weight percentage using injection moulding machine operated at a temperature of 250°C. Some mechanical properties vital in automobile parts- impact strength and tensile strength at yield were determined at different weight fraction of filler (0%, 5%, 10%, 15%, 20%, 25%, 30%) in accordance to ASTM D256 and ASTM D638 method respectively. The virgin HDPE used was sourced from Indorama Eleme petrochemical Ltd along with the technical data sheet containing its mechanical properties. The X-ray diffraction (XRD) analysis was carried out to investigate the phase composition, crystalline structure, and the degree of disorderliness of raw ball clay and calcined ball clay. The Raw ball clay and calcined ball clay were subjected to scanning electron microscope (SEM) to obtain more understanding on the structures and size distributions of the samples. Results showed that there was an improvement on the mechanical properties as the filler content increases. Calcined ball clay produces better mechanical properties than raw ball clay. As the filler loadings were increased to a significant amount, the mechanical properties started to reduce. Reinforcing High Density Polyethylene (HDPE) with Raw/Calcined ball clay significantly improves the Tensile strength at yield, and Impact strength of HDPE. Calcined Ball clay-HDPE composite produces better mechanical properties than raw ball clay-HDPE composite and can be used in the manufacture of automobile parts like car bumper.

Keywords: Filler, High Density Polyethylene, and Ball Clay

GRAFT COPOLYMERIZATION OF ACRYLIC ACID MONOMER ONTO THE CELLULOSE BACKBONE OF OLDNEWSPAPER AND ITS EFFICACIES FOR REMOVAL OF SOME HEAVY METAL IONS IN WASTE WATER

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ABSTRACT

Graft copolymerization is a well-established and commonly used technique for modification of polymer surface and it is an important tool in order to modify the physical or chemical properties of polymers. Significant advances in cellulosic modifications and the resultant production of derivatives with unique chemical and physical properties have dramatically increase interest in cellulose research over the past decade. Acrylic acid was grafted onto cellulose backbone of old newspaper by using ceric ammonium nitrate (CAN) initiator in aqueous medium. Grafting parameter such as percentage grafting (GP%) and Grafting yield (GY%) was evaluated at different reaction conditions such as temperature, time, monomer and initiator concentration. The result showed that as time of reaction increased the grafting percentage also increased, hence it was after 150minutes (at temperature of 50⁰C, 2.5g of CAN and 8ml of AA) had highest GP% of 96% and GY% of 160% of CE-g-PAA. The products were characterized by FTIR and TGA analyses. Removal of heavy metals from wastewater was evaluated using the grafted copolymer, the results revealed promising potential of the grafted cellulose as adsorbent for remediation of wastewater.

Keywords: Graft, copolymerization, remediation, wastewater

POL 004

GREEN SYNTHESIS OF SILVER NANOPARTICLES USING PECTIN FROM *P. BIGLOBOSA* PULP

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ABSTRACT

Silver nanoparticles were synthesized via a one-step green approach using pectin obtained from the pulp of *P. biglobosa* as reducing agents. The nanoparticles synthesized were analyzed using characterization techniques such as uv-vis Spectrophotometer, Fourier Transform Infra-Red (FTIR) and Energy Dispersive X-ray Fluorescence (EDXF). Uv-spectra of the sample were characteristic of silver nanoparticles while the FTIR results indicated the role of different functional groups from pectin in the synthesis. Findings from EDXF also confirmed the presence of silver. It can be implied that pectin from *P. biglobosa* pulp exhibits potentials to boost green approach in nanotechnology for industrial applications.

Keywords: surface plasmonic resonance, pectin, capping, green synthesis.

EDU01

**ASSESSMENT OF THE EFFECTS OF LABORATORY METHOD ON
STUDENTS' PERFORMANCE IN CHEMISTRY IN SENIOR SECONDARY
SCHOOLS IN KADUNA STATE, NIGERIA**

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ABSTRACT

The performance of students in chemistry and the negative attitude of students to chemistry has been a matter of serious concern to all stakeholders. Therefore, this study investigated the effects of laboratory methods on students' performance in Chemistry in senior secondary schools in Kaduna state. To achieve this, therefore, this study adopted a quasi-experimental research design, that involved pre-test, post-test and control group design. The population comprised all public senior secondary schools II students in Zaria educational zone in Kaduna state. Two senior secondary schools out of the 24 available were randomly selected using intact classes. Two (2) hypotheses were formulated and tested. The instrument used for this study was self-developed test items titled "Chemistry lesson performance Test (CLPT)". The data collected were subjected to statistical analysis of t-test and descriptive statistics at 0.05 level of significance. Independent t-test revealed that significant difference existed between the performance mean scores between the pre-test and post-test. Also, significant difference existed between the performance mean scores of students in the experimental and control groups. The following recommendations were made after the findings. Chemistry teachers should ensure that students are exposed to laboratory methods of teaching in their schools. Teacher, laboratory attendants and gardeners must be made to attend, at regular intervals, relevant workshops, seminars, conferences and shorts courses that with update and upgrade their knowledge and experiences from time to time and government should provide physical resources, and curriculum development that will enhance the use of laboratory method and improve the performance of students in our schools.

Keywords: Laboratory method, Academic performance, Chemistry

EDU002

EFFECT OF LECTURE AND DEMONSTRATION METHODS ON THE ACADEMIC ACHIEVEMENT OF SSI CHEMISTRY STUDENTS TAUGHT SEPARATION TECHNIQUES IN PUBLIC SCHOOLS OF ZARIA AND SABON-GARI LOCAL GOVERNMENT AREA OF KADUNA STATE

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ABSTRACT

This study analyses the effect of lecture and demonstration methods on the academic achievement of chemistry students taught separation techniques in public schools of Zaria and Sabon-Gari Local Government Area of Kaduna State. Challenges facing the use of the most effective and influential method of teaching chemistry with the most productive outcome necessitated the research because chemistry is a core science subject and it is a basic requirement for most careers in the field of science. The population of the study comprises the entire public secondary schools in Sabon-Gari and Zaria Local Government Area of Kaduna State. Six Senior Secondary schools from each local government and 50 students were selected from each school using Random sampling technique. Pre- test post- test experimental research design and one research instruments namely: chemistry achievement test was use for the purpose of this research. One research question was raised: What is the difference between the academic achievements of students taught separation technique using lecture method and those taught using demonstration method and answered using mean score of students in both experimental and control groups. One research hypothesis: there is no significant difference between the academic achievement of students taught separation technique using lecture method and those taught using demonstration method was tested using T- test. Result revealed that the academic achievement of students taught separation technique using demonstration method was significantly higher than that of their counterparts who were taught using lecture method. Recommendations were made which includes that: students should be taught separation technique using demonstration method among others.

Keywords: Demonstration Method, Lecture Method, Academic achievement and Separation techniques.