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BRIEF INTRODUCTION

A professor of Chemistry in Ambrose Alli University, Ekpoma with over 20 years in teaching, research and supervision and over thirty five publications in both local and international journals. Having earned my Ph.D, I understand the importance of mentorship, supervision and training the trainer in a triadic relationship and in helping individuals in research development and in adopting chemical principles in organic, inorganic, analytical, physical and environmental Chemistry in solving environmental challenges. I have worked and consulted for Federal Ministry of Works, Abuja and I have also received excellent feedback from my collaborators.

I have served as a consultant chemist, in the following areas:

1. To evaluate the use of stone-mastic Asphalt and polymer modified bitumen (PMB) for possible adoption for the construction and Rehabilitation works on Lagos – Ibadan Dual carriage way in Nigeria.
2. To evaluate the use and benefits of polymer modified Bitumen, and possible adoption in Nigeria in line with international best practices and standard.
3. To evaluate the use of Roadcem for soil stabilization and benefits for road construction and its possible adoption in Nigeria in line with international best practices and standards.
4. To evaluate the use and benefits of Geotextile/Geosynthetics Materials as stabilizers for road construction and maintenance and their adoption for use in Nigeria.
5. To evaluate facility of Link Middle-East Industry Limited, Dubai (UAE).

Area of Expertise

- i. Adoption of Chemical Principles in Analytical, Physical, Inorganic, Organic, Industrial and Environmental chemistry in the solving of problems in the total environment

Research Interests

- i. Speciation and uptake of heavy metals in the environment
- ii. Unravelling the lacking properties of the black cotton soils and erosion prone soils in Nigeria.
- iii. Soil stabilization/remediation strategies for stubborn soils
- iv. Polymer modified bitumen and pavement evaluation studies
- v. Studies on the correlation of physico-chemical and physico-mechanical properties of black cotton soils, erosion prone soils, Bitumen and soils stabilizers.

Research Grants

I am a recipient of the tertiary education trust fund research grant award in 2017.

Post graduate supervision

➤ Ph.D Supervision

- Distribution, Chemical Fractionation (speciation) and Bioavailability potential of some Heavy Metals in Warri River Sediments.
- Studies on speciation and uptake of some heavy metals by selected vegetable crops from amended soils and evaluation of physico-mechanical properties of soils.

➤ M.Sc Supervision

- i. Graft copolymerization of polyvinyl acetate (PVA), acrylonitrile and Cashew tree exudates on gum Arabic
- ii. Studies on the composition, concentration levels and speciation of some heavy metals in bitumen obtained from Ondo State, Nigeria.
- iii. Characterization of ground water quality from selected oil producing areas of Delta State, Nigeria.
- iv. A study of the speciation of some heavy metals in relation to the physico-mechanical properties of the black cotton in the North-East, Nigeria.
- v. A study of the speciation of some of the heavy metals in relation to the physico-mechanical properties of erosion prone soils in South-East, Nigeria.

Publications

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A THREE PRONGED TECHNIQUE FOR DETERMINATION OF ERODIBILITY OF SOILS IN GULLIES.

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Abstract

A study of the gully in Ibore, Irrua, Edo State was carried out using two-dimensional induced polarization (2D-IP) and two-dimensional electrical resistivity tomography (2D-ERT) to determine the susceptibility of the area to soil erodibility. Soil samples in the vicinity of the gully were analysed for the physico-chemical properties using standard methods. The 2D-IP at the surface of the gully channel indicated a low chargeability indicating that the top soil contained low clay minerals while the high chargeability at the basal part of the gully showed the presence of large clay minerals. The data obtained from the 2D-ERT indicated low resistivity at the surface implying that the top soil contained materials that are porous, friable and erodible while the basal portion of the gully contained well cemented, indurated sand stone that can resist erosion. The textural analysis and the geological materials indicated that the soils are erodible. The presence of clay within the sand stone further predisposes the soil to erosion. The physico-chemical properties showed that the area has sandy loam texture (high sand 80.20%, low clay 18.20% and silt 1.59%) which allows much of the rainfall to seep right into the soil due to good infiltration and drainage. The low concentration of K^+ (0.18meq/100g), Na^+ (0.34meq/100g), Mg^{2+} (0.88meq/100g) and Ca^{2+} (1.40meq/100g) in the soil is detrimental to it as it decreases flocculation and increases the dispersion of clays. It also indicated poor soil structure, low aggregates formation and hence the soil cannot resist the forces of water, wind and human activity which promote erosion in the area. The physico-chemical data obtained were consistent with the 2D-ERT and 2D-IP data, confirming susceptibility of the soils to erosion.

Keywords: 2D-ERT, 2D-IP, Physico-chemical, Gully, Erodibility

EFFECT OF PIGGERY AND POULTRY DUNG ON THE PHYSICO-CHEMICAL PROPERTIES OF HUMAN SOILS

Okojie V.U, Osuide M.O and Ejemah B

Abstract

In order to investigate the effect of Piggery and Poultry dung on the Physico-chemical properties of humus soils, an experiment was carried out in which humus soil was amended with Piggery and Poultry dung at 0, 40, 60, 80 and 100g kg⁻¹. The soil treated were incubated in the dark at 25⁰C for seven weeks at field capacity. Soil pH, OC, N, P, K Ca, Mg, Na and CEC increased with rate of manure, while exchangeable acidity reduced irrespective of the concentration. The Poultry manure gave quick response and higher concentration of soil chemical properties especially in case of humus soil.

Keywords: Humus soil, amendment, dung, field capacity.

A Study of the Trends in the Physico-Chemical Properties of the Surface Water and the Heavy Metals Composition of the Bottom Sediments of Ijana River, Warri, Delta State, Nigeria.

Okojie V.U. Osuide M.O. Ebu S. and Ize-Iyamu O.K.

Abstract

A study was carried out to investigate the concentrations, distribution and speciation of some heavy metals such as Cd, Cu, Pb, and Cr in the bottom sediments of Ijana River which has been contaminated by effluent from petroleum exploitation activities. The total concentration levels of Cd, Pb, Cu, and Cr were determined specifically at upstream, effluent zone, downstream and recipient of storm water of the river. Pb, Cu, and Cr were found to be the most abundant metals in the river. The distribution pattern of the river indicates the source of pollution to be land-based. Sequential extraction showed that 30-60% of Cd, were exchangeable fraction, indicating that Cd in the sediments posed a high risk to local environments while Cu, Pb and Cr were at moderate risk levels. From the relationship between percentage fraction of metal speciation and total metal concentration, it was found that the distribution of Cd, Cu, and Pb in some fractions were dynamic in the process of pollutants migration and the stability of metals in sediment of the Ijana River decreased in the order Cr>Pb>Cd>Cu. The correlation analysis suggest that some of the metals are strongly associated, indicating a common source or chemical similarity. The pollution load index (PLI) of the studied area ranged from 0.10 to 50.78 which indicated the sediments were polluted while the index of geoaccumulation showed that all the sampling points may face a severe metal pollution/contamination problem in the future.

Keyword: Pollution Load Index (PLI), Index of Geoaccumulation, Speciation, Sediment Pollution, Heavy metals, Correlation.

Graft copolymerization of vinyl acetate on gum Arabic

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Abstract

Graft copolymerization of vinyl acetate onto gum Arabic obtained from Kano market, Kano Nigeria was achieved using benzoyl peroxide initiator at 70⁰C. The highest graft level was obtained at 0.04M benzoyl peroxide concentration. The graft copolymers were characterized in terms of graft level, grafting efficiency and molecular weight of the grafted chains. The grafted copolymer samples were used to produce adhesives. It was found that the grafted copolymer adhesives were more efficient than adhesive made of ungrafted gum Arabic.

Keywords: Adhesive; Copolymerization; Gum Arabic; Grafting; Vinyl acetate.

AN ASSESSMENT OF HEAVY METALS UPTAKE BY SELECTED VEGETABLE CROPS GROWN IN POULTRY DUNG AMENDED SOILS

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Abstract

Four varieties of vegetable crops were cultivated in the soils amended samples and control soil to assess the potential of these vegetable crops namely *Amaranthus cruetus* (green), *Talinum triangulae* (water leaf), *Telfaria occidentalis* (pumpkin) and *Corchoru olitorius* (ewedu), to take up and distribute the metals to their edible tissues. The amended soil samples and the control soil were analyzed for chemical fractionation using Tessier's extraction method in six soils phases including exchangeable, carbonate bound, iron-oxide bound, carbon and cation exchange capacity (CEC) were also analyzed. The results of elemental analysis were subject to statistical analysis.

The result of the heavy metal fractionation showed that of all the metals studied, Cr, Zn an Fe had the highest concentration levels in the residual bound fractions. The linear regression relation between PH and uptake of Cd, Pb, and Fe is significant at 0.05 probability level. While the influence of physico-chemical characteristics of the soils on the retention and fractionation of the heavy metals indicate that Zn, Fe, Cu and Mn are dependent on the cation exchange capacity of the soil. The uptake of

the heavy metals by *Talfaria occidentalis* was mainly in the leaves while *Amaranthus Cruetus*, *Talinium triangulae* and *Corchorus Olitorious* roots accumulated more metals than their leaves.

**PRELIMINARY STUDY OF THE ACUTE TOXICITY OF
POTASSIUM PERMANGANATE TO THE FINGERLINGS OF
CLARIAS GARIEPIUNS (CATFISH) (BURCHEL, 1822)
(SILURIFORMES: CLARIDAE)**

Onogbosele C.O., Okojie V.U. and Ajibola K.S.

Abstract

The acute toxicity of potassium permanganate (KMnO₄) to the fingerlings of *Clarias gariepinus* was studied. *C. gariepinus* fingerlings with mean weight and total length of 1.79g and 5.3cm, respectively were exposed to different concentration (0.0, 0.5, 1.0, 1.5 and 2.0mg/l) of KMnO₄ in static toxicity test in the laboratory. The estimated 96h LC₅₀ (median lethal concentration) was 1.5mg/l KMnO₄. Mortality of the fingerlings increased with increase in the concentration of KMnO₄. The lowest mortality (8%) was recorded in the treatment with 0.5mg/l KMnO₄ while the highest mortality (76%) was recorded in the treatment with 2.0mg/L KMnO₄. There was no mortality in the treatment (control) without KMnO₄. On exposure to KMnO₄ and prior to death, the fingerlings exhibited flashing, whirling, gasping and lethargy. Mortality commenced earlier (within 33 hours) in treatments with higher concentrations of KMnO₄ than (within 48hours) in treatments with lower concentration of KMnO₄. These result indicate that the acute toxicity of KMnO₄ to fingerlings of *C. gariepinus* varies with the concentration of KMnO₄ and the duration of fish exposure.

**SOLID MINERALS IN EDO STATE: INVENTORY, NATURE,
APPLICATIONS AND THE ENVIRONMENT**

M.O. OSUIDE, V.U OKOJIE, M.N. ABDULKADRIA O. IMASUEN,

Abstract

The development of mineral resources in Nigeria will diversify Nigeria's economic base and boost its industrial power. Edo state has the potential of sharing of this economic and industrial task by being able to show case, up to thirteen solid minerals inclusive of: limestone, marble, kaolin, gypsum, feldspar, gold, granite, dolomite, galena, tantalite, gemstone, quartz and bitumen all available commercially but largely unexploited. Sustainable development demands that the environment for mineral exploitation must be given conservation and remediation cognizance so as to conserve the culture and the livelihood of the ordinary citizens particularly the low income earners who depend directly on the environment for sustenance.