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Geology and Geochemistry of Some Crystalline Basement Rocks in Ilesha Area, Southwestern Nigeria: Implications on Provenance and Evolution

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(received July 11, 2006; revised May 17, 2007; accepted July 3, 2007)

Abstract. Geological and geochemical study of the basement complex rocks in Ilesha schist belt revealed that amphibolite, hornblende gneiss and granite gneiss are the major constituents. The gneisses are composed of similar rock forming silicates with variations in abundance. The amphibolite being a mafic rock has different compositions, containing abundant pyroxene, actinolite and tremolite. Monazite is present in the mineralogy of all these rocks. Chemical composition of these rocks revealed that they are petrogenetically related. Geochemical diagrams, plotted from chemical composition of these rocks, REE fractionation trends and presence of monazite in their mineralogy reveal that all these rocks were derived from a mixed magma source which did not originate from a pure upper mantle, but possibly from a back arc tectonic setting. The pattern of the REE, progressively increasing negative Eu/Eu* anomaly, La_N/Yb_N from the amphibolite to the granite gneiss and marked Eu depletion tend to implicate evolution through fractionation of a mixed basaltic magma to form the precursor of these rocks. The amphibolite probably represents the sample of the original basaltic magma.

Keywords: basement complex, Petro-genesis, magma, tectonic setting, fractionation, precursor Ilesha

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Nutrients in a Freshwater Lagoon, Lagos, Nigeria

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Abstract. Water samples were taken from a freshwater lagoon of Nigeria, for determination of inorganic nutrients and other water constituents at different sampling points of Owo river and Ologe lagoon at bimonthly intervals for a period of two years from January, 1997 to December, 1998. Indications of the pristine nature of the environment were considerable lower concentrations of dissolved phosphate, nitrate and ammonia than the global averages for unpolluted freshwater. Less significant differences were observed between spatial and seasonal variations in NO_3^- - N and NH_3 -N concentration. PO_4^{3-} - P concentrations on the other hand showed no significant difference. Phosphorus level was below 0.1 mg/l throughout the study period which signal eutrophy in lotic systems. Nitrogen/phosphorus ratios in Owo river and lagoon system (3.0 - 3.2) were lower than expected in P-limited freshwater systems, where molar ratio of N/P is generally >10 to 15. Hence, the nutrient limiting aquatic primary productivity and the most critical to control in the entire study area was nitrogen.

Keywords: nutrients, freshwater lagoon, nitrogen/phosphorus ratio, Nigeria

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Estimation of Groundwater Recharge in Oil Producing Areas of the Niger Delta Basin of Nigeria: Using Soil Moisture Deficit Technique

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Abstract. The study was undertaken to predict natural and incidental groundwater recharge using the moisture deficit technique. It evaluates the rate of contaminants inflow into the phreatic aquifers of the Niger Delta Basin. The computer model used basic hydrological and agro-meteorological input parameters such as rainfall, potential evapo-transpiration, runoff coefficient, weighted root constant and oil and gas exploration/production spill data of 3 years to estimate the incidents of recharge on daily bases. The model was applied to selected four non-overlapping potential spill sites within the onshore area based on available data and geology/soil types. The study indicated that the daily natural recharge ranged from zero to 120 mm. Average monthly and annual natural recharge varied from zero to 585mm, and from 1416 to 2044 mm, respectively. The study established recharge coefficients of 0.143 to 0.365 for the area, with 95% confidence limit. Extensive tests determined that the model results are the most sensitive to variations in rainfall, evaporation and spill data. The estimated recharge coefficients were in agreement with the earlier reported range of 0.08 to 0.30.

Keywords: groundwater recharge, Niger delta, soil moisture deficit, oil exploration impact

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Characteristic Levels of Total Petroleum Hydrocarbons in Soil, Sediment and Surface Water of an Oil Impacted Area in the Niger Delta

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Abstract. Soil, bottom sediments and surface water were collected at several points in Abalagada-Aboh area in the Niger delta, Nigeria, that had previously received spilled crude oil. The samples were analyzed for total petroleum hydrocarbon contents. Petroleum hydrocarbon concentrations varied significantly among various environmental matrices. The concentrations ranged widely between 2.80-785.6 mg/kg, 2.84-804.74 mg/kg, 0.30-865.64 mg/kg and 0.03-22.99 mg/kg for surface water, sediments, topsoil and subsoil, respectively. The samples showed elevated concentrations of hydrocarbon when compared to the control site.

Keywords: petroleum hydrocarbons, soil, sediment, surface water, oil spill, Niger delta

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Short Communication

Effect of Sucrose and Potassium Metabisulphite on the Physicochemical and Microbial Analysis of Apricot Pulp

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(received December 2l, 2004; revised August 8, 2007; accepted August 10, 2007)

Abstract. Effect of different concentrations of sucrose and potassium metabisulphite on the apricot pulp was studied fortnightly for 90 days through physicochemical and microbial analysis. No significant change in total soluble solids (TSS) of apricot pulp was observed during the storage. Acidity and non-reducing sugar significantly ($p<0.05$) decreased, while pH and reducing sugars significantly ($p<0.05$) increased during the storage. Samples with added 20% sucrose and 0.2% potassium metabisulphite, packed in plastic and glass containers, had negligible microbial population, maintained maximum nutrients and the best sensory characteristics during the storage. Storage duration and treatments had significant ($p<0.05$) effect on pH, acidity, non reducing sugars and total fungal count, while on TSS (total soluble solids) and reducing sugar, the effect of treatments was nonsignificant ($p<0.05$).

Keywords: apricot pulp, additives, chemical analysis, microbial analysis, sucrose, potassium metabisulphite

Biological Sciences

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Growth Performance and Haematology of the Laboratory Rat, *Rattus norvegicus* fed on Protein Supplements and Heavy Metals

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(received October 16, 2006; revised May 23, 2007; accepted June 27, 2007)

Abstract. Laboratory rat *Rattus norvegicus*, fed on poultry growers mash plus additional protein supplements and some heavy metals, was studied for the growth and the haematological parameters. All the dietary supplements resulted in an increase in the growth of the rats. The rats, fed on growers mash and prawn meal showed the best growth within 7 weeks. Effects of diets were significantly, correlated at 0.01 level. Weight loss was recorded in case of all heavy metal-laced diets, however, calcium sulphate-laced diets resulted in an increase in growth. Mercurous chloride was the most toxic salt which resulted in the greatest weight loss. Haematological analysis of rats revealed that RBCs were higher in the case of heavy metal-laced diets than heavy metal-free diets. Generally, RBC counts were higher in females than in males within a group. Fish meal and prawn meal feeding resulted in higher WBC counts.

Keywords: *Rattus norvegicus*, haematology, heavy metal feed, protein supplements

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Antibacterial and Antifungal Screening of the Root Extracts of *Nardostachys jatamansi*

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Abstract. Antimicrobial activity of ethanol, ethyl acetate and hexane extracts of *Nardostachys jatamansi* roots were studied *in vitro* against six pathogenic gram positive bacteria (*Stayphylococcus aureus, Streptococcus intermedius, S. faecalis, Bacillus pumilus, B. cereus, B. subtilus*), six gram negative bacteria (*Escherichia coli, Salmonella typhi, S. paratyphi B, Klebsiella pneumoniae, Proteus mirabilus, Shigella flexneri*) and five fungi (*Trichophyton rubrum, T. schoenleinii, Aspergillus niger, Candida albicans, C. glabrata*). Ethanolic root extract exhibited maximum antimicrobial activity against all the tested bacteria and fungi, at concentrations of 5, 10 and 20 mg/ml as compared to ethyl acetate and hexane extract, which did not show marked activity. Antimicrobial activity was compared with the activities of standard antibacterial and antifungal drugs, namely Ampicillin and Nystatin, respectively. The minimum inhibitory concentrations (MIC) were between 0.5-1 mg/ml against all the studied microorganisms.

Keywords: *Nardostachys jatamansi*, antibacterial activity, antifungal activity, root extract

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Environmental Impact of Oil Exploration on the Crustacean Zooplankton of Osse River, Southern Nigeria

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(received November 19, 2005; revised February 7, 2007; accepted August 10, 2007)

Abstract. The impact of crude oil exploration on the crustacean zooplankton of Osse River, Edo State (Nigeria) was investigated at five sites between July 2000 and June 2002. Cladocera accounted for 60.85% of the total number of organisms collected from all the five stations, while Copepoda contributed 39.15%. Chydoridae, the only cladoceran family was represented by 11 taxa of two subfamilies, Aloninae (7) and Chydorinae (4). The overall abundance of Cladocera was significantly different ($P < 0.05$) among the stations. A *posteriori* Duncan Multiple Range (DMR) test showed that the abundance of Cladocera was significantly higher ($P < 0.05$) in 3 stations, whereas, Copepod abundance was significantly higher ($P < 0.05$) in 2 stations. The diversity indices revealed the highest and the lowest taxa richness, while Shannon-Wiener and Evenness indices were higher in 3 stations. The temporal dynamics revealed higher faunal abundance during the dry season.

Keywords: crustacea, zooplankton, fresh water, bio-diversity, oil exploration impact, Nigerian river environment

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Bacteriological Analysis of Groundwater of Karachi

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Abstract. The level of microbial contamination in open wells in selected areas of the Karachi city was studied in consideration of the health of the inhabitants of the areas. A total of 115 well water samples were collected and examined for total bacterial count and counts of coliform, faecal coliform and *Pseudomonas aeruginosa*. The microbiological analysis yielded presence of coliform and faecal coliform in 66.63% and 60.89% of the samples examined, respectively, while, *Pseudomonas aeruginosa* was detected in 30% of the ground water samples. 84.34% of the water samples were found unsatisfactory as per WHO standards.

Keywords: ground water, bacterial contamination, WHO guidelines, Karachi city, drinking water quality

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Ethnobotanical Study of the Alpine-Subalpine Flora of Neelum Valley, Azad Jammu and Kashmir

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Abstract. Ethnobotanical study of Angiosperms, procured in association with timberline vegetation of the Neelum Valley, Azad Jammu and Kashmir, resulted in a floristic list, represented by 136 species belonging to 98 genera of 33 Angiospermic families. The family Asteraceae was the largest, represented by 26 species. The second largest family was Ranunculaceae, consisting of 12 species. Other families were represented by varying number of species ranging from 1-7 at the study areas.

Keywords: ethnobotanical study, alpine-subalpine flora, angiosperms, Kashmir, Neelum valley

Technology

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Recovery of Flake Graphite from Kish

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(received June 3, 2006; revised April 28, 2007; accepted June 7, 2007)

Abstract. A laboratory investigation was made to recover high quality flake graphite from the steel making waste. The waste, which is called Kish, initially contained 65% graphitic carbon. Acid leaching technique was employed to purify the waste and it was completed in two steps using HCl and HF. This paper deals with the results on the optimization of leaching parameters like acid concentration, liquid to solid ratio, time and temperature. First leaching with HCl upgraded the Kish to 92.48% @ 99.74% recovery, while second leaching with HF further improved the grade up to 99.38% @ recovery 99.89%.

Keywords: flake graphite, acid leaching, Kish, steel waste

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Studies on the Preparation and Composition of Guava (*Psidium guajava* L.) Toffee and Slab Bars

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Abstract. Guava toffee/slab bars were made from guava pulp using hot air dehydration. No artificial colour, preservative or essence was added to the product. Comparative investigation of the fresh guava pulp and the product was conducted. Moisture, ash, soluble pectin, ascorbic acid, tannins, sugar, citric acid along with mineral contents i.e. calcium, sodium, potassium and phosphorus were determined. Shelf life of the product was monitored for more than twelve months and organoleptic evaluation was conducted. No change in colour, flavour or texture was observed during the storage at room temperature.

Keywords: guava product, nutrients, minerals