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Origin of Opal-CT in Lower Eocene Tallahatta Formation, Mississippi, USA and Pleistocene Barind Clay Formation in Bangladesh: A Comparative Study

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Abstract. Opal-CT mineral in the lower Eocene Tallahatta formation in Mississippi, USA and the Pleistocene Barind clay formation in Bangladesh is of volcanogenic origin. X-ray diffraction patterns of claystones in the former indicated more ordered condition of the older sediments than those of the latter, which may be due to higher burial temperatures and longer time interval for transformation from volcanic ash to opal-CT of the former. Glass shards, present in the latter sediments, were not identified in the former, which may be due to transformation of glass shards of volcanic ash to opal-CT over the time.

Keywords: opal-CT, glass shards, Tallahatta formation, Barind clay formation, Bangladesh

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Studies on the Peroxo Complexes of Thorium (IV) Containing Organic Acids and Amine Bases

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Abstract. New peroxo complexes of Th(IV) have been synthesized and characterized by elemental analyses and various physicochemical techniques. The complexes were found to oxidize allyl alcohol and triphenylphosphine as well as triphenylarsine to their respective oxides. The molar conductance values and six fold coordination indicate that all the complexes are 1:1 electrolytes in dimethylsulphoxide revealing their ionic characters. The complexes display ν(C=O) bands at ~1625 cm^{-1} and ν(C-O) bands at ~1405 cm^{-1}, significantly lower than the values of amino acid (~1630 cm^{-1} and ~1412 cm^{-1}) indicating the coordination of amino acids through their carboxylate anion. The Th(IV) complexes display ν(M=O) modes in the region 910-999 cm^{-1}. The broad band observed at about 3244-3386 cm^{-1} for ν(N-H) modes indicates the coordination of amino group through nitrogen atom of amino acid. These are predominantly O-O stretching ν_1, the symmetric M-O stretch ν_2 and the antisymmetric M-O stretch ν_3. The characteristic ν_1(O-O) modes of the complexes appear at 800-840 cm^{-1}. It is observed that the ν_1 mode decreases with the increase of atomic number of the metal in a particular group. The magnetic moment values of dioxothorium (IV) complexes revealed them to be diamagnetic in nature, suggesting there were no changes in the oxidation states of the metal ions upon complexation. The electronic spectral data of the complexes showed bands at 260-350 nm region due to the charge transfer band only.

Keywords: peroxo complexes, thorium (IV), organic acids, amine bases

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Quantization of Buspirone Hydrochloride in Pure and Pharmaceutical Formulations by Spectrophotometric Method

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Abstract. A simple and sensitive method is described for the determination of buspirone hydrochloride in bulk drug and in formulations employing spectrophotometric technique. The method is based on the interaction of buspirone hydrochloride with ammonium molybdate in acidic media and the absorbance is measured at 700 nm. Beer's Law is obeyed in the range of 5 µg to 350 µg/ml and RSD is 0.96 % for buspirone hydrochloride. Analytical data for the determination of pure compound is presented along with the application of the proposed method for the analysis of pharmaceutical formulation.

Keywords: buspirone hydrochloride, ammonium molybdate, spectrophotometry.

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Proximate Composition, Nutritionally Valuable Minerals and the Effects of Some Salts on the Functional Properties of Silkworm (*Anaphe infracta*) Larvae

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(received January 18, 2005; revised April 1, 2008; accepted April 2, 2008)

Abstract. The investigations of the silkworm (*Anaphe infracta*) larvae on dry weight basis showed that total ash, crude fat and fibre values were low while crude protein and carbohydrate values were high. Fe, Zn, Mg and P were high while Na, Cu, Ni, K, Ca, Mn, Co, Cr were low. The lowest gelation concentration varied between 6.0 in 1.0% Na_2SO_3 and 14.0 in 20.0% NaCl, $NaNO_3$ and Na_2CO_3 with low CV%. All the water absorption capacity values were generally high, the highest being in $NaNO_3$. The oil emulsion capacities were generally low whereas the oil emulsion stability was good in all the salts. The isoelectric point under pH solubility depended on the type of salt solution under consideration. These results make *A. infracta* larvae useful in some food formulations.

Keywords: *Anaphe infracta*, chemical composition, salt effects, functional properties, nutritional value

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Short Communication

Assessment of Groundwater Recharge in Semi-Arid Region of Northern Nigeria

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Abstract. The average annual groundwater recharge value of three sites, representing the major geological basins of Northern Nigeria, ranged from 169 mm for Maiduguri to 837 mm in Kano area and the recharge coefficient for the zone ranged from 0.26 to 0.56. The month of August accounted for about 53% of the average annual estimate. About 69 mm (70%) of average annual potential natural groundwater recharge was lost, as a result.

Keywords: drought, groundwater recharge, semi-arid zones, Nigeria

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Biological Sciences

Transplacentally Transmitted Congenital Brucellosis due to *Brucella abortus* Biotype 1 in Sprague-Dawley Rats

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Abstract. In the investigation on the transplacentally transmitted congenital brucellosis due to *Brucella abortus* biotype 1 in Sprague- Dawley rats, neither any stillbirth, abortion or premature birth nor any abnormality of fetus was observed in the infected group or in the control group. *B. abortus* biotype 1 was isolated from the fetus of infected rats only. Only one band of 498 base pair DNA was obtained in polymerase chain reaction products from DNA of the fetuses of infected SD rats.

Keywords: *Brucella abortus* biotype 1, transplacental transmission, congenital brucellosis

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Potential Industrial Uses and Quality of Oil of Palm Weevil, *Rhynchophorus phoenicis* F. (Coleoptera: Curculionidae)

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Abstract. The study of the industrial potentials of the palm weevil revealed the water absorption capacity to range from 53.33% in the late larval stage (LLS) to 113.33% in adult stage (ADS) while oil absorption capacity varied from 87.97% in LLS to 121.33% in ADS. The adult had the highest emulsion capacity while none of the samples formed foams. ADS gelled at 4% while LLS and ELS (early larval stage) gelled at 10% and 16%, respectively. The oil had a specific gravity of 0.8742. Iodine and unsaponifiable matter were the highest in ELS, while LLS had the highest saponification value. ADS recorded the highest values for acid, free fatty acid, peroxide, slip point, melting point, softening point, smoke point, flash point and fire point. The anti-nutrient contents were generally low. Phytic acid was the highest in LLS, whereas, ADS had the highest oxalate and tannin contents.

Keywords: *Rhynchophorus phoenicis*, functional properties, physicochemical properties, smoke point, anti-nutrients

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Effect of Halopriming on Sunflower Seed Germination and Seedling Establishment under Saline Environment

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Abstract. The effect of halopriming of sunflower seeds with inorganic salts (KNO_3 and K_2SO_4) on seed germination and seedling establishment under salt stress (200 mM NaCl) was studied. Priming of sunflower seeds using low concentration of salt improved germination. Hundred percent germination and better seedling establishment were recorded with 2% K_2SO_4 at 200 mM NaCl salt stress. In plant tissues, higher concentration of Na^+ (0.61%) was observed in case of 2% KNO_3 and minimum with 2% K_2SO_4 (0.26%) and higher concentration of K^+ was observed with 2% K_2SO_4 followed by 1% K_2SO_4 and 2% KNO_3. Maximum concentrations of Ca and Mg in plant tissues were found with 2% K_2SO_4.

Keywords: halopriming, sunflower seeds, inorganic salts, salt stress, saline environment

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Performance of Maize Cultivars for Fodder Production under Rainfed Conditions of Pothohar Tract

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Abstract. For finding the forage yield potential of eight maize cultivars, the cultivars were sown in the month of July during both consecutive years 2001 and 2002 and harvested in the month of September in both the years. The cultivars differed significantly from one another with regard to plant height, number of leaves per tiller, number of plants per row, leaf area per plant, green fodder and dry matter yield. The cultivar 'Akbar' produced taller plants, with the largest leaf area and more number of leaves per tiller and consequently yielded highest amount of green as well as dry matter among all the varieties under the rainfed climatic conditions of Pothohar tract of Pakistan.

Keywords: Z*ea mays*, maize cultivars, Pothohar, agronomic characters, Pakistan, fodder yield

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Performance of Newly Released Dry Land Wheat Varieties under Barani and Minor Irrigated Conditions

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Abstract. Among the three newly released dry land wheat varieties viz; Marwat J-01, Lucky J-03 and Raj 2000 and the local race "Khattakwal wheat" sowed in district Karak during, November, 2004-05, significant difference was found between the grain yields both under barani and minor irrigated environment. Marwat J-01 out yielded significantly all the varieties with one irrigation (4120 kg/ha) followed by Raj-2000 (3993 kg/ha). Under barani conditions as well, the two varieties produced statistically equal but highest grain yield of 1718 and 1773 kg/ha, respectively.

Keywords. wheat, arid lands, grain yield, Pakistan, *Triticum aestivum*

Review

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From Chemistry to Biology: Furanic Complexes as Samples

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Abstract: In order to demonstrate the links between chemistry and biology, some biological properties of a few furanic compounds have been described, starting from the synthesis and the structural characteristics. Also some features of the furan compounds with oximes; semicarbazones and thiosemicarbazones have been pointed out.

Keywords: furanic campounds, structure, biological properties.