

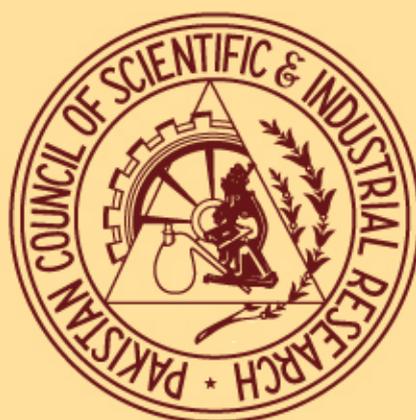
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Equilibrium in the Partitioning of Zn(II) between Aqueous Sulphate Solution and Kerosene Solution of Cyanex 272

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(received July 26, 2011; revised February 4, 2012; accepted March 7, 2012)

Abstract. The equilibrium in the partitioning of Zn(II) from its sulphate solution to *bis*-(2,4,4-trimethylpentyl) phosphinic acid (Cyanex 272, BTMPPA, H₂A₂) solution in kerosene (paraffin) has been investigated extensively. The equilibration time is < 5 min. Extraction of Zn(II) is found to be increased with increasing equilibrium pH, extractant concentration and temperature; and independent of [Zn(II)] in the aqueous phase provided equilibrium pH and extractant concentration are kept constant. The pH dependence of extraction ratio (D) at a constant [H₂A₂]_(o,eq) is found to be 2. The extractant dependence plots at constant equilibrium pH values are not straight lines but are curves with asymptotic slopes of 1 and 2 at lower concentration region (LCR) and higher concentration region (HCR) of extractant, respectively. D is found to be an inverse function of (1 + 2[SO₄²⁻]). The extraction at LCR of extractant is found to occur through the reaction: $Zn^{2+} + H_2A_2 (o) \rightleftharpoons [ZnA_2]_{(o)} + 2 H^+$; but at HCR of extractant, it occurs via the reaction: $Zn^{2+} + 2 H_2A_2 \rightleftharpoons [ZnA_2.H_2A_2]_{(o)} + 2 H^+$. The extraction equilibrium constants, K_{ex} at LCR and HCR of extractant are estimated as 10^{-3.11} and 10^{-2.08}, respectively, at 303 K. The extraction process is found to be endothermic but ΔH value increases with increasing extractant concentration. The maximum loading capacity is estimated to be 11.5 g Zn(II) per 100 g extractant. At a maximum loading, the species exists in organic phase is ZnA₂. The stripping ability of various inorganic acids towards loaded zinc, as well as, the possibilities of separation of Zn(II) from its binary mixtures with 3d - block metal ions have also been investigated.

Keywords: extraction equilibrium, Zn(II) - extraction, Cyanex 272, sulphate medium, kerosene

Assessment of Radioactivity in Some Soil Samples of Qatar by Gamma-Ray Spectroscopy and the Derived Dose Rates

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(received November 24, 2011; revised April 6, 2012; accepted May 3, 2012)

Abstract. The activity concentrations of some natural and artificial radionuclides have been measured in soil samples by gamma-ray spectroscopy using a high purity germanium detector. From the obtained gamma-ray spectra, the activity concentrations of ^{238}U and ^{232}Th natural decay series and the long-lived naturally occurring radionuclide ^{40}K have been determined, in addition to the fission product ^{137}Cs . A wide range of different gamma-ray lines ranging from ~ 100 keV up to 2.6 MeV, associated with the decay products of ^{238}U and ^{232}Th series have been analyzed independently to obtain more statistically significant overall results. The data have been analyzed, when secular equilibrium of the radionuclides is achieved within the samples. The weighted activity concentrations of ^{238}U and ^{232}Th series vary from 4.4 to 64.4 and 0.8 to 7.6 Bq/kg, respectively. The activity concentrations of ^{40}K and ^{137}Cs have been found in the range of 13.6 to 179.5 and 0.3 to 3.7 Bq/kg, respectively. Based on the measured activity concentrations, dose rate, radium equivalent, radiation hazard index and annual effective dose rates have been estimated. The values obtained are within the recommended safety limits.

Keywords: Qatar soil, gamma-ray spectroscopy, dose rate, radiation hazard index, radium equivalent

Absorption Studies of Binary Mixtures

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Abstract. Ultrasonic velocity, density and viscosity for binary mixtures of Aniline with ethanol, methanol and propanol have been measured at room temperature of about 300.15K over entire volume component percentage range. The ultrasonic velocity (v) is measured with ultrasonic Pulse Echo Overlap (PEO) technique at a frequency of 2 MHz. The density (ρ) measurements have been carried out by 10 mL specific gravity bottle. The viscosity (η) measurements have been carried out by using Cannon-Fenske Viscometer with an accuracy of $\pm 0.3\%$. Attenuation coefficient (α) is measured using a cathode ray oscilloscope (CRO) for a transmitted pulse and n^{th} echo. Relaxation time (τ), absorptivity (A) was computed using measured data of ultrasonic velocity, density and viscosity. Data of ultrasonic velocity, attenuation coefficient, density and viscosity are useful in evaluating some useful thermodynamic properties like adiabatic compressibility, internal pressure, free volume which can be utilized as a qualitative guide to predict the extent of complex formation in binary liquid mixtures of aniline-alcohol mixtures.

Keywords: ultrasonic velocity, density, viscosity, attenuation coefficient, absorptivity, relaxation time

Performance of Coconut Shell Particulate Filled Polyester Composites

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Abstract. Tensile and flexural properties of coconut shell particulate reinforced polyester resin matrix based composites were evaluated to assess the possibility of using these filler as a new eco-friendly material in engineering applications. Composites were made out of the function of coconut shell powder with different weight variations *viz.* 10, 15, 20, 25 and 30 wt %, treated with 5% NaOH alkali solution and these were prepared by hand lay-up process. Performance was increased gradually as filler content increased from 10 to 25 wt %. On the other hand decline of the properties were observed when filler content was beyond 25 wt %, heat deflection temperature (HDT) increased up to certain percentage (i.e. 25 wt %) of filler in polyester above which no influence in its value was observed. The glass transition temperature (T_g) and thermal stability was improved significantly. Scanning electron microscopy (SEM) micrographs were also studied to illustrate the particle/matrix interactions. These composites were further subjected to an evaluation of thermogravimetric, differential scanning calorimetry, and heat deflection temperature (HDT) analysis.

Keywords: coconut shell particulate, polyester, composites, mechanical properties, thermal properties, heat deflection temperature

The Tensile Properties of Polyester / Cotton Blended Yarn as Affected by Different Process Variables of Murata Vortex Spinning System

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(received August 15, 2011; revised October 27, 2011; accepted October 31, 2011)

Abstract. The quality of Murata Vortex Spinning (MVS) yarn especially its tensile properties is significantly affected by different process settings (variables) of the system. The research was carried to optimize MVS process variables like yarn delivery speed, spindle diameter and the distance between front roll and spindle to achieve better tensile properties of polyester / cotton blend yarn. The results revealed that spindle diameter, the distance between front roll and spindle and blend ratio all have significant effect upon tensile properties of MVS yarn.

Keywords: Murata Vortex Spinning, tensile properties, blend ratio, delivery speed, spindle diameter

Removal of Pollutants from the Liming Effluent in Course of Leather Processing

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(received February 28, 2011; revised March 28, 2012; accepted May 3, 2012)

Abstract. In present work, the liming floats were treated with phosphoric acid, oxalic acid, acetic acid, boric acid and formic acid in different experiments to precipitate the suspended solids and then passed through the column filled with activated charcoal prepared from raw trimmings of cattle hides. The flow rate of 100 mL/min was observed during the experiment. Considerable reductions of pollutants i.e. 88.84-99.56% of BOD, 78.87-99.6% of COD, 78.8-99.72% of suspended solids and 82.3-98.55% of total solids were removed in the treated liming float. Activated charcoal prepared from raw trimmings of cattle hides, a solids waste from leather industry was found an effective adsorbent to remove the pollutants from the liming floats.

Keywords: cattle hides, liming floats, pollutants, suspended solids, leather processing

Triterpenoids and Steroids Isolated from Aerial Parts of *Glochidion multiloculare*

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Abstract. This study presents the chemical investigation of the leaves and stem barks of *Glochidion multiloculare* (Roxb. ex Willd.) Muell.-Arg., Phyllanthaceae. Classic phytochemical investigation of organic extracts of the aerial parts of *Glochidion multiloculare* together with spectroscopic methods led to the isolation and characterization of four triterpenes, namely; glochidonol (**1**), glochidiol (**2**), glochidone (**3**), lupeol (**4**) and two steroids, namely; daucosterol (**5**) and stigmasterol (**6**).

Keywords: triterpenes, glochidonol, glochidone, glochidiol, *multiloculare*, *Glochidion*

Short Communication

Water Quality and the Compressive Strength of Concrete—A Case Study of Hydrogen Point Concentration

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(received November 2, 2010; revised June 30, 2011; accepted July 25, 2011)

Abstract. Concrete samples of standard mix of 1:2:4:0.55 with water of different pH values ranging from 1 to 12 were cured in a water tank containing distilled water for 7, 14 and 28 days at room temperature after which they were tested for compressive strength. Results showed that the compressive strength of concrete decreased as the value of the hydrogen ion concentration increased and as the basicity of the mix water was increased, the strength of concrete was reduced. The highest compressive strength of 33.5 kN/mm² was achieved at a mix water pH of 7.

Keywords: hydrogen ion, water pH, concrete, compressive strength

Short Communication

Comparative Studies on the Physico-chemical Properties of Degermed Flours of White and Yellow Maize (*Zea mays*)

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(received December 14, 2010; revised January 14, 2012; accepted January 16, 2012)

Abstract. Flours of degermed grains of white and yellow maize (*Zea mays*) varieties were analyzed for their proximate compositions, physico-chemical properties, mineral compositions and pasting behaviours. The results of their proximate composition showed that the degermed white maize flour was a better source of dietary protein and energy than degermed yellow maize flour. Degermed white maize flour exhibited higher values of water absorption capacity, least gelation concentration, swelling power and solubility than degermed yellow maize flour. The increasing order of abundance of minerals in the flour samples was Zn<Fe<Na<P<Ca<K. Appreciably high value of stability (7.58 RVU) at 83.30°C in 7.00 mins made degermed white maize flour stand out in pastry, bakery and weaning food applications.

Keywords: maize, degermed flour, pasting behaviours
