

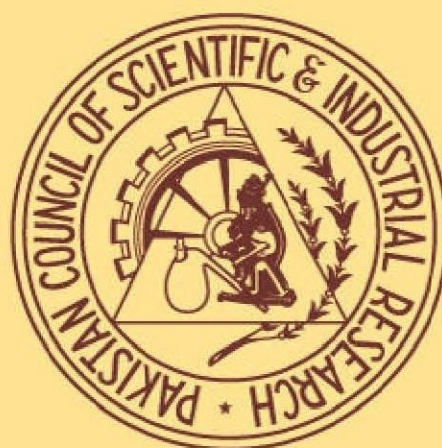
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**Series A: Physical Sciences**  
**Vol. 60, No. 2, May-June, 2017**

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## **Isolation and Identification of Catechin by a New Method from Food Efficiency Stimulating Plant *Alhagi camelorum***

**Abdul Hafeez Laghari<sup>a\*</sup>, Shahabuddin Memon<sup>b</sup>, Aisha Nelofar<sup>a</sup> and Khalid Mohammad. Khan<sup>c</sup>**

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(received October 18, 2016; revised February 27, 2017; accepted March 9, 2017)

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**Abstract:** The present article describes a new developed method for the simultaneous determination of (+)-catechin (**1**) and (-)-epicatechin (**2**), separated *via* HPLC. The method has been validated and applied on the real samples and **1** has been detected in both aerial and root parts of *Alhagi camelorum* without any ambiguity of fake positive or negative presence of **1** or **2** by virtue of dual detection system of UV and Mass Spectrometry. The antioxidant capacity was also investigated and a linear correlation has been noticed between the antioxidant capacity and the catechin amount in *A. camelorum* extracts

**Keywords:** catechin, *Alhagi camelorum*, HPLC, isolation

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## Chemical Characterisation of Himalayan Rock Salt

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(received November 3, 2016; revised January 11, 2017; accepted January 20, 2017)

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**Abstract.** Present study involves the chemical evaluation of rock salt samples collected from the plugging sites of Himalayan salt (Khewra salt mines and Kalabagh salt mines) for their moisture content, water insoluble matter, calcium, magnesium, sulphate content and trace minerals such as Fe, Cu, Cd, Pb, As, Ag and Zn determined by atomic absorption spectroscopy. Moisture content of Khewra and Kalabagh salt samples ranged from 0.03 wt. % to 0.09 wt. % and 0.06 % to 0.08 %, respectively. Water insoluble matter ranged from 0.08 wt. % to 1.4 wt. % and 1.5 wt. % to 2.8wt. % for Khewra and Kalabagh salt samples, respectively. Sulphate content for Khewra salt sample was from 0.39 % to 0.91 % and for Kalabagh salt mines from 0.75 wt. % to 0.95wt. %. For Khewra salt mines calcium ranged 0.15wt. % to 0.32wt. % and for Kalabagh salt samples from 0.1 wt. % to 0.27wt. %. Magnesium ranged from 0.11 wt. % to 0.35wt. % for Khewra salt mines, while for Kalabagh salt samples its range was 0.18wt. % to 0.89wt. %. Trace metals had the concentration ranges between 0.2 to 1.85 mg/kg for copper; between 0.21 to 0.42 mg/kg for manganese; between 0.04 to 0.06 mg/kg for zinc; between 0.12 to 0.18 mg/kg for arsenic and between 0.03 and 0.05 mg/kg for lead while cadmium content was either below the method's detection limits or in very trace amounts. The results show that the concentrations of all the parameters studied are below the limits set by World Health Organization (WHO) and Food and Agriculture Organization (FAO). Therefore, it can be concluded from the paper that the Himalayan salt from the plugging sites of Khewra and Kalabagh salt mines are safe to use.

**Keywords:** atomic absorption spectrophotometer, minerals, water insoluble matter, sulphate

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## Radiological Parameters Due to Radon-222 in Soil Samples at Baghdad Governorate (Karakh), Iraq

Ali Abid Abojassim<sup>a\*</sup>, Ahmed Rahim Shltake<sup>b</sup>, Laith Ahmed Najam<sup>c</sup> and Inas Riad Merza<sup>a</sup>

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(received February 8, 2017; revised May 25, 2017; accepted May 26, 2017)

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**Abstract:** Measurements of radon concentration, effective radium content, potential alpha energy concentration (PAEC) and annual effective dose (AED) were estimated for soil samples in fifteen locations of the Baghdad governorate (Karakh) in the central part of Iraq. In this survey we used the can technique, containing nuclear track detector (CR-39). The obtained values of radon concentration measurements were generally low, ranging from  $38.12 \pm 13.46$  to  $94.51 \pm 16.5$  Bq/m<sup>3</sup>, with an average 66.07 Bq/m<sup>3</sup>, while the effective radium content varied from  $5.80 \pm 0.21$  Bq/kg to  $14.39 \pm 0.33$  Bq/kg with an average 10.09 Bq/kg. The average of the PAEC and AED were assessed to be 7.14 mWL 1.66 mSv/y, respectively. The results of the present study shows that the radium content are lower than the allowed limit reported by Organization for Economic Cooperation and Development (OECD) that is equal to 370 Bq/kg. In general, it is seen that the AED limit was within the recommended reference level (3 mSv/y to 10 mSv/y) of the World Health Organization. Also, it is found that there is a strong correlation ( $R^2 = 1$ ) between radon concentrations and effective radium content. The results obtained from this study indicate that the locations of Karakh has background radioactivity (radon concentrations) levels within the natural limits.

**Keywords:** radon levels, soil samples, Baghdad governorate, CR-39 detector

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## Dynamic Compression and Thermo-Physical Properties of Some Wood Particles in South Western Nigeria

Sunday Samuel Oluyamo<sup>a</sup>, Mathew Adefusika Adekoya<sup>ab\*</sup> and Olawale Ramon Bello<sup>a</sup>

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(received June 6, 2016; revised January 10, 2017; accepted January 20, 2017)

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**Abstract.** This study examines the dynamic compression and thermo-physical properties of some wood particles obtained from Akure, south local government area, Ondo State, South Western Nigeria. These wood particles are of the species of *Celtis zenkeri* and *Celtis philippensis* of the Ulmaceae family. The samples were possessed into different particle sizes (300, 600 and 850  $\mu\text{m}$ ) and subjected to varied compacting pressures (2.6-3.0 MPa). The density and specific heat capacity of the wood samples were determined using weighing displacement methods and temperature dependent model while the thermal diffusivity was estimated from other thermal properties. The results revealed significant variation in the values of the specific heat capacity as a result of change in pressure for all the wood samples considered. The density of wood samples lies between  $4.51 \times 10^2$  -  $7.32 \times 10^2$   $\text{kg/m}^3$  and the specific heat capacity values obtained for the samples fall within the range of  $1.28 \times 10^3$  -  $1.33 \times 10^3$   $\text{J/kg/K}$ . It was also noted that the thermal diffusivity obtained falls within the range of  $1.37 \times 10^{-7}$  -  $2.10 \times 10^{-7}$   $\text{m}^2/\text{s}$  for the wood materials considered. However, the values of the densities, specific heat capacities and thermal diffusivities of the samples were found to change as the compacting pressure increased due to decreased in porosity. The implication of the study is that the materials have potential for use in polymer applications and the fabrication of film based photographic devices.

**Keywords:** density, specific heat capacity, thermal diffusivity, wood particle

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# A Three-Layer Microstrip Resonator for Complex Permittivity Measurement of Medium Loss Liquids Using 3D-FDTD Simulation

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(received October 15, 2016; revised April 8, 2017; accepted April 27, 2017)

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**Abstract.** A three-layer microstrip resonator is introduced to measure complex permittivities of medium loss liquids. The device is configured such that the first layer containing the liquid under test; a sheet of polytetrafluoroethylene (PTFE) is embedded in the middle layer, and the third layer functions as the base on which the patch is printed. The base layer is inverted on PTFE layer, and reflection coefficient is measured from 2.5 GHz to 5 GHz. The complex permittivities are extracted from the resonant frequency and the 10-dB bandwidth of S-parameter for different combinations of ethanol and methanol. Indeed, a three-layer microstrip resonator allows us to possess an affordable, and yet, high-accuracy electrical device to measure complex permittivities of medium loss liquids. FDTD method is used for analysing the structure and the results obtained by using FDTD method and the experimental data indicate a high degree of similarity.

**Keywords:** microstrip resonator, microwave chemistry, complex permittivity measurement, 3D-FDTD

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## **Biosorption of Chromium (VI) and Calculations of Langmuir's and Freundlich's Isotherms**

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(received June 16, 2016; revised January 25, 2017; accepted January 30, 2017)

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**Abstract.** In the present study yeast biomass has been successfully used as biosorbent for removal of Cr from aqueous solution. Yeasts of *Saccharomyces cerevisiae* are effective biosorbents for heavy metal ions and it can be bought in large quantity at low cost. *S. cerevisiae* can remove toxic metals from aqueous solutions to various levels. This low-cost biosorbent will make the process cost-effective and competitive particularly for environmental applications in detoxifying effluents. Langmuir's and Freundlich's isotherms were also plotted to observe the maximum biosorption of heavy metal chromium (VI).

**Keywords:** heavy metals, biosorption, yeast, wastewater, chromium (VI)

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## **Extraction of Ecofriendly Leather Dyes from Plants Bark**

**Hafiza Bushra Shamsheer\*, Tahira Aziz Mughal, Attiya Ishaq,  
Sana Zaheer and Kiran Zahid**

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(received June 6, 2016; revised January 10, 2017; accepted January 20, 2017)

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**Abstract.** Present study is focused on the isolation of ecofriendly dyes from the bark of different plants. Aqueous extracts of the bark of *Mangifera indica* L., *Syzygium cumini* L. and *Eucalyptus camaldulensis* Dehn were used to dye the crust blue leather of goat. Four different types of mordents  $\text{CuSO}_4$ ,  $\text{FeSO}_4$ ,  $\text{KMnO}_4$  and Potash Alum were used. The fastness properties (washing, heating, sunlight and rubbing) were also evaluated by grey scale. *Syzygium cumini* L extract showed more variation in colours. *M. indica* L. showed good fastness properties as compared to others. The formation of light and soft colours with different mordants was observed.

**Keywords:** ecofriendly, natural dye, leather, mordants, plant bark

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## Quantification of Pesticide Residues in Drinking Water in Different Areas of District Charsadda, Pakistan

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(received August 4, 2015; revised April 7, 2016; accepted April 13, 2016)

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**Abstract.** Pesticides residues were determined quantitatively in drinking water samples collected from district Charsadda of the province Khyber Pakhtunkhwa, Pakistan employing GC-MS technique. The survey was conducted soon after the flood in 2010. Aldicarb (0.003 mg/L) was found only in C7, while residues of acetachlor (0.001 mg/L) was found in C8. Among the pesticides quantified Chlorpyrifos delivered highest amount of residues in C8, C9, C10, C11 and C12. Residues of *o, p'*-DDT were found higher in C1 to C6 than the permitted value (0.002 mg/L), while higher concentration of Pyridaben than the allowed value (0.0001 mg/L) was resulted in C1, C5, C6 and C14. Residues of Carbofuran, Atrazine,  $\alpha$ -Endosulfan and Dieldrin,  $\beta$ -Endosulfan, Difenoconazole-1 and Difenoconazole-2 were not detected in any of the collected water samples. Concentrations of rest of the pesticides residues detected in water samples were within the permissible limits. The study revealed that water samples collected from district Charsadda are highly contaminated with pesticides, which is a health risk factor for the inhabitant of this areas.

**Keywords:** drinking water, pesticides residues, GC-MS, district Charsadda, flood 2010

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## Effects of Crude Oil Inundated Soils on the Ecosystem – A Case Study

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(received January 24, 2017; revised April 17, 2017; accepted May 5, 2017)

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**Abstract.** Crude oil inundated soils were collected from Agbada field after a recorded incidence of oil spillage to ascertain the effects of the oil spill on the soil status. Soil samples were collected from (0-30 cm) depths, using the grid sampling technique. Total petroleum hydrocarbon content (TPH) of the impacted soils ranged from  $1.81541 \times 10^3$ - $4.8525040 \times 10^3$  mg/kg. The levels of total organic carbon (%TOC), pH, conductivity, sulphates, nitrates and phosphates were enhanced in impacted soil. The concentration of some trace metals such as Cd, Cu, Cr, Pb, Ni, Fe and V were also analysed using atomic absorption spectroscopy. Cd ranged from 0.2-0.38 mg/kg, Cu ranged from 4.20-5.20 mg/kg, Cr ranged from 18.40-44.40 mg/kg, Pb ranged from 1.20-30.40 mg/kg, Ni ranged from 2.40-2.70 mg/kg, Fe ranged from 17581.77-30273.25 mg/kg and V ranged 0.20-0.30 mg/kg. Most of the trace metals were highly enhanced in the impacted soil. Multivariate statistical analysis was carried out on the dataset to unveil the variation and relationship among them. Results showed that the first three principal components with the eigen values greater than one ( $>1.0$ ) represent 93.4% of the total variability, suggesting that three principal components effectively describe the disparity in the data set. It was concluded that soils impacted with high hydrocarbon content; ultimately affect its physicochemical characteristics, which in turn impinge on the agricultural potentials of the soil.

**Keywords:** petroleum hydrocarbons; trace metals; impacted soil, depollution, oil spillage

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## Short Communication

# Effect of pH During Composting of Municipal Solid Waste

**Shahid Raza<sup>a</sup>, Neelma Munir<sup>b</sup>, Shagufta Naz<sup>b</sup>, Jalil Ahmed<sup>b</sup> and Ayesha Ameen<sup>b\*</sup>**

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**Abstract.** This study was designed to monitor the pH during process of composting by using organic waste segregated from municipal solid waste. pH was measured by preparing sample in laboratory by mixing compost with distilled water (1:10). and monitored in laboratory for the authentic results. The main objective of this study was to monitor the effect of pH during aerobic composting process that do not release harmful gases. It concluded that the pH value end up with alkalinity in degradation process but initially it was acidic.

**Keywords:** pH, composting, C: N, moisture %

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