



ISSN-1680-9955

Pak. J. Anal. Chem. Vol. 6, No. 2, (2005) 35 – 41

## Separation and Determination of Metals in Mixed Solvent System on Anion Exchanger Using Atomic Absorption Spectrophotometer

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*Received: 15-08-2006, Revised: 05-10-2006, Accepted: 11-10-2006*

### Abstract

The use of 2-propanol in admixture with formic acid for the selective elution of cations on the ion-exchange resin Amberlite IRA-420 in Cl<sup>-</sup> form is investigated. The elution technique was coupled with absorption spectrometry and atomic absorption spectrophotometry. The distribution coefficients of metal ions were measured in 2-propanol-water-formic acid mixture. By applying distribution coefficient data, conditions for column separation of mixtures have been effected by eluting with 2-propanol-water-formic acid solution of different compositions. The average recovery for all separations (n =18) was within 95.1 – 98.3 % and the standard deviation for all data was 10%. The developed analytical methodology was successfully applied for the separation and quantification of metal ions in the microgram range from the real samples collecting from natural water and industrial effluents using UV-Visible and AAS techniques.



ISSN-1680-9955

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## Diffusion and Flow of Water Vapours in Chromatographic Alumina Gel

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*Received: 30-11-2005, Revised: 04-02-2006, Accepted: 13-05-2006*

### Abstract

The kinetics of sorption of water vapours in chromatographic alumina gel was studied. Water vapours are adsorbed on the gel at temperature (15 °C) at different constant relative pressure from 0.1-0.93 p/p. Rate constant, Effective diffusivities, Knudsen diffusivities and bulk diffusivities were determined through Fick type equation. Total pore volume is 0.498 cc g<sup>-1</sup> and specific surface area comes to be 465 m<sup>2</sup> g<sup>-1</sup> as obtained by Gurvitsch rule and Kiesel's equations respectively. An average pore radius (hydraulic) is 1.1x10<sup>-7</sup> cm. The study of these quantities provide a strong basis for evaluating surface properties.



## A Simple Spectrophotometric Method for the Determination of Molybdenum in Industrial, Environmental, Biological and Soil Samples Using, 2-Hydroxyacetophenonebenzoylhydrazone.

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Received: 29-04-2006, Revised: 11-09-2006, Accepted: 11-10-2006

### Abstract

A very simple, ultra-sensitive and highly selective non-extractive spectrophotometric method for the determination of trace amounts of molybdenum(VI) using 2-hydroxyacetophenonebenzoylhydrazone (HAPBH) has been developed. 2-hydroxyacetophenonebenzoylhydrazone reacts in acidic (0.03-1 M H<sub>2</sub>SO<sub>4</sub>) and 30% 1, 4-dioxane media with molybdenum(VI) to give a redish-yellow chelate which has an absorption maxima at 443 nm. The average molar absorption coefficient and Sandell's sensitivity were found to be  $2.59 \times 10^4 \text{ L mol}^{-1} \text{ cm}^{-1}$  and  $15 \text{ ng cm}^{-2}$  of Mo<sup>VI</sup>, respectively. Linear calibration graphs were obtained for 0.1-30 mgL<sup>-1</sup>. The stoichiometric composition of the chelate is 1:2 (Mo:HAPBH). The absorbance intensity of the metal chelate reaches to a constant value within few seconds and remains unchanged for more than 48 hours. Large excess of over 60 cations, anions and complexing agents (like tartrate, oxalate, chloride, phosphate, EDTA, ascorbic acid, bromide, citrate, etc.) do not interfere in the molybdenum determination. The developed method was successfully used for assaying several standard reference materials (alloys and steels), environmental waters (inland and surface), biological samples (human blood and urine), soil samples, solutions containing both molybdenum(V) and molybdenum(VI) and complex synthetic mixtures. The method has high precision and accuracy ( $s = \pm 0.01$  for  $0.5 \text{ mgL}^{-1}$ ).



ISSN-1680-9955

Pak. J. Anal. Chem. Vol. 6, No. 2, (2005) 59 – 64

## Organic Carbon, Nitrogen and Phosphorus Contents of Some Soils of Kaliti Tea-Estate, Bangladesh

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*Received: 15-08-2006, Revised: 02-10-2006, Accepted: 28-10-2006*

### Abstract

Some soil samples were collected from Kaliti Tea-Estate of Moulvibazar district, Bangladesh. Total nitrogen, organic carbon, organic matter, carbon-nitrogen ratio and available phosphorus content of the collected soil samples of different depths and of different topographic positions have been determined. Total nitrogen was found 0.07 to 0.12 %. Organic carbon and organic matter content found to vary from 0.79 to 1.25 and 1.36 to 2.15 % respectively. Carbon-nitrogen ratio of these soils varied from 9.84 to 10.69, while available phosphorus content varied from 2.11 to 4.13 ppm.

**Keywords:** Soil; total nitrogen; organic carbon; organic matter; carbon nitrogen ratio; available phosphorus.



ISSN-1680-9955

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## Studies on the Effect of Additives on the Strength of Ordinary Portland Cement

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*Received: 15-08-2006, Revised: 26-09-2006, Accepted: 30-09-2006*

### Abstract

The effects of additives, such as slag, limestone and fly ash on the strength of ordinary Portland cement (OPC) have been studied. The percentages of the additives were varied from 9 to 29%. 2.5% gypsum was used in all preparations. The influence of the additives on the strength of OPC was monitored by measuring compressive strengths. The results indicated that the strengths of all the composite cements were nicely satisfied the respective American Society for Testing and Materials (ASTM) values recommended for different times of curing. It was observed that the strengths of the all composite cements gradually increased with time of curing. Interestingly, slag composite cements showed higher strengths at all ages (3, 7 and 28 days). On the other hand, limestone composite cements showed comparatively lower strengths but higher than that of ASTM recommended values. It has also been observed that the strengths are independent of the fineness of the composite cements.

**Keywords:** Ordinary Portland Cement (OPC), Additives, Composite Cement.



ISSN-1680-9955

Pak. J. Anal. Chem. Vol. 6, No. 2, (2005) 72 – 79

## Quality of Rain Water and its Suitability for Drinking and Agricultural use in District Bhimber Azad Kashmir, Pakistan

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Received: 28-08-2006, Revised: 20-09-2006, Accepted: 30-10-2006

### Abstract

District Bhimber shares its borders with Gujrat and Jhelum Districts of the Punjab Province of Pakistan and is situated at the foothills of mountain series of Himalayas. The area falls in subtropical highland type of climate and is away from the reach of snowmelts and irrigation system of Punjab Pakistan because of mountainous geological formations. In this area, drinking and agricultural resources totally depend on degree of precipitation that raises water table and feeds running streams. The suitability of rain water for drinking and agriculture was assayed by modeling it on hydrochemistry of District Bhimber. Physicochemical parameters such as temperature of air and water, pH, electrical conductivity (EC), total dissolved solids (TDS), total hardness (TH)  $\text{HCO}_3^-$ ,  $\text{CO}_3^{2-}$ ,  $\text{Cl}^-$ ,  $\text{SO}_4^{2-}$ ,  $\text{NO}_2\text{-N}$ ,  $\text{NO}_3\text{-N}$ , Kjeldahl nitrogen (KN), orthophosphate (O- $\text{PO}_4$ ), acid hydrolysable phosphate (T- $\text{PO}_4$ ), dissolved oxygen (DO), biological oxygen demand (BOD), chemical oxygen demand (COD),  $\text{Na}^+$ ,  $\text{K}^+$ ,  $\text{Ca}^{2+}$ ,  $\text{Mg}^{2+}$ ,  $\text{Fe}^{2+}$ ,  $\text{Cu}^{2+}$ ,  $\text{Ni}^{2+}$ ,  $\text{Zn}^{2+}$ ,  $\text{Pb}^{2+}$ ,  $\text{Cd}^{2+}$ , and  $\text{Co}^{2+}$  were determined. Chemical analyses of the rain water shows that the mean concentration of ions is of the order  $\text{Ca}^{2+} > \text{Na}^+ > \text{Mg}^{2+} > \text{K}^+ = \text{HCO}_3^- > \text{Cl}^- \geq \text{SO}_4^{2-} > \text{NO}_3^- > \text{CO}_3^{2-}$ . Interpretation of Piper plot on elemental composition indicates that Ca-Mg-  $\text{HCO}_3^-/\text{CO}_3^{2-}$ , Ca – Cl and Na- Cl are the dominant hydro chemical types, likewise salinity hazard index sets the criterion for its agricultural utility. Higher concentrations of  $\text{NO}_3^-$  and  $\text{SO}_4^{2-}$  and  $\text{pH} < 7$  indicate acid rains in the study area. Seasonal variations were found insignificant.



ISSN-1680-9955

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## Carbamates Toxicity in Farmers and its Assessment Through Biochemical Parameters

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*Received: 24-04-2006, Revised: 23-05-2006, Accepted: 16-06-2006*

### Abstract

Prevalent environmental toxicity of various chemical groups of pesticides and their effects leading towards increasing morbidity and mortality in the farmers is of great concern. In this situation the biochemical biomarkers are regarded as meaningful tools for monitoring toxic end points. This work was aimed to assess the toxic impacts of carbamates through some biochemical parameters and useful validity of these biomarkers was also observed. Present results reveal inhibition of cholinesterase activity by 46%, whereas bilirubin, urea and creatinine levels in serum were increased and sugar values were decreased at highly significant level ( $p < 0.001$ ). Urine urobilinogen concentration found raised significantly at high level ( $p < 0.001$ ) while protein, urea, creatinine and sugar values in urine of the farmers were non-significant. This study concluded that the selected biochemical parameters can be used as biomarkers to assess the significant toxic effects in the exposed populations.

**Keywords:** Carbamates, Biochemical biomarkers, Farmers in Pakistan



ISSN-1680-9955

Pak. J. Anal. Chem. Vol. 6, No. 2, (2005) 84 – 88

## Spectrophotometric Determination of Isoniazid in Dosage forms by Derivatization

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*Received: 05-09-2006, Revised: 15-10-2006, Accepted: 06-11-2006*

### Abstract

Isoniazid (INH) anti-tuberculosis drug was determined spectrophotometrically after derivatizing with 2-hydroxy-1,4-naphthoquinone (HNQ) at pH 3 in aqueous-methanolic solution. The reaction conditions were optimized and the derivative absorbed maximally at 365 nm. The Beer's law was obeyed in the range 5-25 $\mu$ g/ml. With coefficient of determination 0.9991. The method was applied for the determination of INH in pharmaceutical preparations with coefficient of variation 0.86-0.98.