

2016

Synthesis of poly(hydroxamic acid) ligand from polymer grafted corn-cob cellulose for transition metals extraction

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Poly(hydroxamic acid) ligand was synthesized using ester functionalities of cellulose-graft-poly(methyl acrylate) copolymer, and products are characterized by Fourier transform infrared spectroscopy, field emission scanning electron microscopy, high-resolution transmission electron microscopy, and X-ray photoelectron spectroscopy analysis. The poly(hydroxamic acid) ligand was utilized for the sensing and removal of transition metal ions from aqueous solutions. The solution pH is found a key factor for the optical detection of metal ions, and the reflectance spectra of the [Cu-ligand]<sub>n</sub><sup>+</sup> complex were observed to be the highest absorbance 99.5% at pH 6. With the increase of Cu<sup>2+</sup> ion concentration, the reflectance spectra were increased, and a broad peak at 705nm indicated that the charge transfer ( $\pi$ - $\pi$  transition) complex was formed. The adsorption capacity with copper was found to be superior, 320mgg<sup>-1</sup>, and adsorption capacities for other transition metal ions were also found to be good such as Fe<sup>3+</sup>, Mn<sup>2+</sup>, Co<sup>3+</sup>, Cr<sup>3+</sup>, Ni<sup>2+</sup>, and Zn<sup>2+</sup> were 255, 260, 300, 280, 233, and 223mgg<sup>-1</sup>, respectively, at pH 6. The experimental data show that all metal ions fitted well with the pseudo-second-order rate equation. The sorption results of the transition metal ions onto ligand were well fitted with Langmuir isotherm model ( $R^2 > 0.98$ ), which implies the homogenous and monolayer character of poly(hydroxamic acid) ligand surface. Eleven cycles sorption/desorption process were applied to verify the reusability of this adsorbent. The investigation of sorption and extraction efficiency in each cycle indicated that this new type of adsorbent can be recycled in many cycles with no significant loss in its original detection and removal capability.

Keywords: adsorption; cellulose; grafting; poly(hydroxamic acid) ligand; metal ion sensing

Synthesis of Poly(hydroxamic acid) Ligand from Polymer Grafted Khaya Cellulose for Transition Metals Extraction

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A cellulose-graft-poly(methyl acrylate) was synthesized by free radical initiating process and the ester functional groups were converted into the hydroxamic acid ligand. The intermediate and final products are characterized by FT-IR, FESEM, HR-TEM and XPS technique. The pH of the solution acts as a key factor in achieving optical color signals of metal complexation. The reflectance spectra of the [Cu-ligand]<sub>n</sub><sup>+</sup> complex was found to be a highest absorbance at 99.8 % at pH 6 and it was increased upon increasing of Cu<sup>2+</sup> ion concentrations and a broad peak at 700 nm was observed which indicated the charge transfer ( $\pi$ - $\pi$  transition) metals-Cu complex. The adsorption capacity of copper was found to be superior (336 mg g<sup>-1</sup>) rather than other transition metals such as Fe<sup>3+</sup>, Co<sup>3+</sup>, Cr<sup>3+</sup>, Ni<sup>2+</sup>, Mn<sup>2+</sup> and Zn<sup>2+</sup> were 310, 295, 288, 250, 248 and 225 mg g<sup>-1</sup>, respectively at pH 6. The experimental data of all metal ions fitted significantly with the pseudo-second-order rate equation. The transition metal ions sorption onto ligand were well fitted with the Langmuir isotherm model ( $R^2 > 0.99$ ), which suggested that the cellulose-based adsorbent known as poly(hydroxamic

acid) ligand surface is homogenous and monolayer. The reusability of the poly(hydroxamic acid) ligand was checked by the sorption/desorption process up to ten cycles without any significant loss in its original sensing and removal performances.

Keywords: Adsorption, Khaya cellulose, Poly(hydroxamic acid), Transition metals, Extraction

Synthesis of tapioca cellulose-based poly(hydroxamic acid) ligand for heavy metals removal from water

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A graft copolymerization was performed using free radical initiating process to prepare the poly(methyl acrylate) grafted copolymer from the tapioca cellulose. The desired material is poly(hydroxamic acid) ligand, which is synthesized from poly(methyl acrylate) grafted cellulose using hydroxylation reaction. The tapioca cellulose, grafted cellulose and poly(hydroxamic acid) ligand were characterized by Infrared Spectroscopy and Field Emission Scanning Electron Microscope. The adsorption capacity with copper was found to be good, 210 mg g<sup>-1</sup> with a faster adsorption rate (t<sub>1/2</sub> D 10.5 min). The adsorption capacities for other heavy metal ions were also found to be strong such as Fe<sup>3+</sup>, Cr<sup>3+</sup>, Co<sup>3+</sup> and Ni<sup>2+</sup> were 191, 182, 202 and 173 mg g<sup>-1</sup>, respectively at pH 6. To predict the adsorption behavior, the heavy metal ions sorption onto ligand were well-fitted with the Langmuir isotherm model (R<sup>2</sup> > 0.99), which suggest that the cellulose-based adsorbent i.e., poly(hydroxamic acid) ligand surface is homogenous and monolayer. The reusability was checked by the sorption/desorption process for six cycles and the sorption and extraction efficiency in each cycle was determined. This new adsorbent can be reused in many cycles without any significant loss in its original removal performances.

Keywords: Tapioca cellulose; poly (hydroxamic acid) ligand; heavy metals; adsorption

Synthesis and Characterization of Titanium Dioxide Using a Caustic Hydrothermal with moderate Molarity and Ratio from synthetic Rutile Waste.

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The objective of this study is to determine the effects of molarity and ratio of caustic hydrothermal method for extracting the Titanium dioxide (TiO<sub>2</sub>) from synthetic rutile waste. Synthetic rutile waste as a starting material will undergo two processes; decomposition process and sulphate process. The formed of Sodium titanate, Na<sub>2</sub>TiO<sub>3</sub> from the caustic hydrothermal decomposition will continue treated with sulphate process with a moderate molarity and ratio. The product will be characterized with the Electron Dispersive (EDX) to characterize its chemical composition, Field Emission Scanning Electron Microscope (FESEM) to determine its micrographs and particle size and lastly is X-Ray Diffraction (XRD) to identify the crystalline phase and crystallite size. The TiO<sub>2</sub> was successfully extracted by using this caustic hydrothermal method and the effects of molarity and ratio to our TiO<sub>2</sub> growth was determined. Lastly, the effects of calcination process to the selected best conditions was studied.

Keywords: Synthetic rutile, titanium dioxide, Caustic hydrothermal, Sodium titanate..

Synthesis of tapioca cellulose-based poly(hydroxamic acid) ligand for heavy metals removal from water

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MAKDI MASNODDIN

2016

Difficulties Experience by Science Foundation Students on Basic Mendelian Genetics Topic: A Preliminary Study

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This paper aims to report and identify the difficulties experienced by Science Foundation students in understanding basic Mendelian Genetics based on their ability to solve three types of basic Mendelian Genetics problems. The problems given are; a monohybrid cross and two dihybridcross cases. Result shown that 52.6% students were able to solve all the given problems while another 47.4 % had difficulties to solve at least one of the given problems. Among the students that had difficulties to solve the given problems, 4.4% students had difficulties to solve Type 1 problem, 13.3% students had difficulties to solve Type 2 problem, 15.6% students had difficulties to solve Type 3 problem, 8.9% students that had difficulties to solve both Type 1 and 3 problems, 40% students had difficulties to solve both dihybrid cross Type 2 and 3 problems, and 17.8% students were unable to solve all the given problems. E(X) or number of questions that the Science Foundation students had difficulties to solve is 0.874. The standard deviation for number of questions that the Science Foundation students had difficulties to solve is 1.842. In solving basic Mendelian Genetics problems, we expected students were able to solve the problems given and also can clarify the techniques used in term of genetic context. The initial finding reported in this study may be used to have a better understanding on students' ability and problem solving skills in learning genetics.

Keywords: Monohybrid; Dihybrid; Genetic; Mendelian; Biology

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Keywords: Monohybrid; Dihybrid; Genetic; Mendelian; Biology

## Azlinah Matawali

2016

Antibacterial and Phytochemical Investigations of *Mikania micrantha* H.B.K. (Asteraceae) From Sabah, Malaysia

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Previous study on *Mikania micrantha* had unveiled its importance as protein phosphatase-1 (PP1) inhibitor and cytotoxic agent against HL60 cells. The present study was carried out to investigate the antibacterial properties and to determine the phytochemicals content of *M. micrantha*. Crude methanolic extracts from powdered dry samples were partitioned using liquid-liquid separation technique and further fractionated using silica gel column chromatography to yield six partitionates and 5 fractions. All partitionates and fractions were challenged with Gram positive and Gram negative bacteria and the performances are compared with standard antibiotics. The results revealed that four partitionates (ME, CE, EAE and CME) possessed good antibacterial properties. While, fraction F1 from column chromatography is showing convincing activities towards tested bacteria. Phytochemical tests of the crude extracts, partitionates and fractions had detected the presence of tannins, polyphenols, alkaloids, saponins and triterpenoids. This result supports the potential of this plant species used as a new chemotherapeutic drug.

Keywords: Antibacterial; secondary metabolites; Sabah; Selaput tunggul

Difficulties Experience by Science Foundation Students on Basic Mendelian Genetics Topic: A Preliminary Study

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Keywords: Monohybrid; Dihybrid; Genetic; Mendelian; Biology

*In-vitro* evaluation of anti-kinase, anti-phosphatase and cytotoxic activities of *Mikania micrantha* H.B.K. (asteraceae) from Malaysia

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*Mikania micrantha* H.B.K (Asteraceae) is a creepy with soft stem weed which also known locally as Selaput Tunggul. Although being considered among worst Invasive Alien Weed (IAW) species in the world with less biological importance, it still has patronage from traditional practitioners as the remedy to cure insects or snake bite. This study reports other promising medicinal properties of this plant species. Dried leaves were extracted with various solvent systems, concentrated under reduced pressure and later evaluated for its anti-kinase, anti-phosphatase and cytotoxic activities. Both anti-kinase and anti-phosphatase assays targeted protein MKK1, MSG5 and PP1 in mutated yeast strains namely as MKK1P386, MKK1P386\_MSG5, PAY704-1 and PAY700-4, respectively. The crude methanolic extract has observed as the only inhibitor for PP1 screening assay. Liquid-liquid partition of this extract has confirmed the chloroform partition exhibited potential activity against PP1. Further separation of this partition extracts using column chromatography yielded 5 fractions namely as F1 to F5. Fraction F2 was later confirmed as the PP1 inhibitor, while fraction F1 observed as toxic. MTT assay of this plant extracts also showed good cytotoxic activity against HL60 cell line. This result has indicated that *M. micrantha* shows promise as the natural anticancer agent.

Keywords: Signal transduction, Anti-cancer, HL-60, Malaysia, *Mikania micrantha*.

**Elnetthra Folly Eldy**

**2016**

Leadership and cooperative learning and its relation towards students' grade achievement in problem-based learning environment

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The main objective of the paper is to obtain the outcome of relationship between students' perception of peers' leadership skill and cooperative learning with the final grade achievement in a Physics course. An established of problem-based learning (PBL) approach was set in an independent environment of learning process. The study involved students who registered under Physics with Electronics Programme. Data was gathered from an open-ended survey after the students finished with the PBL assessments towards the final week and the grade from their final exam as well. The open-ended surveys allowed the students to give their genuine perception of peers' performance in terms of leadership and cooperation. The analysis data was done using SPSS Version 22 using the Spearman correlation for non-parametric data. The finding of the report showed positive significant correlation between good leadership with higher final grade of exam. However the relation did not surface any significant relations for cooperative learning as students who performed better in exam not necessarily cooperating better in their teamwork.

Keywords: Problem-based learning; leadership; cooperative.

**Jackson Chang Hian Wui**

**2016**

Langley Calibration of Sun Photometer at Kinabalu Park (1574 M a.s.l.) Using PDM Algorithm and Statistical Filter

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This paper reports the use of improved Langley plot for LED-type sun photometer calibration at four wavelengths 440, 500, 670 and 870 nm. The Langley plot is improved by series filtration using Perez-Dumortier (PDM) algorithm and statistical filter. Data was collected at a mid-altitude site,

Kinabalu Park, Kundasang (1,574 m a.s.l.) using a portable ASEQ, LR-1 spectrometer. It is shown that with Langley plot alone, it is impossible to correctly identify or remove atmospheric variations within the calibration measurements. These variations are dominated by cloud cover, and shortcirrus cloud. However, result findings show that PDM algorithm and statistical filter are useful tool to improve the result by filtering data contaminated by cloud loading and remove possible drifts caused by instabilities of the instrument

Keywords: Langley calibration; Perez-Dumortier (PDM); Mid altitude site; Statistical filter

**Nur Anneliza Abd. Latip**

**2016**

The CFEA Compression Technique for Transmitting Encrypted Data Transmission Utilizing Baptista Symmetric Chaotic Cryptosystem

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The CFEA compression technique was proposed in ensuring a modified Baptista symmetric cryptosystem based on a chaotic dynamical system to be applicable. Baptista symmetric cryptosystem able to produce various ciphers responding to the same message input. The modified Baptista type cryptosystem experienced a large number of ciphertext that is against the conventional methodology of a symmetric cryptosystem. The CFEA compression technique mechanism was untroubled of mapping elements problem from a domain which is much larger than its range. Using the CFEA compression technique, number of ciphertext was reduced from ciphertext, where and , to only 2 ciphertext. Instead of transmitting ciphertext, only 2 ciphertext were transmitted. Therefore, the number of ciphertext to be transmitted was

reduced.

Keywords: Baptista cryptosystem, CFEA-technique, number of ciphertext, lossless, transmission.

**Muhamad Azlan Daud**

**2016**

Comparison of stratified weibull model and weibull accelerated failure time (aft) model in the analysis of cervical cancer survival

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Cervical cancer is the fourth most common cancer affecting women worldwide, after breast, colorectal, and lung cancers with 528 000 new cases every year. It is also the fourth most common cause of cancer death with 266 000 deaths in 2012 among women worldwide. In Malaysia it remains to be a great concern among clinicians; yet published works on survival of cervical cancer patients are somewhat limited. In this study, two survival regression models which are parametric Stratified Weibull model and Weibull Accelerated Failure Time (AFT) model are considered as the alternative and improvement of the well-known Cox proportional hazard model to evaluate the prognostic factor that effect on survival of patients with cervical cancer. Comparisons were made to find the best model. Data were taken from Hospital University Science Malaysia (HUSM) over a period of 12 years. From the analyses it was found that the AFT model was the most appropriate. The AFT model has shown that the median survival time for patient at stage III & IV (14 months) is about one third that of those at stages I & II (40 months) for the same distant metastasis group. While, the median survival time for patient with distant metastasis (17 months) is half that of those without distant metastasis (34 months) for the same stage group.

Keywords: Accelerated Failure Time (AFT), cervical cancer, prognostic factor, stratified weibull, survival