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Preparation, characterization and antibacterial activity of Mn(II), Cu(II) an methionine and 2,2-bipyridine co-ligands

Screen Reader

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Abstract
Mn(II), Cu(II) and Zn(II) complexes of methionine with polypyridine co-ligand formulated as [Mn(MET)(bpy)2] (1), [Cu(MET)(bpy)2] (2) and [Zn(MET)(bpy)2] (3) (MET = methionine, bpy = 2,2-bipyridine) were prepared and characterized by elemental analysis and spectroscopic techniques(Infrared, Electronic and ESI-MS). Electronic absorption spectra data of the complexes are characteristic of octahedral structures. The infrared data revealed that the ligand (MET) behaved as a bidentate anionic ligand. It coordinated to the metal ions via oxygen and nitrogen atoms with exhibiting peaks for υ(NH2) at 3365 cm-1, υas(COO-) and υas(COO-) at 1410 and 1621 cm-1 respectively. The 2,2-bipyridine coordinated to the metal center characteristically via the polypyridyl nitrogen. The compounds showed moderate solubility in distilled water and in some common organic solvents. In vivo evaluation of the antimicrobial activities of the metal complexes and the ligands showed greater activity against some micro-organisms when compared to the parent compounds. For instance, MET has a highest growth inhibition zone diameter of 14 mm whereas (1), (2), (3) has a diameter of inhibition zones at 23, 28 and 28 mm against C. albicans, A. niger and C. albicans respectively.

Keywords: antibacterial, mixed ligands, methionine, polypyridyl

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SUPPORTING INFORMATION – Rajee et al. JKCS 13-1 (2020) 16-21

Evaluation of chemistry performance in secondary schools in nomadic pastoralist communities of Kajiado and Narok counties in Kenya

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Abstract
The study assessed level of training of staff, skills gap, physical facilities and socio-economic factors affecting teaching and learning of chemistry in secondary schools in Narok and Kajiado counties in Kenya which have a large population of nomadic pastoralists. The study involved 20 teachers, 10 technicians and 196 students from 19 schools. Data was collected using questionnaires, observations and oral interviews. The results showed that schools in both counties experienced growth in student enrolr
2017 without a matching increase in facilities and resources for curriculum imple
All the teachers were qualified to teach in secondary schools, however, the averag
both counties was 1:137 way above the recommended 1:40. The data indicates th
chemistry has been declining in the national examination with 81% of the candid
The poor performance is attributed to inadequate number of teachers and technici
facilities and student absenteeism due to socio-cultural practices. The results indi
address the causes of the declining performance in chemistry.

Keywords: Nomadic pastoralists, chemistry curriculum, chemistry examination,
economic practices

Otieno et al. JKCS 13-1 (2020) 28-35

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Antibacterial activity of green synthesized silver nanoparticles using Citrullus lanatus fruit rind extract

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Abstract
The increased resistance of microbes to current antibiotics calls for development of new effective antimicrobial agents. Metal nanoparticles such as silver nanoparticles have continued to attract increased research interest in the recent past because of their wide range of applications such as in the areas of chemical sensing, nanomedicine and electronics. In this work, spherical AgNPs (17.96 ± 0.16 nm in diameter) synthesized via a green method using Citrullus lanatus (water melon) fruit rind extract were evaluated for antimicrobial activity against clinical isolates of Escherichia coli (E.coli) and Salmonella typhi (S.typhi) bacteria using the disc-diffusion method. The Minimum Inhibition Concentration (MIC) value of the nanoparticles was found to be 45.00 ± 0.01 □g/ml for S.typhi and 38.50 ± 0.00 □g/ml for E.coli while the Minimum Bactericidal Concentration (MBC) value was found to be 60.00 ± 0.05 □g/ml for S.typhi and 50.00 ± 0.00 □g/ml for E.coli. This study demonstrated that these two bacterial strains were susceptible to the green synthesized AgNPs.

Keywords: Green synthesis; Antimicrobial activity; Silver nanoparticles; Citrullus lanatus.

Ndikau et al. JKCS 13-1 (2020) 22-27

Comparison of the effectiveness of decolourisation of of sugar syrup by activated carbons from sugarcane bagasse from Chemelil sugar factory with commercial activated carbons

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Abstract
Six bagasse based carbons and two commercial activated carbons (AC) were evaluated for efficiency in the level of decolourisation of sugar syrup. The effect of bagasse activated carbon dosage in the range 0.2 –1.0 g per 100 ml syrup was determined. The Braunauer-Emmet-Teller (BET) specific surface area, pore size and pore volume of the samples were determined using the N2 adsorption-desorption isotherms. The bagasse activated samples were analysed using standard methods including UV-Visible spectroscopy to evaluate the effectiveness for percent colour removal from sugar syrup and compared with the two commercial activated carbons. The colour removal capabilities of all carbons were measured at 1/100 (w/w) dosage. The results showed activated carbon from bagasse activated for 5h at a temperature of 6000C (600/5) was comparable to commercial activated carbon (WP 320) by their high surface areas and syrup dec
Their pH values were also in the range 6-8 that makes them suitable for sugar ref

Keywords: Activated carbon, decolourisation, sugar syrup

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Production and characterization of activated carbons using sugarcane bagas
Factory compared with commercial activated carbons

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Abstract
Activated carbons (AC) synthesized from sun dried bagasse of Chemelil Sugar Factory in Kenya were used in this study. Using molasses as a binder, ratio 1:1, the bagasse and molasses mixture was compressed into pellets in an extruder, heated to produce a char, and then activated using carbon dioxide, before finally being ground into powdered activated carbon. Carbonization was done in a retort, while the heating was done by two gas burners. A thermocouple was used to record and control the temperature, which ranged from 300 – 700oC. The carbonized material (char) was cooled and ground to powder. Sample activation was conducted in an atmosphere of carbon dioxide passing through a chrome-nickel pipe with a gas distributor mounted in a furnace of porcelain cylinder with a metal sheet having one end closed. Air and nitrogen were used to control burning and the temperature of the furnace was controlled to between 300 – 600oC. The activated carbons produced were characterized for their physical properties (bulk density, yield, surface area, and micro pore volume and pore size), chemical properties (ash, pH, conductivity, Iodine and molasses decolourisation) and compared with selected two commercial activated carbons. The results showed that carbon materials activated from bagasse for 5 h at a temperature of 600oC showed similar characteristics with the commercial activated carbons and therefore an inexpensive substitute for AC.

Keywords: Activated Carbon, Adsorption, BET surface area, sugarcane bagasse

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