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CONTENTS

THE HORSERADISH PEROXIDASE/*O*-PHENYLENE DIAMINE (HRP/OPD) SYSTEM EXHIBITS A TWO-STEP MECHANISM

Mariya K. Tiama*, Todd M. Hamilton† 1

TRENDS IN OXIDATION POTENTIAL AND SENSITIVITY FOR CARBOHYDRATES BY CYCLIC VOLTAMMETRY AT COPPER AND NICKEL ELECTRODES FOLLOWING BACKGROUND SUBTRACTION

Colin McGuinness*, Megan Baker*, and Phillip D. Voegel † 5

IDENTIFICATION OF COMPOUNDS OF HENBIT, *LAMIUM AMPLEXICAULE*

Melinda M. Sorensson†, August A. Gallo, Annie Tudryn[1], Julie Rondeleux[1] and Johnathan Ledet 11

SYNTHESIS OF PYRIMIDINES USING A NEW 2-(3,4,5-TRIMETHOXYPHENYL)-VINAMIDINIUM SALT

C. Brian Toney* and Stanton Q. Smith† 15

HIGH SELECTIVITY OF MONOMETHYLATION OF 1,8-DIHYDROXY-9,10-ANTHRAQUINONE VERSUS ITS 1,5-DIHYDROXY-CONTERPART

David G. Akhvlediani* and Grigoriy A. Sereda† 19

CHEMICAL TERRORISM ATTACK DECONTAMINATION II-HOUSEHOLD OXIDIZERS: WHAT WORKS

Christina Costin*, Alan Trahan*, Fred Walters & Eric R. Taylor† 23

HIGH-PERFORMANCE LIQUID CHROMATOGRAPHIC DETERMINATION OF VITAMINS B1, B2, B3, B6, AND B12

Thao Vu*, Liann Marruffo*, and John A. Palasota† 27

SYNTHESIS AND CONFORMATIONAL STUDY OF PER-*O*-ACETYLATED 1-CYANO-1-DEOXY DERIVATIVES FROM L-FUCOSE AND D-GALACTOSE

Laura Jordan*, Thuy T. Nguyen,* Joshua Pwu,* Andreas H. Franz† 31

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THE HORSERADISH PEROXIDASE/ *O*-PHENYLENE DIAMINE (HRP/OPD) SYSTEM EXHIBITS A TWO-STEP MECHANISM

Horseradish peroxidase (HRP) catalyzes the oxidative coupling of *o*-phenylene diamine (OPD) to form 2,3-diamino-phenazine (DAP) in the presence of hydrogen peroxide. The formation of the orange-brown product DAP was followed at 420 nm using a UV-Visible spectrometer. We have discovered strong evidence that the HRP/OPD system follows a conventional ping-pong (ordered two substrates, two products) mechanism. Using steady-state kinetics, we have analyzed the kinetic constants using primary and secondary reciprocal plots of the Michaelis-Menten type. The results are compared to values obtained for HRP with various *o*-diphenol substrates.

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TRENDS IN OXIDATION POTENTIAL AND SENSITIVITY FOR CARBOHYDRATES BY CYCLIC VOLTAMMETRY AT COPPER AND NICKEL ELECTRODES FOLLOWING BACKGROUND SUBTRACTION

Background subtracted cyclic voltammograms for the oxidation of twenty-two carbohydrates at copper and nickel electrodes were directly compared. Application of background subtraction allows easier determination of peak potentials and reveals a second oxidation wave for most carbohydrates at both nickel and copper electrodes. Trends in oxidation potential and current response for different types of carbohydrates were examined for each electrode and inter-electrode comparisons were made. In particular, the ability of both copper and nickel electrodes to oxidize 6-deoxygalactose (fucose) and 6-deoxymannose (rhamose) at the lower potential oxidation wave made evident by background subtraction, coupled with their inability to oxidize 2-deoxyglucose and 2-deoxygalactose at similar potentials, demonstrates the likelihood that the first step in the oxidation of carbohydrates at these potentials is complexation of oxygen atoms near the anomeric carbon with the electrode surfaces.

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IDENTIFICATION OF COMPOUNDS OF HENBIT, *LAMIUM AMPLEXICAULE*

Fresh whole plants of *Lamium amplexicaule* were extracted with 50 percent methanol and partitioned in organic solvents. The crude extracts were tested against *B. subtilis, S. aureus* and *E. coli*. The components of the crude extracts were separated from each other by thin layer chromatography and then identified by GC-MS. Thirty five compounds including benzene carboxylic acids and esters, phenolics, quinones, cyclic alkanes and alkenes, long chain alcohols, and diones were identified. Among the compounds identified were acronyculatin E, vanillic acid methyl ester, and acenaphtylene dione and 9-Fluoro-1,2,3,4,5,6,7,8-octahydroanthracene, *o*-hydroxycinnamic acid and 2-phenyl-1H-Benz[de]-isoquinoline-1,3(2H)-dione.

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SYNTHESIS OF PYRIMIDINES USING A NEW 2-(3,4,5-TRIMETHOXYPHENYL)-VINAMIDINIUM SALT

A novel 2-(3,4,5-trimethoxyphenyl)vinamidinium salt has been prepared by the Vilsmeier-Haack reaction of 3,4,5-trimethoxyphenylacetic acid with phosphorous oxychloride and dimethylformamide. Six new 5-(3,4,5-trimethoxyphenyl)-pyrimidines have been synthesized by the reaction of the vinamidinium salt and selected amidines or guanidines. The pyrimidines were prepared in good yield under mild conditions.

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HIGH SELECTIVITY OF MONOMETHYLATION OF 1,8-DIHYDROXY-9,10-ANTHRAQUINONE VERSUS ITS 1,5-DIHYDROXY-CONTERPART

A striking difference in selectivity of methylation of 1,8-dihydroxy-9,10-anthraquinone and 1,5-dihydroxy-9,10-anthraquinone was observed experimentally. Based on the Visible Spectroscopy data, we concluded that the synthetic outcome of methylation was governed by relative acidities of hydroxyanthraquinones as opposed to relative nucleophilicities of their deprotonated forms.

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CHEMICAL TERRORISM ATTACK DECONTAMINATION II-HOUSEHOLD OXIDIZERS: WHAT WORKS

Household oxidizers are effective as decontamination agents for use against military chemical weapon blistering agents such as mustard gas. Though effective for inanimate objects and surfaces, the products of this destructive oxidation may portend additional hazards to skin absorption of those products and any residual chemical agent remaining. Washing with a soap solution may remain the best means for decontamination of skin rather than the use of the household oxidizers.

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HIGH-PERFORMANCE LIQUID CHROMATOGRAPHIC DETERMINATION OF VITAMINS B1, B2, B3, B6, AND B12

Recent studies indicate that the B vitamins play a critical role in human development and the maintenance of good overall health. Deficiencies in the B vitamins have a variety of symptoms and outcomes, including fatigue, nervousness, and impairing human biological development. The purpose of our work is to develop a liquid chromatographic method for the determination of the water-soluble vitamins B1, B2, B3, B6, and B12. Baseline resolution of all five analytes was achieved using a binary mobile phase of methanol and water adjusted to an acidic or neutral pH.

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SYNTHESIS AND CONFORMATIONAL STUDY OF PER-*O*-ACETYLATED 1-CYANO-1-DEOXY DERIVATIVES FROM L-FUCOSE AND D-GALACTOSE

2,3,4-tri-*O*-acetyl-1-cyano-1-deoxy-L-fucopyranose and 2,3,4,6-tetra-*O*-acetyl-1-cyano-1-deoxy-D-galactopyranose were synthesized from L-fucopyranose and D-galactopyranose, respectively. The cyanation reaction products were analyzed by ^{1}H- and ^{1}H-^{1}H-COSY NMR and revealed the presence of bicyclic cyanoethylidene derivatives previously reported as absent. Molecular modeling was used to support the conformations assigned to the products by ^{1}H-NMR data.

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