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PARAMETERS OPTIMIZATION ON THE FABRICATION OF NANO-STRUCTURED Ag-TiO_2 BI-FUNCTIONAL CATALYST

The composite of silver (Ag) and titania (TiO_2) was fabricated using wet-chemistry method. Scanning Electron Microscopy, Transmission Electron Microscopy, and X-Ray Powder Diffraction, were applied to characterize the microstructure of the nanostructured composite. Microscopic images indicated that the monodispersed nano-structured composite displayed pseudo-spherical appearance with particle size from 10 to 60 nm. By using X-Ray powder diffraction, the results indicated all diffraction peaks of the silver metal were nicely indexed to cubic phase and of titania were corresponding to the anatase and rutile phase. The most important parameters which highly affected the morphology and properties of the composite were optimized using pattern recognition (PR) and artificial neural network (ANN) in order to overcome the disadvantages of cook-art chemistry. These parameters include starting materials, the amount of surfactant, the acidity of solution, and the heat-treatment temperature.

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THE DESIGN AND SYNTHESIS OF FARNESYL "TAIL" ANALOGUES INCORPORATING AROMATIC RINGS: A COMPARISON OF WITTIG AND GRIGNARD REACTION SEQUENCES

Mutant RAS proteins have been linked to over 30% of all human cancers. It has been shown that mutant RAS proteins that cannot be farnesylated do not induce malignant transformation. Therefore, farnesyl protein transferase (FPTase) inhibitors have become attractive targets as potential chemotherapeutic agents. Two farnesyl "tail" analogues have been prepared that incorporate aromatic rings. One of the compounds, *trans*-9-phenyl-8-nonen-1-ol, could only be prepared pure using a Grignard reaction sequence. This sequence is compared to the initially attempted Wittig reaction sequence that results in an inseparable mixture of *cis*/*trans* isomers. It is anticipated that when coupled with polar diphosphate "head" mimetics, the "tails" prepared in this paper will help illuminate the importance of nonbonding interactions in the binding of farnesyl pyrophosphate analogues to the FPTase enzyme active site.

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SYNTHESIS OF THE ADDUCT OF 1,8-DIMETHOXYANTHRACENE AND MALEIC ANHYDRIDE AS A CONVENIENT INTERMEDIATE TOWARD NEW BICYCLIC DIQUINONES

We tested several published procedures for the synthesis of 1,8-dimethoxyanthracene and identified one that affords the target compound in a reproducible yield. The synthesized 1,8-dimethoxyanthracene was converted to its cycloadduct with maleic anhydride and further esterified with methanol. These two compounds we synthesized for the first time will be used as key precursors of new bicyclic diquinones.

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ALTERNATIVE OXIDASE IDENTIFICATION AND CAPACITY IN POST HARVEST RIPENING STAGES OF BANANA FRUIT

Ripening fruit expresses a uncoupling protein in the electron transport chain of mitochondria called alternative oxidase (AOX). Alternative oxidase dissipates the energy from the proton gradient as heat which has a significant impact on the speed at which the fruit will ripen. Alternative oxidase is found in virtually all plants and has a molecular weight between 32 and 39 kD and can be immunologically detected using antibodies from Voodoo Lilies (*Sauromantum guttatum* S). The capacity of the protein in respiring mitochondria can be detected by measuring the oxygen consumption when all other metabolic pathways have been blocked. Previous study showed that AOX levels decrease over time as tomatoes (*Lycopersicon esculentum* M.) ripen. Our study analyzes a similar trend in commercially available bananas (*Musa acuminate* Colla) that have also been ethylene treated prior to shipment, a standard practice for banana growers. Immunoblotting confirmed the presence of AOX in all three stages of banana ripening (green, yellow, and black according to peel color), with the greatest amount in the green stage. Oxygen consumption data supports the immunoassay and showed significantly greater capacity during the green stage, compared to both the yellow and black stages. These results are similar to what was shown for tomatoes and indicates the results found in tomatoes are not species specific.

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MICROENVIRONMENTAL EFFECTS OF POLYMER BOUND $NaBH_4$ REAGENTS: CONCENTRATING CHIRAL SITES USING HIGH POLYMER LOADINGS AND SMALL DENDRIMERS

Because the microenvironment of a polymer support plays an active role during the course of a reaction, this investigation into how reduction reactions of a prochiral ketone were affected by concentrating stereogenic centers within a polymer matrix was conducted. In order to study this effect, both nondendritic and dendritic chiral polyols were synthesized from δ-gluconolactone and attached to crosslinked polystyrene polymer supports by means of either an amido or a carbamate bond. Once formed, the chiral polyols were further derivatized by reaction with sodium borohydride to yield the active reducing agents. The supported borohydrides were then used to reduce acetophenone to the corresponding chiral alcohol. Enantiomeric excesses of 25-35% were found to occur during these reductions. The extent of chiral induction was dependent on both the concentration of polyol chains on the polymer and the swellability of the polymer. Because the analogous homogeneous reagents have been demonstrated not to yield any asymmetric induction, this study further indicated that polymer microenvironments could be designed to make significant contributions to reactions.

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THE USE OF LIQUID CARBON DIOXIDE TO EXTRACT FLAVOR COMPOUNDS FROM COMMON FOOD SOURCES; A QUALITATIVE ANALYSIS

A liquid carbon dioxide (CO_2) extraction protocol utilizing a simple device was utilized for the extraction of various food sources. This method was evaluated for a variety of food sources. The extracts of citrus zests, fresh frozen and crushed herbs, and ground spices were analyzed by GC/MS and the major components were identified.

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THERMOGRAVIMETRIC ANALYSIS OF IRON(III) DITHIOCARBAMATE COMPLEXES

The thermogravimetric analysis of fifteen tris(diorganodithiocarbamato)iron(III) complexes have been investigated. Each compound undergoes substantial mass loss upon pyrolysis in a nitrogen atmosphere between 195° and 370°C, with major mass losses occurring between 279° and 324°C. Steric repulsion between organic substituents generally decreased the decomposition temperature. The product of the pyrolysis was not well defined, but usually consistent with being either FeS or Fe_2S_3 or a combination of these.

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IDENTIFICATION OF AMINO ACIDS IN A DIPEPTIDE BY HYDROLYSIS, DERIVATIZATION, AND HPLC ANALYSIS

A reversed-phase HPLC method is described that allows the separation of chemically derivatized amino acids. The dipeptide Gly-Leu was subjected to hydrolysis and subsequent derivatization of the hydrolyzed amino acids using FMOC. Derivatized amino acids were identified in the chromatogram by comparison of the elution times of standard derivatized amino acids. Derivatized glycine is seen at about 3.5 minutes and derivatized leucine is seen at about 8.0 minutes.

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