2 COMPARISON OF THE PLANT PROTEIN ANALOG BEYOND MEAT HAMBURGER TO A TRADITIONAL MEAT BASED HAMBURGER

Abstract:

Global concerns related to the continued availability of animal-based protein sources, in addition to the awareness of consumers for healthier and less-global climate impact food sources, have driven the introduction of plant-based meat products in the marketplace. Some of the challenges in winning over more consumers relates to the taste of these non-animal based products. Can companies really make a plant-based chicken or beef product taste as good as the animal-based version? In our lab, we investigate the chemical compounds in foods and beverages that are responsible for the taste and aroma. By leveraging the technique of Gas Chromatography – Olfactometry (GC-O), we can identify the volatile compounds which are strongly contributing to the aroma of a food product. This approach enables us to focus on the most relevant

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THE FATE OF AMMONIUM IN SOILS

Abstract:

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THE EFFECTS OF C8-SUBSTITUENTS ON ELECTRONIC STRUCTURES OF FLAVINS

Samuel Chasen, Senior, Chemistry, University of Kentucky
Rajiv K. Kar, Chemistry, Technische Universität Berlin

Abstract:

Flavins are versatile molecules that have an absorption maxima at 447 nm to 374 nm, giving off a yellow color. These molecules have been shown to exhibit significant oxidation and reduction activities that are imperative to life. Recent studies at the Miller Lab have shown that changing the C8 position of the simplest flavin, lumiflavin, has significant effects on the absorption maxima and its electronic properties. To understand these transitions, numerous quantum chemical methods were used to simulate seven lumiflavin derivatives to identify changes in the flavin's electronic structure that corresponds with its changing spectra. Using computational methods to simulate these flavins, it was found that the optical spectra from the calculated values of the simulated flavin are in a good agreement of the derivatives and follow a consistent trend of the experimental spectra.

5 UNDERSTANDING WHICH ELEMENTS ARE HARDER TO MEMORIZE AND EASIER TO FORGET

Abstract:

Objective: This project is based on the biochemical characterization of a putative Glucan Water Dikinase (GWD) orthologue that has been identified in a unicellular, thermophilic red alga, Cyanidioschyzon merolae (Cm). The goal of this experiment is to study the functioning of three carbohydrate binding modules (CBM) of family 45 contained in the sequence of CmGWD.

Significance: Glucan water dikinase is involved in starch metabolism through phosphorylation. The carbohydrate binding modules are thought to be critical for the enzyme's ability to efficiently phosphorylate starch. The role of CmGWD in starch metabolism is of interest because of potential industrial applications.

Methods: Bioinformatics to design primers to mutate certain tryptophan, tyrosine, or phenylalanine residues to alanine in three CBM45s. Polymerase chain reaction (PCR) to amplify the mutations. Transformation into

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SOLIDAGO AS A FETAL ALCOHOL SYNDROME PREVENTION METHOD

Camryn Kennemore, Senior, Chemistry, University of Kentucky
Allan Butterfield, Chemistry, University of Kentucky

Abstract:

Fetal Alcohol Spectrum Disorders is a worldwide issue that results in a child after prenatal alcohol consumption. These disorders are incurable, which is why there is such a focus on preventing FASDs. New research suggests that alcohol related birth defects can be lessened or reversed using antioxidants. Because ethanol from alcohol creates oxidative stress in a fetus, scientists hope that a supplement of antioxidants could neutralize the radical oxidative species and prevent the damage caused by them. My intended project was to determine if the solidago has antioxidant properties that could do this.

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THE RATE OF FORGETFULLNESS FOR PERIODIC TABLE ELEMENTS

Abstract:

The most known periodic table elements (noble gases, nonmetals, alkali, etc) are often introduced in introductory level chemistry courses, but as students near upper level courses, less common elements begin to be incorporated into the curriculum. When new elements are introduced that students have not yet covered, they are not only learning the new curriculum, but they are also trying to learn and remember an element. This creates more work for the student and can potentially lead to underperformance. The purpose o ɪ ᵐ ɤ ʊ

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THE ELEMENTS: ENCODING, RETAINING, AND FORGETTING

Abstract:

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THE PERIODIC TABLE

Danielle Peterson, Senior, Chemistry, University of Kentucky
Stephen Testa, Chemistry, University of Kentucky

Abstract:

This study investigates memorization, retention, and my familiarity with the periodic table. Over a 63 day period, I took 10 tests to examine my retention of the periodic table elements. These tests were taken on day 1, 15, 16, 17, 19, 23, 31, 39, 47, and 63. The abbreviations were provided and I was tested on my ability to identify and correctly spell the elements. A baseline test was taken on day 1 of this study and acted as a point of reference for any progress throughout the study. For two weeks I studied the periodic table in whatever manner I found fit and took no tests. On day 15, I improved from 59 correct elements to 113. From day 17 - 23 only 3 elements that were learned from the study period were forgotten. A total of only 6 elements were never learned and 3 elements were hard to define throughout the study because they were forgotten, mixed up, or misspelled occassionally. The general trends for 12 elements that were either never known, hard to define, or forgotten were elements that resided in periods 5, 6, and 7. It is concluded that the chemistry of elements has not been explicitly discussed or mentioned throughout my undergraduate career and this made memorization difficult. I can conclude that familiarity with elements is crucial and aids in the retention of element abbreviations and names.

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DEVELOPING A NEURAL NETWORKS FOR DIHEDRAL DEPENDENT ENERGIES

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ANALYSIS OF THE ANTIOXIDANTS IN HOMEMADE VS. COMMERCIAL KOMBUCHA

Abstract:

Kombucha is tea that is fermented by a symbiotic culture of bacteria and yeast (SCOBY). It has many purported health benefits, partly due to its antioxidant levels. This study contrasted the concentrations of antioxidants in homemade vs. commercial kombucha. High performance liquid chromatography (HPLC-UV) was used to analyze the concentrations of the antioxidants caffeine, catechin, epicatechin, and epigallocatechin gallate (EGCG). UV-Vis spectroscopy was used to analyze the concentrations of total antioxidants in the kombucha samples. The concentrations of caffeine, catechin, epicatechin, EGCG, and total antioxidants were all shown to be statistically higher in homemade kombucha than in commercial kombucha ($p < 5\%$). Of the four, only EGCG concentrations were shown to be higher in homemade fermented kombucha than in the original unfermented tea. There was no significant difference between caffeine, catechin, epicatechin, or EGCG concentrations in the analyzed kombuchas with fruit compared to plain kombucha.

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