Artificial Synthesis of Aromatic Amino Acid Tyrosine, Based on Pi-to-Pi* Absorbance Peaks

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The aromatic amino acid Tyrosine was synthesized using three types of clays, water, heat, and a few common compounds. However, initial efforts to identify Tyrosine were stymied by the sole use of the Pearson Correlation Coefficient to statistically compare synthesized compounds with laboratory-grade amino acids, without any understanding of the underlying chemistry. This synthesis was successfully revisited with the aid of quantitative chemistry, to understand the actual chemical bonding and thus the amino acid synthesized. The Beer-Lambert equation, Plank's equation, and two dominant spectroscopic absorbance peaks at Lambda1 = 287nm and Lambda2 = 294nm were critical to this study. The dominant spectroscopic peaks represented Pi-to-Pi* electron transitions, as these peaks were significantly higher than all other absorbance data in the absorbance versus wavelength graph. These two dominant peaks became a UV/Vis "signature" which lead to identifying the aromatic amino acid Tyrosine as having been created by all three types of clays. The Beer-Lambert equation was applied to show that Kaolinite Clay produced a higher concentration of Tyrosine than Morrocan, and Morrocan produced a higher concentration than Talc.

Awards Won:
Arizona State University: Arizona State University ISEF Scholarship (valued at up to $52,000 each)
University of Arizona: Renewal Tuition Scholarship