Finding Active Ingredients in Pharmaceuticals by UV Spectrophotometry

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The active ingredient in any pharmaceutical is the chemical that will ultimately deliver the desired effect on a patient. Knowing the quality and the quantity of the active ingredient in a pill right before ingestion is of paramount importance for the patient's health and the desired results. Unfortunately drugs only undergo quality control testing at the manufacturing plant but not at the point of sale. Moreover, to an untrained eye, one pill may not appear different from another and if the wrong pill or the wrong dose is taken, adverse health effects may arise. Indeed, manufacturers of counterfeit drugs rely on these two points of appearance and testing. In this study we examine whether ultra violet (UV) spectrophotometry absorbance can be used to separate an active ingredient's UV peaks from the combination of peaks generated by the inactive ingredients of the tablet. A well-understood active ingredient, acetaminophen, was used for this study. Samples were prepared by crushing Tylenol tablets, dissolving the powder in different solvents (0.1M HCl, 0.1M NaOH, and H2O) at various concentrations and mixed by vortex. After preparation, the samples were measured by UV Spectroscopy. Experimental results were compared to standard UV curves for the pure active ingredient to correlate the observed changes in absorbance within the relevant UV wavelength range. We observe that more than one solvent is needed to identify the active ingredient. Development of a simple method to accurately identify the quality of the active ingredient will provide an additional safeguard to consumers, particularly in regions where counterfeit drugs are prevalent.

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