



**CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY**

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Project Title Going Organic: Chrysanthemum x morifolium Indicator, an Alternative to Phenolphthalein Titrations	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals To determine which of five flower petals, when soaked individually in methanol or ethanol, will produce an efficient indicator that is economically natural/safe, and will provide the most intense pH color change.</p> <p>Methods/Materials Two different studies were performed. In the first study, petals of primrose, carnation, daisy, chrysanthemum, and tulip were soaked independently in two different alcohols (methanol and ethanol). After a two hour exposure, the alcohol extracts for each flower were tested for their response in acidic, neutral, and basic conditions. This allowed for colorimetric analysis of each flower's response to different pH levels. Then, the second study was performed. The chrysanthemum gave the best colorimetric results, and therefore, was analyzed for its response to a much wider range of pH levels from one to fourteen.</p> <p>Results For the results in part one, the flowers that were tested gave colorimetric results. When using ethanol, there were changes in the colors, but based on the results obtained, methanol had the most dramatic color differences. The flower which had the most dramatic colorimetric results was the chrysanthemum in the methanol. In part two, when the chrysanthemum methanol indicator was expanded for a wider range of pH responses, it was found that the chrysanthemum in methanol extract gave distinctive color changes from pH one to four and pH eleven to fourteen. However, there were no visible color changes from pH four to eleven.</p> <p>Conclusions/Discussion In the original hypothesis, chrysanthemum was chosen as the flower that would provide the best indicator based on its higher anthocyanins content and that daisies would provide the least dramatic results. Based on the findings, it proved to be true. The findings show that the extraction from a plant indicator can be done in a few hours and at least the Chrysanthemum indicator can be readily made and used in a simple laboratory setting. The use of simple indicators as an introduction can serve as a stepping stone to more complex indicators, such as Phenolphthalein, but more importantly, simple plant indicators can prove to be cheaper and safer for humans as well as the environment due to their organic nature.</p>	
Summary Statement The purpose was to determine which of the five flower petals, when soaked individually in methanol or ethanol, would produce an efficient indicator that is economically natural/safe and provide the most intense pH color change.	
Help Received Narquiz Cervantes, our chemistry teacher, provided us with equipment.	