California Science Center

CALIFORNIA STATE SCIENCE FAIR
2001 PROJECT SUMMARY

Your Name (List all student names if multiple authors.)

Adam Field

Science Fair Use Only

S0404

Project Title (Limit: 120 characters. Those beyond 120 will be ignored. See pg. 9)

Digital Camera vs. the pH Rod: Using a Camera to Determine pH

Division

S Junior (6-8) S Senior (9-12)

Preferred Category (See page 5 for descriptions.)

4 - Chemistry

Abstract (Include Objective, Methods, Results, Conclusion. See samples on page 14.)

Use no attachments. Only text inside these boxes will be used for category assignment or given to your judges.

Objective: The objective of my project is to find out what kind of a relationship exists between the pH of a chemical and the intensity of color it turns when tested with an pH indicator.

Materials and Method: I used solutions with known pH's from 2 to 12. I verified the pH with a Vernier Software Calculator-Based Laboratory pH meter. I used a Kodac DC120 digital camera to record the indicator's color. I used a Fujitsu Laptop PC and Microsoft Paint to analyze the color intensity in Red, Green and Blue. For each pH solution, I reacted one mL of the solution with two drops of a pH indicator (Bromothymol blue) in each of three vials, Once they reacted, I took a picture with the digital camera, then repeated it for the rest of the solutions. When all my data was collected, I downloaded the pictures onto my PC, and used Microsoft Paint to find the red, green and blue value for the color of each vial.

Results: Below pH 6 and above pH 9, the color values stay constant. The change occurs between pH 6 and 9, in which range blue increases and green decreases by similar amounts, and red falls significantly.

Conclusion: All three colors show sigmoidal curves. Using these results, it would be possible to create a machine to find the pH, which would analyze a solution's color the way I did automatically, and if that color was on the graph, it would tell you what the pH was. Although my results show that a single indicator is only useful for about 3 pH levels, if 4 indicators were used, it would cover almost the entire range. The apparatus could analyze all four colors, compare them to the four graphs, and determine if any of those points fit.

Summary Statement (In one sentence, state what your project is about.)

I wanted to determine the relationship between the pH of a chemical and the intensity of color it turns when tested with an pH indicator.

Help Received in Doing Project (e.g. Mother helped type report; Neighbor helped wire board; Used lab equipment at university X under the supervision of Dr. Y; Participant in NSF Young Scholars Program) See Display Regulation #8 on page 4.

Used UCSC student lab under supervision of Glen Milhauser; borrowed chemicals and pH meter from Kelly Clark (science teacher)