



**CALIFORNIA STATE SCIENCE FAIR  
2014 PROJECT SUMMARY**

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| <b>Name(s)</b><br>Alicia N. Hans  | <b>Project Number</b><br><b>J0803</b> |
| <b>Project Title</b><br><b>The Effects of Acids and Bases on Soil Permeability</b>  |                                       |
| <b>Objectives/Goals</b><br>My objective was to learn if the pH of the water affected the soil permeability.   |                                       |
| <b>Abstract</b><br><b>Methods/Materials</b><br>Materials used: potting soil, plastic cups, a funnel, a pitcher, measuring tools for volume, water, vinegar to create an acidic solution, baking soda to create a basic solution, two stopwatches, a piece of fabric, rubber band, pH strips, marking pen.<br><br>First, I prepared the soils; 100 mL, five samples for each of three solutions. Then I saturated the soil, poured the saturated soil into the funnel (with the fabric attached to stop the soil from falling), measured the pH of the solution, poured in the solution, started both stopwatches, stopped the first one when five seconds passed between drops, stopped the second one when ten seconds passed between drops, continued timing until ten minutes had gone by, removed the funnel, measured the pH of the solution again, measured how much water had come through in ten minutes, and cleaned out the funnel and pitcher. I did this five times for each of three solutions and recorded all the data: starting pH of the solution, time when five seconds passed between drops, time when ten seconds passed between drops, second pH, and mL of water that came through in ten minutes. |                                       |
| <b>Results</b><br>My results were extremely inconsistent. The ranges were large and overlapped each other. The average amount of water that came through in ten minutes for the acidic solution was 60.8 mL, basic solution was 33.2 mL, and neutral solution was 56.8 mL. The average time it took for there to be five seconds between drops for the neutral solution was 295 seconds, acidic solution 438 seconds, and basic solution 267 seconds. The average time it took for there to be ten seconds between drops for the neutral solution was 440 seconds, acidic solution was 534 seconds, and basic solution was 469 seconds. I can see a trend in the averages but the ranges are so large it is difficult to tell if the trend is significant.  |                                       |
| <b>Conclusions/Discussion</b><br>My conclusion was that, based on the trend I could see in the averages, my data did not support my hypothesis. The acidic solution produced the lowest average permeability rate and the basic solution produced the highest. The trend may not be significant, and if it is not, then I cannot find enough evidence to prove my hypothesis true or false.   |                                       |
| <b>Summary Statement</b><br>My project is about the effects of acids and bases on soil permeability.  |                                       |
| <b>Help Received</b><br>Parents ran stopwatches; mom helped find sources for research; dad helped with graphing program.  |                                       |