



**CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY**

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| Name(s) Shalin N. Shah | Project Number J0127 |
| Project Title Transport Phenomena | |
| Objectives/Goals The object of this project is to see if the density of a liquid exerts the same resistance to flow as the liquid's viscosity. Because viscosity is a fluid's resistance to flow, and a denser liquid has more concentration, I arrived at the hypothesis that they do exert the same resistance to flow. | |
| Abstract Methods/Materials The materials I used to perform this experiment were a measuring cup, a stopcock with a reservoir, a 90 degree pvc elbow, a one foot long pvc pipe, a collecting cup, a mass balance, and a stopwatch. The liquids I ran my experiment on were water, milk, 7-Up, normal saline, canola oil, and corn syrup. Using the reservoir, the pvc elbow joint, and the pvc pipe, I made a flow apparatus. Through this apparatus, I allowed 500mL of liquid to flow horizontally through pipe into a collecting vessel at the other end, and recorded the time it took. I experimented on all six of the liquids in this way, performing three trials for each, and ranked them all in order from most to least time, or most to least viscous. I found the density of the liquids by dividing its mass, which I measured on the mass balance, by its volume. I also ranked them in order from most to least dense. I compared the rankings of liquids viscosities and densities. | |
| Results For the results, the average times of the liquids in order of most to least viscous came out to corn syrup with 823.6 seconds, Canola oil with 24.8 seconds, 7-Up with 17.9 seconds, milk with 15.4 seconds, water with 14.7 seconds, and saline solution with 13.8 seconds. The order of liquids from most to least dense was corn syrup-1.71g/mL, 7-Up-1.25g/mL, milk-1.18g/mL, saline solution-1.17g/mL, water-1g/mL, and canola oil-.81g/mL. The order of most to least viscous liquids didn't match with the order of most to least dense liquids. | |
| Conclusions/Discussion In conclusion, my hypothesis was incorrect. My experiment proved that density and viscosity do not exert the same resistance to flow. One of the things I applied this project to was the circulatory system, because the process of liquids flowing through a pipe like the way blood flowing through arteries, and the effects of changes in viscosity and density to fluids is similar to the way coronary artery disease works. | |
| Summary Statement My project determines whether the density of a liquid exerts the same resistance to flow as as the liquid's viscosity, and this concept can be applied to the circulatory system. | |
| Help Received Mother helped collect materials and assemble the apparatus. | |