CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY

Name(s)
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Project Number
J1816

Project Title
Paper Chromatography

Abstract

Objectives/Goals
My objective is to determine which marker possesses the strongest bonding ink, a characteristic measured by paper chromatography (strength indicated by the retention factor). In this process of experimentation, I wanted to learn the basic principles of paper chromatography.

Methods/Materials
Materials:
Water, vinegar, 15 strips of paper towel, ruler, pencil, sharpie permanent marker, crayola thin washable marker, crayola block washable marker, tape and a wide mouth jar were used in this experiment.
Method:
A ruler was used to draw a horizontal line 2 cm, above the bottom edge of the already cut paper strips. After pouring a small amount of water into a glass, a dot of each marker was placed at center along the line on the paper. Each strip was labeled and the strips were taped to pencil and then hung across the glass jar so that the bottom of the strip was barely touching the water surface. After letting the water raise for 10 minutes, the distance the solvent rose was measured and compared to the distance the dot (sample of ink) traveled. The test was repeated 5 times in water and then the solvent was changed to Vinegar and hot water.

Results
Retention factor (R.F) is the distant traveled by the sample (dot) over the distance traveled by the solvent. Average retention factors for Sharpie Permanent Marker were 0.022 in Water, 0.035 in Vinegar and 0.059 in Hot Water. Average retention factors for Crayola Block Marker were 0.67 in Water, 0.737 in Vinegar and 0.743 in Hot Water. Average retention factors for Crayola Thin Marker were 0.625 in Water, 0.67 in Vinegar and 0.713 in Hot Water.
Basically, the block marker showed the highest retention factor.

Conclusions/Discussion
I thought that the crayola block marker in water would have the highest retention value. Experiment results showed the retention factor value of the block marker the highest (0.67 # 0.743) irrespective of the solvents used. The sharpie permanent marker had a very low (0.022 # 0.059) retention factor indicating strong adhesion of ink components which is needed for permanent marking. The thin marker had a R.F of 0.625 to 0.713 which has a similar washable ink but because of its thin spread it showed slightly lower R.F. I was correct about my hypothesis

Summary Statement
My project is to identify the material composition (type of ink) using the principles of paper chromatography. .

Help Received
Dad, sister and grandpa helped me put together the display board.