Team Third Report

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MCEN 4151: Flow Visualization

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The image shown in Figure 1 below was submitted for the MCEN 4151 Flow Visualization Team Third Assignment.

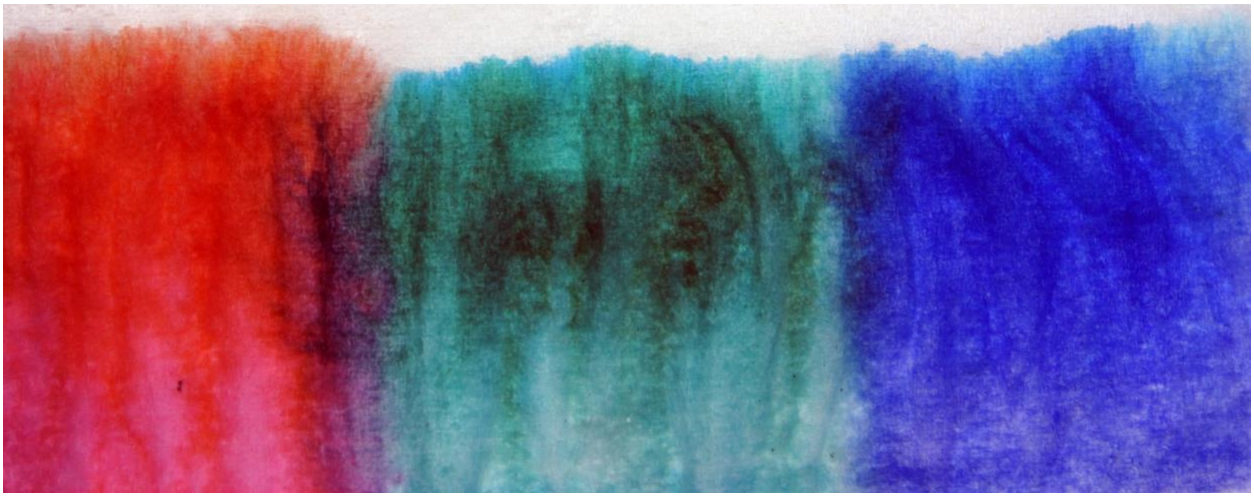

Figure 1: Submitted Image

The image reveals the physical phenomena of capillary action, where water flows upward, against gravity, driven by intermolecular forces.

The flow apparatus was as follows: a strip of toilet/tissue paper was marked with a felt-tip marker in three stripes. Each stripe was a different color, in this case, red, green, and blue. After the paper was marked with a decent amount of ink. The lower edge of the paper was then dipped and held just under the surface of the water. At this point the edge of the paper became saturated, and the water began to flow upwards toward the marker ink. After the water contacted the ink, it continued upward carrying the ink along with it. What is seen in the image in Figure 1, at the top of the image, is the 'front' of the flow, where the small peaks and valleys are where the water is currently propagating.

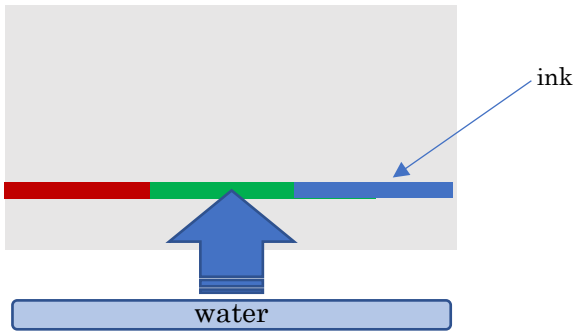

Figure 2: Schematic of flow setup

Figure 2, above, contains a diagram of the flow setup. Capillary action, which is the primary force driving this flow, is defined as the rising of liquids through a permeable substance due to adhesive and cohesive forces interacting between the liquid (in this case, water) and the surface (the tissue paper) [1]. The ink is from a washable marker, which implies that the ink is water-soluble, this allows for the diffusion seen.

The field of view is approximately 3"x2". The distance of the tissue to the camera lens is approximately 1.5 inches. The type of camera used is a Canon PowerShot SX530 HS, point-and-shoot. The original image has dimensions of 4608x3456 px. The camera's specifications and settings at the time of the image capture were, an ISO of 100, 1/40 shutter speed, F/4.0, with auto white balance and focus. No photoshop or any post-processing used beside cropping.

The image in Figure 1 reveals the power of capillary action. I like the simplicity of the image. In the future, I might try different colors or types of ink, or a different solute instead of water.

Works Consulted

Libretexts. “Capillary Action.” *Chemistry LibreTexts*, Libretexts, 28 Aug. 2017, chem.libretexts.org/Core/Physical_and_Theoretical_Chemistry/Physical_Properties_of_Matter/States_of_Matter/Properties_of_Liquids/Capillary_Action.