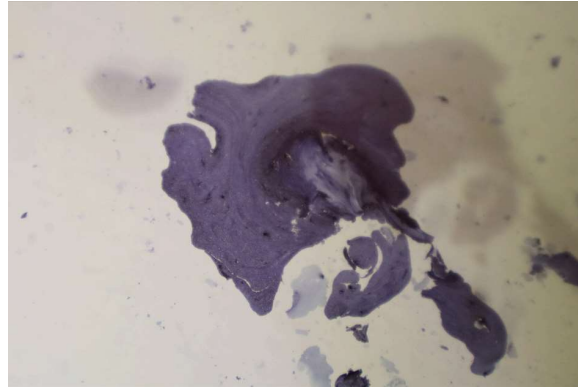


# Team First - Ink vs Water

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Edited photo



Original Photo

As part of the first assignment for this flow visualization class, I wanted to try and replicate a video I saw online where a person had ink on the end of a leaf and placed it into the water where it then created beautiful designs and caused the leaf to move forward like it had an engine. In the end, I was not able to create the same phenomenon, but I was able to observe a different phenomenon which intrigued me. I knew that ink and water do not mix well and wanted to learn more about the cause and document what happened.

For this experiment, I was not able to find a conclusive answer for exactly what happened but I have two theories both involving the surface tension of the ink (He, Yang, Qin): First, The ink used in this experiment might contain some additives which are water soluble, meaning that as I moved the paper these absorbent additives stuck to the ink causing the original ink splotch to stretch as both the ink and water wanted to stay together.. The second theory is that the ink and water did not mix at all and instead the ink stuck very well to the paper as a waterproof ink creates very strong bonds with the paper (Kenzo). The shear stress along the ink splotch caused some of the ink to attempt to be pulled away from paper, but the strong bond between the page and the ink and the surface tension of the ink caused the water to move away from the paper creating this flat disk floating in the water when it finally detached from the paper.

This photo was taken using a Canon EOS R100. Some specific specifications for the settings include: Shutter Speed (1/160), Aperture Value (F6.3), ISO speed (ISO1000), and a Lens Focal Length (42mm). The shutter speed was very quick because the ink was moving slowly on the water and I did not want to catch any of this motion. Both the ISO speed and aperture value were selected to allow a good amount of light in so the ink was almost reflective. The photo was taken from about 3 feet away and has a small field of view around 4" x 6". After the photo was taken, I increased the exposure to +1 in order to make the ink splotch more prominent in the frame. In addition, I increased the contrast of the edges to make it pop a bit more. The last thing I did was adjust the color lightness to reduce outside color that I did not want and emphasise blue and reds so the purple color of the ink looks the best.

The image revealed an interesting phenomenon involving ink and water and highlights properties of surface tension in both liquids. I do not love the background of the photo and would love to do this in a nice outdoor freshwater environment, but I was concerned about dropping oil into natural water. This would create a better background for the photo. I had some trouble getting the ink to create this phenomenon and it almost seemed like a random point in time when the ink chose to behave in this way. I would love to see or do more experimentation that shows the same phenomenon. There is room for improvement in my photography and also the amount of ink used. I believe I could create some beautiful images with more ink on the pages. To further develop this idea, I would play around with the amount of ink in one place as this seemed to create the most art as well as different vessels for putting it in the water such as leaves or thin paper since I used a thick engineering sheet of paper.

### Work Cited

Kenzo Kasahara, "A New Quick-Drying, High-Water-Resistant Glossy Ink Jet Paper" in *Proc. IS&T Int'l Conf. on Digital Printing Technologies (NIP14)*, 1998, pp 150 - 152, [https://doi.org/10.2352/ISSN.2169-4451.1998.14.1.art00037\\_1](https://doi.org/10.2352/ISSN.2169-4451.1998.14.1.art00037_1)

He, B., Yang, S., Qin, Z. *et al.* The roles of wettability and surface tension in droplet formation during inkjet printing. *Sci Rep* 7, 11841 (2017). <https://doi.org/10.1038/s41598-017-12189-7>