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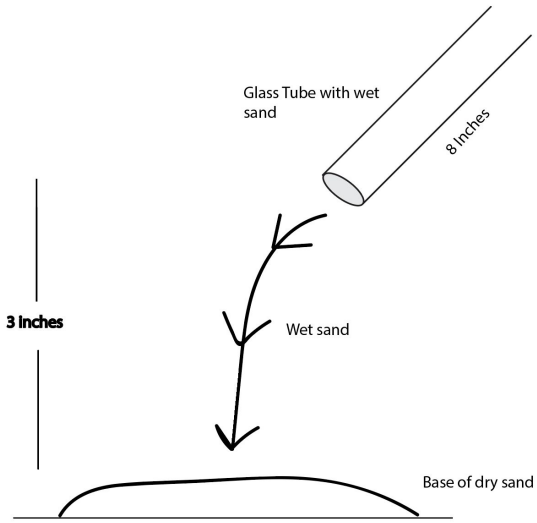
Building with Sand

This picture was shot with a Sony Cyber Shot camera with a 16x optical zoom using “beach mode” which helped pick up the vibrance of the sand without blurring the tans. The image was shot with a 4.3-68.5mm f/3.3-5.9 lens with a focal length of 13.86mm. The exposure was 1/320 sec with an ISO of 100. The image was edited in PhotoShop. I increased the contrast and cropped the image. I also blurred out the background to bring focus more to the sand instead of the trees in the background.

The set up is shown below:




This phenomena was created by dropping wet sand out of a glass tube. As clumps of wet sand fell from the tube, they would pile on one another instead of forming one lump. The excess water is drawn downwards through capillary action. Capillary action is the ability for liquids to flow in narrow spaces and can often oppose other forces such as gravity. This is the same force that allows menisci to form and water to travel up thin tubes. This is the result of both cohesive forces and surface tension in the liquid. As the water is sucked downwards, the grains of sand are pulled together. This allows them to remain upright instead of sliding past each other and forming a clump at the base. The dry bed of sand that I was dropping the wet sand mixture on soon became completely saturated by water every four or five times I attempted a tower which demonstrates how much water is getting sucked into the base. The water being drawn downwards was noticeable as the sand grains lost their shine and shifted closer to one another.

It took a lot of trial and error to get this image. At first, I tried dropping the wet sand from a spoon onto a plastic surface. The sand would not hold its shape or form layers as seen in this image. Instead, it would all form into one pile that would not build

more than a few centimeters high and did not have the same modular effect. I then switched to a dry sand surface, which allowed for the excess water to move into the dry sand and for the wet sand to hold it's shape. However, due to the inconsistency of letting the sand slide off a spoon, the tower would quickly fall over due to too much sand being added and gravity over powering the capillary action forces.

I finally switched to putting the wet sand in a .5in diameter, 8 in long glass tube. Holding this at an angle and controlling how much sand came out by using my thumb to create a seal at the opposite end gave more control. In this method, I was able to have the sand stack higher before toppling. For the most part, the towers would topple due to my error of new sand not being perfectly aligned with the sand below. However, this ended up giving an interesting asymmetrical effect. The tower in the image was ~1 inch tall and the bed of sand it was built on was ~3 inches in diameter.

As seen here, a lot of interesting shapes came from this set-up. On the left, the sand was less wet and the sand dropped out of the tube in larger chunks. On the right, the sand was more wet and poured out in a continuous stream.

The get wet assignment exposed me to photography and photoshop. I was surprised by how long getting the right shot took but am overall happy with the outcome.

Works Cited:

Mott, Vallerie. "Introduction to Chemistry." *Lumen*, Lumen Learning, courses.lumenlearning.com/introchem/chapter/capillary-action/.