Post-lab Analysis

First, write a paragraph summarizing your understanding of the properties of water. How does water behave, and what are the chemical processes that cause those behaviors? Include concepts like hydrogen bonding and polarity.

Water (H2O) is a unique compound whose notable characteristics vary greatly from its elements (H2 and O2 in nature). While technically not an organic compound because it does not contain a Carbon (C), it is still a molecule prevalent in Biology and therefore its properties should be understood. Water has three main properties that other properties can be derived from: Polarity, Ability to form hydrogen bonds, and a relatively high specific heat. Water is polar because Oxygen (O) is much more Eneg that Hydrogen (H) and therefore pulls e-s in the bond closer to its nucleus resulting in a slight negative (-) charge on Oxygen (O) and therefore a slight positive (+) charge on Hydrogen (H). These regions of positive and negative charge are attracted to other negative and positive regions respectively. Water also has the ability to form hydrogen bonds more and more at lower temperatures. This is because the Hydrogen bonded to the Oxygen in water carry a positive charge that is strongly attracted to the lone pair of another very Eneg element bonded to a Hydrogen. This is what happens when water freezes to ice. The water forms hydrogen bonds in a crystalline structure, these molecules are now farther apart and therefore less dense which is why ice floats in water. On a side note its worth thinking about if the Titanic would have sunk if ice didn't float! Water's third basic property, its high specific heat comes from the heat released when making and breaking hydrogen bonds. This means that water can absorb a lot of heat before entering into its gaseous phase. This is why truly gaseous water (not steam) can cause a burn when it condenses on your skin, all the heat it adsorbed to enter into the gaseous phase is then transference onto your skin as the water condenses. From these three basic properties, other properties can be derived, for example, water gets it high surface tension from its strong dipole-dipole interactions which in turn are caused by its polarity.

Then,

1. Name two stations that seem to demonstrate the same property of water. What do these stations have in common?
   Stop on a Dime and The Wax Philosophic seemed to demonstrate the same property of water: Its high surface tension. This surface tension, as discussed above, is a result of water's polarity. The surface tension is created when the polar water molecules line up in long trains of positive – negative, positive – negative, positive – negative and try to keep all together. This was seen in both experiments when the water beaded up when trying to keep together in the long chains created due to water's polarity.

2. Name another two stations that seem to demonstrate the same property of water, but a property that is different than your answer for Question #1. What do these stations have in common?
   What would make the best wick? And Anti-Gravity appear aimed at demonstrating the same property of water, that being its ability to move against gravity via capillary action due to water high surface tension. Capillary action is a result of high surface tension. Capillary action happens when water is introduced into a small pocket. Like water does in a graduated cylinder, the water will seeming climb up the edges to the ends of the pocket due to surface tension. This then introduces water into the next pocket where the process is repeated causing water to seemingly defy gravity.

3. Write up your procedure, data and conclusion of your experiment to determine the best wick (#6).

   Procedure: Obtain 2 water bottles (with caps), a piece of polyester and cotton yarn of equal

length. Cut bottles in half and puncture a consistent hole in the cap. Fill the bottom half with and equal volume (depending on the size of your water bottle). Thread the bottle caps with holes each with a piece of string ensuring that the lengths on either size of the caps are indeed equal. Screw the caps back onto the cut bottle tops and flip entire top assembly upside down and into the base filled with water taking care to check that the length of each wick submerged is almost equal. Wait about 30 min to 1 hour before collecting data and concluding the experiment.

Data:

Yarn Wick

- Seems wet
- can see what clear liquid in top area of wick
- entire wick is wet when removed from water base

Polyester Wick

- No wet appearance
- bottom of wick is dry when removed from water base

Conclusion: From the small amount of qualitative data collected, the conclusion can be drawn that the yarn wick, opposed to the polyester wick, would best be able to move water from the base below to the soil above via capillary action. This would best allow the soil to stay hydrated as the plat uses water in the soil and water evaporates. It can be assumed that the yarn wick proved better at transporting water via capillary action because it has more and wider pores allowing for more capillary action to take place at a faster rate than with the polyester wick, this may even stem from the fact that the polyester wick was more tightly wound that the yarn wick witch may have yielded the smaller pores discussed above.