**Hard Water Lab** Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Background**: The contents of tap water vary from community to community. Water is classified as hard or soft based on the amount of calcium or magnesium in the water, measured in milligrams per liter (mg/L). A forensics lab has two samples of water. One sample comes from Community A, which has soft water. The other sample comes from Community B, which has hard water. The scientists in the lab forgot to label the samples and can’t remember which came from where.

**Question:** Which sample comes from Community A and which sample comes from Community B?

**Procedure:**

1. From the back table, obtain 3 test tubes. With the markers, label one “D” for distilled water, “1” for sample one, and “2” for sample two.
2. Use a graduated cylinder to measure out 10 mL of distilled water. Pour the water into test tube “D.”
3. Place test tubes 1, and 2 next to test tube D and make a mark on each test tube that corresponds to the height of the water in test tube D.
4. Obtain sample 1 in a beaker from your teacher. Slowly pour the water sample into test tube 1 until you reach the marked height.
5. Obtain sample 2 in a beaker from your teacher. Slowly pour the water sample into test tube 2 until you reach the marked height.
6. Add one drop of dish detergent to each test tube. Cover the tubes tightly and shake for 30 seconds to produce suds.
7. Use a metric ruler to measure the height of the suds.

|  |  |
| --- | --- |
| Data Table | |
| Sample | Height of Suds |
|  |  |
|  |  |
|  |  |
|  |  |

Conclusion:

1. Which sample produced the most suds? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. Which sample produced the least amount of suds? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. Soft water produces more suds than hard water. Use the table below to determine from which community each water sample originated.

|  |  |
| --- | --- |
| Classification of Water Hardness | |
| Classification | Mg of Calcium or Magnesium/L |
| Soft | 0-60 |
| Moderate | 61-120 |
| Hard | 121-180 |
| Very Hard | >180 |

* Sample 1 came from \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Sample 2 came from \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. If the 50 mL of hard water that you obtained contained 7.3 mg of magnesium, how hard would the water be according to the table above? (50 mL = 0.05L)
2. What did you purposely change (independent variable)? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. What did you measure (dependent variable)? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. What was the control? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
5. Name 2 constants \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

CLEAN UP YOUR AREA!!! Pour water samples down the drain and rinse out test tubes with plenty of water. Return cleaned supplies to the back table.