Dynamic Design: The Cleanroom

Washing Dishes

STUDENT ACTIVITY

Part I Playing Pepper

1. Fill your empty beaker half full of water. Sprinkle some pepper on the top of the water. Observe and draw what you see below.

2. Add one drop of liquid detergent to the beaker. Describe what happened below. Draw a diagram to illustrate this.

Drawing

Description

3. Dump the contents of the beaker down the drain. Completely rinse and dry your beaker. Repeat the above process this time using a bit of Ivory®soap (not detergent) on a toothpick. Describe any similarities or differences.

4. Describe why the events in numbers 2-3 above took place.

Part II A Penny For Your Thoughts

1. Dump the contents of the beaker. Obtain a beaker that has soapy water and one that has tap water. You will also need two pennies and two medicine droppers. Based on your experience above, predict how many drops of tap water you can put on the surface of a penny. Also predict how many drops of soapy water can be placed on a penny. Write your predictions below:

2. Draw liquid into your medicine dropper from the tap water and begin dropping the liquid onto the penny, one-drop at a time. Make sure you keep track of how many drops are going onto the penny. If you are working with a partner, he or she can complete the procedure with the soapy water using a different medicine dropper and a different penny.

3. Make a data table below to represent your findings:

4. Write a sentence that describes how your predictions compared with your results.

5. Write a paragraph that explains what happened in your experience and why it happened. You may need to go to the library or on line to find out more information.

Part III We are in Hot Water

Describe how the water felt in the teacher demonstration. What temperature do you think it was? (Degrees Celsius)

Washing Dishes (Guided Inquiry)

1. Using the following question, identify the variables that are being tested:

   Question: How does the amount of liquid detergent affect how well peanut butter is removed from spoons?

2. List the variables that should be controlled during this experiment.

3. The following is a procedure that you may follow to complete this activity. Answer the "thought" questions in your journal.
   - Fill up nine clear plastic cups with _____mL. of warm water.
   - What else should be controlled about the water?
   - Apply some peanut butter on each of the spoons.
   - What variables should be controlled in this step?
   - Label three of the cups "no detergent."
   - Label three of the cups "one drop of detergent."
   - Label three of the cups "two drops of detergent."
   - Why are there three cups testing the same thing?
   - Add the appropriate number of drops of detergent to each cup.
   - Using the stir stick, stir each cup. (remember not to cross contaminate)

   Using an if/then hypothesis format complete the following sentence:

   If the amount of soap _____then the amount of peanut butter on the spoon _____.

   - Add the spoons to each of the cups.

4. Design a data table to record the observations at equal time intervals leaving a space to record observation after 24 hours. Your final observation will be made tomorrow. Make sure that you include in your table a way to observe the peanut butter on the spoon as well as the appearance of the water. The data table should include a section for drawings as well as verbal descriptions.

   Data Table:

5. Write a conclusion for this experiment that answers the question and uses data from your observations to support your conclusion.

6. What advice would you give next year's students, if they perform this experiment in the future?

Washing Dishes (Open Inquiry)

Questions:

Definition of Variables:

Controlled Variables:

Hypothesis:

Procedure:

Data:

Conclusion: