EXPERIMENT #1

WHAT CHEMISTS DO: The Reactions of Household Chemicals

PURPOSE:

1. To identify several common household chemicals by evaluating their chemical properties.
2. To use deductive reasoning to determine the identity of an unknown substance.

PRINCIPLES:

Part of the fun of chemistry is being able to identify different substances by tests. To identify substances, chemists use reagents which are known chemicals or mixtures of chemicals. When a reagent is added to a sample being tested, it may or it may not produce an observable change. Both the positive and the negative result will help identify the unknown sample being tested.

In this simple experiment, four household chemicals (Clorox, Arm and Hammer Baking Soda, Lysol Toilet Bowl Cleaner and Vanish Crystal Bowl Cleaner) and five testing chemicals (reagents) will be used. The household chemicals were prepared in house by the technicians and they have added a yellow dye in order to make them harder to distinguish from each other. They are also, except for Clorox, diluted versions of the what you can buy at a convenience store. The concentration of each of the household chemical is about 5% of its active ingredient.

Household Chemical	Chemical Reagents
Clorox (5% sodium hypochlorite)	FD & C Blue No. 1 Dye
Arm and Hammer Baking Soda (sodium bicarbonate)	0.1 M $AgNO_3$ (silver nitrate)
Lysol Toilet Bowl Cleaner (9.5% hydrochloric acid)	0.1% thymol blue indicator
Vanish Crystal Bowl Cleaner (62% sodium bisulfate)	1.0 M $CaCl_2$ (calcium chloride)
	6 M HCl (hydrochloric acid)

A series of tests will be performed that will help you, to find out how each of the household chemicals behaves when each of the five chemical reagents is added.

When performing the tests, look for both POSITIVE RESULTS (color changes and the production of gas bubbles) as well as NEGATIVE RESULTS (no observable change) since both positive and negative results carry the same significance in chemical analysis. Make sure to wait at least 2 to 3 minutes for each test to run its course.

After you establish the tests that identify or indicate a difference between the four household chemicals, you will analyze 2 unknown samples.

RECORDING YOUR DATA:

1. Prepare data tables in your notebook using as model those given in the Report Form.
2. After completing each step of the procedure, record your results in the data tables prepared in your notebook (not on the Report Form).
3. When you are sure of your observations and conclusions, THEN transfer your data to the Report Form.

PROCEDURE:

PART I: IDENTIFICATION of KNOWNS

1. Make sure you wash and distill rinse your spot plate before you use it. If you do not do so, you may end up contaminating your samples. Do the same after you finish working with each one of the household chemicals.
2. Label 5 wells of your spot plate in such a way that you know which chemical reagent will be added to the household chemical to be studied. Leave an empty well between each reagent to make your work easier.
3. Place 10 drops of Clorox in the 5 different wells that you previously labeled as in Figure 1. Dispense the drops directly from the dropper bottle and avoid touching the sides or liquid inside the wells.

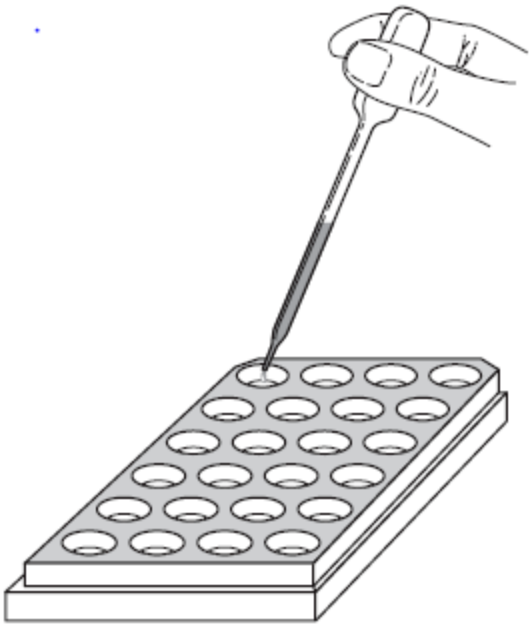

Figure 1. Adding the household chemical to your spot plate.

4. Add 10 drops of the reagent indicated on your label to the 1st well. For example if you labeled it as FD & C Blue No.1 dye, add 10 drops of that reagent to the sample of Clorox already in the well. Repeat this with the other 4 chemical reagents (0.1 M $AgNO_3$, 0.1% thymol blue indicator, 1.0 M $CaCl_2$ and 6 M HCl).

   NOTE**: Contamination is the major cause for errors in this experiment. Be careful not to contaminate the liquids. Be careful not to contaminate each of your test samples.**

5. Repeat steps 1 through 4 using Arm and Hammer Baking Soda.
6. Repeat steps 1 through 4 using Lysol Toilet Bowl Cleaner.
7. Finally, repeat steps 1 through 4 using Vanish Crystal Bowl Cleaner.
8. Record your observations of the chemical reactions and briefly describe how you can identify each of the household chemicals by its reactions with the chemical reagents. Write down your observations in a table similar to the one below