Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Period\_\_\_\_

***Demo/Lab: How Clouds Form***

**Objectives** Students will:

1. Develop a basic understanding of condensation and how a change in pressure affects this phase change.
2. Develop a basic understanding of cloud formation.
3. Conduct an investigation making careful observations, recording data, drawing conclusions, describing and communicating results.

**Prelab:**

1. What are the three requirements for cloud formation?
2. Prediction: Predict which conditions in the table below will have a cloud form in them. Explain why.

**Data Table:**

|  |  |
| --- | --- |
| **Condition in the glass sphere** | **Describe changes in the appearance of the glass sphere** |
| Empty – no water, no smoke |  |
| Water only |  |
| Water & Smoke |  |

**Post Lab:**

1. Was your prediction supported? Explain using specific data from your data table. What could be possible errors or problems with the lab?
2. List AND explain the two MAIN ways that lift is provided in nature for storm cloud formation? (NOTE: convection is not one of them.)
3. Why is lift necessary?
4. There are 3 requirements for cloud formation. Tell how each was supplied (or simulated) in the Condition #3 bottle of the lab:
   1. Water vapor
   2. Condensation nuclei
   3. “Lift”
5. What are other types of condensation nuclei in the atmosphere?
6. Not all clouds produce rain. What happens inside a cloud to get precipitation to fall the Earth? (The answer should include a vocab word for what causes the water droplets in the cloud to get large enough to fall.)

***Lab: How Clouds Form PROCEDURE PAGE***

**Background:** Three possible conditions for cloud formation will be investigated; no liquid water, liquid water, and liquid water plus smoke. A 2L bottle will be used to investigate all three conditions.

**Objectives** Students will:

1. Develop a basic understanding of condensation and how a change in pressure affects this phase change.
2. Develop a basic understanding of cloud formation.
3. Conduct an investigation making careful observations, recording data, drawing conclusions, describing and communicating results.

**Materials:**

* 2L Clear bottle with screw-on cap
* Dark –colored construction paper
* White paper
* 5 marking pens ranging in color from very light to very dark
* Scissors
* Clear tape
* 50ml graduated cylinder
* Wooden matches

**SAFETY:**

1. **Long hair** must be tied back as matches will be burned.
2. **Goggles** before & during use of matches.
3. Stay by YOUR group.
4. Perform only the procedures that follow.

**Procedure**

1. Completely remove bottle label to be able to see inside the bottle.
2. Cut an approximately 4cm x 4cm square of white paper.
3. Use the 5 marking pens to draw a different colored X at each corner and 1 in the center of the white paper. Each X should be about 1.5cm high.
4. Tape the paper with the five X’s onto the back of the 2L bottle, approximately 10cm below the top of the bottle, facing inward so that the Xs can be clearly viewed by looking through the bottle. (Tape just below the curve that goes to the top of the bottle.)
5. Cut a 10cm x 15cm strip of the dark-colored construction paper and tape it behind the white paper with the Xs, beginning near the neck of the soda bottle. This will enable better viewing of important changes inside the bottle.

**Condition 1 (No Water)**

1. If the bottle is damp from a previous class, shake as much water out as possible.
2. Screw the lid on tightly.
3. Look through the bottle at the five Xs, and squeeze the bottle **near the bottom** and hold for 5-10 seconds. Observe the Xs to determine if they become less visible and also note any changes inside the bottle**.** Release the bottle. Repeat squeezing, holding for 5-10 seconds, and releasing 4-5 times.
4. **Record** your data.

**Condition 2 (Just Water)**

1. Remove the lid from the bottle and add 50ml of tap water. \*\*\*Be careful to not get water on the side of the bottle – try to pour the water down the center.
2. Replace the cap and carefully swirl the bottle 10-15 seconds.
3. Repeat the observing, squeezing and releasing as in Step #3 for in Condition 1 above.
4. **Record** your data.

**Condition 3 (Water & Smoke)**

1. Remove the lid from the bottle.
2. Carefully light one of the wooden matches and place it into the neck of the bottle – do NOT drop the match into the bottle. Sqeeze the bottle to extinguish the match and then let go quickly to draw the smake into the bottle.
3. Remove the match and screw the cap onto the bottle.
4. Repeat the observing, squeezing and releasing as in Step #3 for in Condition 1 above.
5. **Record** your data.