Recipe for a Cloud Make-Up Lab

Name: _____ **Date:** _____

Pre-lab Questions:

1. Why would there be more humidity in the air above a warmer lake than there would be above a colder lake?

2. For a cloud to form, the humid air must be cooled below its _____.

3. When air is compressed (squeezed), does it become warmer, or does it become cooler? Why? (If you were squeezed close to other people would you be warmer or colder? Why?)

4. As air rises, will it be compressed, or will it expand? How will this affect its temperature?

5. What are "condensation nuclei"? Give two examples.

Lab Directions:

- Go to Mrs.Gillin's website, https://hhs.helenaschools.org/teachers/egillin/ .
- Scroll down and select Unit 4 Meteorology
- Watch the video titled: Cloud in a Bottle Lab Make-Up Video
- Answer the questions below as you watch the video.

Procedures/Observations: *Observations must be at least one sentence long*

1. Trial #1: Get 200 mL of very **cold water** and then pour it into the plastic bottle. Firmly screw on the lid. Shake the bottle vigorously for 30 seconds. Squeeze the bottle for at least 10 seconds to increase the pressure, and then release it to allow the air inside to expand. Squeeze and release several times as you watch the air in the bottle.

Observations:

2. Trial #2: Unscrew the cap from the bottle. Light a match, blow it out into the bottle, and then hold it there for about 3 seconds. Quickly replace the cap. Squeeze and release in procedure #1. Put the match on the table.

Observations:

3. Trial #3: Empty the cold water from the bottle and get 200 mL of very hot water (On the side of the room in the back). Replace the cap and shake the bottle for 30 seconds. Squeeze, release, and observe.

Observations:

4. Trial #4: Unscrew the cap and hold a match into the bottle as you did in procedure #2. Quickly replace the cap, and then squeeze, release, and observe.

Observations:

IMPORTANT – If you didn't get a good cloud on at least one of your trials, tell your instructor.

Conclusion Questions: Answer in full sentences and bold your words so it's easy to see.

1. Which of your four trials resulted in the best cloud formation?

2. Was cloud formation more impressive when smoke particles were present in the bottle?

3. Did the cloud appear when you caused high pressure on the air in the bottle (by squeezing), or when you caused low pressure (by releasing)?

4. Which provided more vapor in the bottle . . . the hot water, or the cold water?

5. Based on your findings, what is the recipe for cloud formation? (Circle 3)

cooling caused by high pressure; compression

cooling caused by low pressure; expansion

particles (smoke, dust, etc.)

water vapor

6. In your experiment, what served as the "condensation nuclei"?

7. *Why did the cloud disappear when you squeezed the bottle? You must use the terms **evaporate** and **dew point** in your answer.

8. You can see clouds because they are made of _____ or _____ . Circle two.

water vapor water droplets ice crystals

9. *How do particles such as smoke or dust help clouds form? (What is their role?)

Read the article below and then answer questions 10-12.

If you think Hurricane Fran was a full force when it slammed into the Carolina coast two years ago, think again. It would have been worse on Monday or Tuesday, say researchers at Arizona State.

The costliest storm in North Carolina history, the infamous weekend hurricanes Hazel and Hugo before it, was probably choked a bit by air pollution drifting off the East Coast during the workweek, according to climatologists Randall Cerveny and Robert Balling Jr. Their study was published in a recent edition of the science journal NATURE.

The duo found that average hurricane intensity over the past 50 years has been weaker for storms coming ashore at the end of the week and on weekends than for hurricanes striking on Mondays, Tuesdays, and Wednesdays.

They believe pollution particles coming out of smokestacks and tailpipes during the workweek drift into the Atlantic and provide tiny seeds (condensation nuclei) for cloud droplets to form around. The rain-forming particles help approaching hurricanes blow off some of their steam before the storms reach land, they concluded.

"Hurricanes are the biggest storms that we have on this planet, in terms of energy and precipitation," Cerveny said. "And what we've found is that we're having an impact on them. It's a little daunting when you start thinking about it."

10. *What did the two scientists find out about "average hurricane intensity" over the past 50 years?

11. *What do they believe is the reason for this? (Explain in 2-3 sentences)

12. *What was it in your lab that played the same role as the pollution discussed in the article?