NAME _____HR____

LAB: What's the Recipe for a Cloud? /29

Pre-lab Questions:

1. Which will probably have more humidity (water vapor) in the air above it? Circle one.

. . . . . A) a part of the ocean having colder surface waters

. . . . . B) a part of the ocean having warmer surface waters

2. In order for a cloud to form, the humid air must be cooled below its **???** point. Circle one.

thermal . . . . . condensation . . . . . dew

3. As air is compressed (squeezed), will it become warmer, or will it become cooler?

4. As air is allowed to expand, what happens to its temperature?

5. What are **condensation nuclei**? Give two examples. (3pts)

Materials: 2 liter (untinted) plastic pop bottle with lid, book of matches, 250 ml beaker (or larger), hot water, ice water

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Scientific Question: What is the best combination of ingredients to make a cloud? Hot water, cold water? Condensation nuclei or none? High pressure or low pressure?

Hypothesis: I think...

Procedures/Observations:

1. Trial #1: Pour 200 ml of cold water into the plastic bottle, and then firmly screw on the lid. Squeeze the bottle for several 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. What happens?

Observations:

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2. Trial #2: Unscrew the cap from the bottle. Light a match, blow it out, and then hold the smoking match inside the tilted bottle for about 3 seconds. Quickly replace the cap. Squeeze and release as you did in procedure #1.

Observations:

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3. Trial #3: Shake the bottle vigorously for 15 seconds, (to get rid of all the smoke particles) then empty the cold water from the bottle. Pour 200 ml of hot water into it. Replace the cap. Squeeze, release, and observe.

Observations:

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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:

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Analysis Questions:

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

2. Was cloud formation more impressive when smoke particles were present or when they were absent?

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

6. **ARGUMENT / CONCLUSION**: Make a ***claim*** about what you have found. What is the best combination of ingredients to make a cloud? Support your statement of truth with ***evidence*** you found in this lab. **(3pts)** (There are 3 ingredients or conditions)

7. Why did the cloud disappear when you squeezed the bottle? You must use the term "dew point" in your answer.

8. You can see clouds because they are made up of **???** or **???**. Circle two answers.
water vapor . . . . . .water droplets . . . . . ice crystals

9. As air rises in the atmosphere, is it compressed, or does it expand?

10. If it is rising, what effect does this have on the air's temperature?

11. Circle the letters of the five situations listed below that will contribute to **cloud formation**. (5pts)

- ☐ A. Moist air is forced upward as it encounters the Cascade Mountain Range.
- ☐ B. Tomorrow's forecast calls for an area of high pressure to be centered over your region.
- ☐ C. The westerlies cause air to flow down the east side of the Rockies into Montana.
- ☐ D. During the afternoon, air over a large air force base begins to rise because it is so much hotter than air over the surrounding forest.
- ☐ E. In autumn, the Santa Ana winds blow down from the mountain slopes of interior California out to the sea.
- ☐ F. Intensely heated air over the equator rises in an area called the intertropical convergence zone.
- ☐ G. As part of the global circulation pattern, air 30 degrees north of the equator is sinking in an area called the horse latitudes.
- ☐ H. An intense low pressure system moves across the Midwest.
- ☐ I. A cold air mass from Canada pushes into a mass of warm humid air over Nebraska.