Lab: Cloud in a Bottle

Earth Science

NAME: _____

PARTNER: _____

DATE: _____ HR: ____

Background: (answer after reading p. 484)

1. Read the first sentence atop p. 484. What are clouds?

   Where do clouds and fog originate from?

2. Describe what must be available for water vapor to condense.

   Where do these solid surfaces come from?

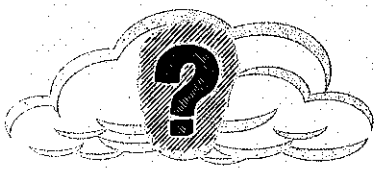
   What are the solid surfaces called?

3. Why are condensation nuclei suspended in the atmosphere?

4. What also must be true of the air for clouds to form?

5. What temperature must air cool to for clouds to form?

Question: What ingredients are needed for cloud to form in a bottle?



Hypothesis:

Materials: plastic bottle, fizz keeper w/ temp strip, matches, water

Procedure:

TRIAL #1-Dry Bottle

1. Screw fizz keeper onto bottle so that temperature strip hangs inside. Record air temp before any pumps.
2. Begin pumping the fizz keeper. Squeeze bottle after every 20th pump to check pressure. Record.
3. After the 80th pump, record temp and squeeze pressure, then quickly unscrew fizz keeper.
4. Record the air temperature after pressure is released and record if a cloud formed.

TRIAL #2-Moist Bottle

5. Unscrew the cap completely and add 100-ml of water.
6. Repeat steps 1-4 making sure to keep bottle UPRIGHT (vertical)...**keep the thermometer dry!**
7. After releasing the pressure (step 4), leave the water in bottle.

TRIAL #3-Moist Bottle with Match

8. Carefully light your matche(s), and drop them into the water at the bottom of the bottle.
9. QUICKLY put the fizz keeper onto the bottle and repeat steps 1-4.
10. After releasing the pressure (step 4), leave the fizz keeper on.
11. Tighten the fizz keeper back on and pump the bottle back up until air inside bottle is clear again.
12. Release pressure one last time. Unscrew fizz keeper, and gently squeeze out the air from the bottle!
13. Clean up by: 1) draining water, 2) throwing away matches (***garbage, not sink***), 3) inverting bottle to dry.

Humidity Practice Problems Name: _____

Earth Science Date: _____ Hr: ___

1. Use the water vapor graph (back) to solve the following:
   a. If the air temperature is 40°C and the humidity in the air is measured at 40g, the capacity is _____ **g** and the relative humidity is _____**%** (show work).

   b. If the air temperature drops to 35°C but the humidity stays the same, calculate the new relative humidity (show work).

2. Use the water vapor graph (back) to solve the following:
   a. If the air temperature is 20°C and the humidity in the air is measured at 14g, the capacity is _____ **g** and the relative humidity is _____**%** (show work).

   b. If the air temperature rises to 25°C but the humidity stays the same, calculate the new relative humidity (show work).

3. Use the Dry-Bulb-Wet Bulb Chart (back) to solve the following:
   a. After using a sling psychrometer, the dry bulb temperature was measured at 8°C and the wet-bulb measured at 6°C. Find the relative humidity. Show basic set-up.

   b. After using a sling psychrometer, the dry bulb temperature was measured at 18°C and the wet-bulb measured at 16°C. Find the relative humidity. Show basic set-up.

   c. After using a sling psychrometer, the dry bulb temperature was measured at 28°C and the wet-bulb measured at 26°C. Find the relative humidity. Show basic set-up.

4. [*Choose the correct term for each blank to accurately complete the statement*]

   "_____ *(condensation/evaporation/freezing/melting)* **occurs when liquid H_2O absorbs energy and changes to H_2O vapor., while "** _____ *(condensation/evaporation/freezing/melting)* **occurs when water vapor cools to its dew point and forms liquid H_2O."**

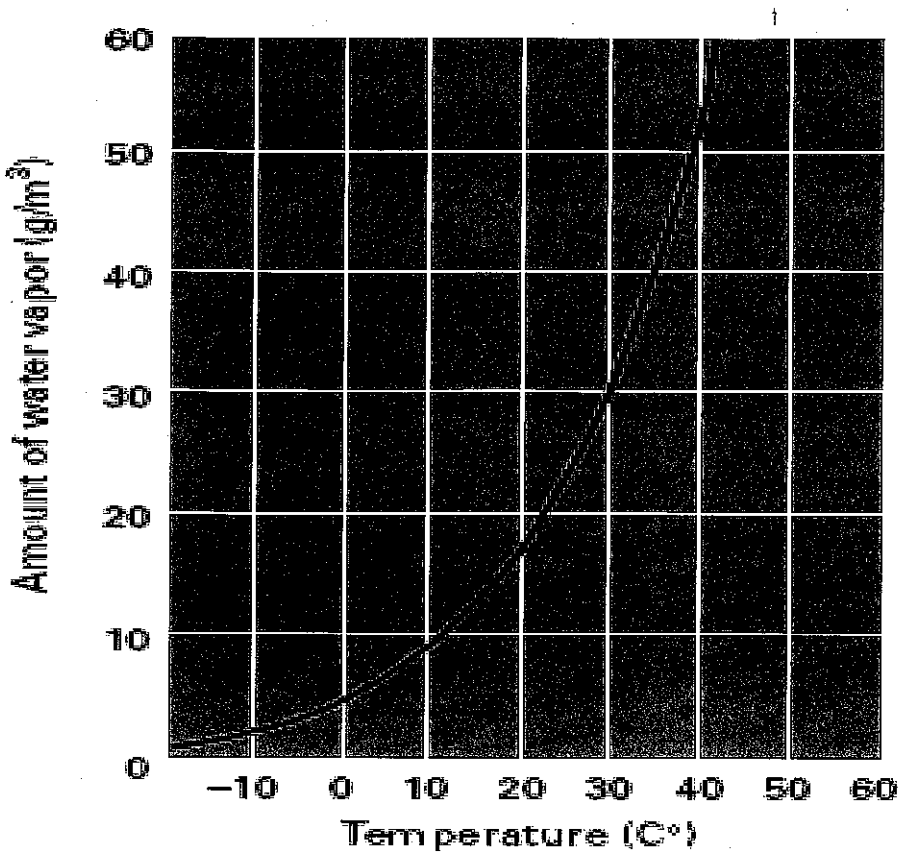
5. Tonight at dinner you have a glass of lemonade with lots of ice. After a few minutes, water drops appear along the outside of the glass. *Use the terms **condensation, temperature** and **dew point** to explain how the water droplets got there.*

6. Identify what has formed in each situation described below:
   a. H_2O vapor in the air changes state by deposition (directly to ice crystals) coating the ground.

   b. Cooler ground causes water vapor in air to condense as a liquid onto a surface.

Humidity Practice Problems
Earth Science

Name: _____
Date: _____ Hr: ___



Relative Humidity (%)

Dry-Bulb Temperature (°C)	Difference Between Wet-Bulb and Dry-Bulb Temperatures (C°)															
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
−20	100	28														
−18	100	40														
−16	100	48														
−14	100	55	11													
−12	100	61	23													
−10	100	66	33													
−8	100	71	41	13												
−6	100	73	48	20												
−4	100	77	54	32	11											
−2	100	79	58	37	20	1										
0	100	81	63	45	28	11										
2	100	83	67	51	36	20	6									
4	100	85	70	56	42	27	14									
6	100	86	72	59	46	35	22	10								
8	100	87	74	62	51	39	28	17	6							
10	100	88	76	65	54	43	33	24	13	4						
12	100	88	78	67	57	46	38	28	19	10	2					
14	100	89	79	69	60	50	41	33	25	16	8	1				
16	100	90	80	71	62	54	45	37	29	21	14	7	1			
18	100	91	81	72	64	56	48	40	33	26	19	12	6			
20	100	91	82	74	66	58	51	44	36	30	23	17	11	5		
22	100	92	83	75	68	60	53	46	40	33	27	21	15	10	4	
24	100	92	84	76	69	62	55	49	42	36	30	25	20	14	9	4
26	100	92	85	77	70	64	57	51	45	39	34	28	23	18	13	9
28	100	93	86	78	71	65	59	53	47	42	36	31	26	21	17	12
30	100	93	86	79	72	66	61	55	49	44	39	34	29	25	20	16