

NAME _____ DATE _____

INSTRUCTOR _____ PERIOD _____ PARTNER _____

Unit 6: Weather

LAB 6-4: DEWPOINT AND CLOUD FORMATION

INTRODUCTION: Cumulus clouds are our “puffy” fair weather clouds. They are often flat on the bottom and rounded on top. The distance from Earth’s surface to the bottom of these clouds is often the same for a large group of them. Clouds can only form if a specific temperature, called the **dewpoint**, is reached. Since the air temperature decreases with height above Earth’s surface, clouds may form if the air temperature is cold enough to be at the dewpoint at some altitude.

OBJECTIVE: In this lab you will study the relationship between the dewpoint temperature and the height above Earth’s surface at which clouds form.

VOCABULARY:

dewpoint temperature: _____

psychrometer: _____

wet-bulb depression: _____

cloud base: _____

PROCEDURE A:

Refer to the Dewpoint Temperature Chart in the Appendix to answer questions 1 through 3.

1. What is the wet-bulb depression if the dry-bulb temperature is 20°C and the wet-bulb is 17°C? _____

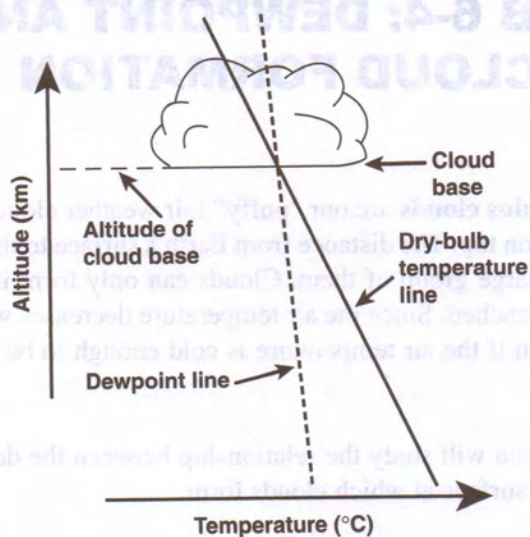
2. What is the dewpoint temperature if the dry-bulb is 16°C and the wet-bulb depression is 5°C? _____

3. What is the dewpoint temperature if the dry-bulb temperature is 24°C and the wet-bulb temperature is 20°C? _____

PROCEDURE B:

The altitude at which clouds form (the cloud base) can be determined using the “Generalized Graph for Determining Cloud Base Altitude” found in Appendix A. The diagram below shows how the cloud base is determined using the graph.

How to Use the Graph for Determining Cloud Base Altitude



Refer to the “Generalized Graph for Determining Cloud Base Altitude” found in Appendix A to answer questions 1 through 5 below.

1. What change occurs in the dewpoint as altitude increases? (Look at the dashed lines.)

2. How does air temperature (dry-bulb temperature) change with increasing altitude? (Look at the solid lines.)

3. Which changes more rapidly with increasing altitude, air temperature (dry-bulb temperature) or dewpoint temperature?

4. At what altitude do the dewpoint and dry-bulb (air) temperatures become the same if the dry-bulb temperature at the ground level is 0°C and the dewpoint temperature at ground level is -8°C ?

5. What would be the altitude of the bottom of a cloud mass if the dry-bulb temperature at the ground level is 30°C and the ground level dewpoint temperature is 12°C ?

PROCEDURE C:

Use the information given on Report Sheet 1 to determine the dewpoint temperatures and cloud base altitudes.

REPORT SHEET #1

	(1)	(2)	(3)
DRY-BULB TEMPERATURE	20°C	4°C	28°C
WET-BULB TEMPERATURE	12°C	-1°C	19°C
WET-BULB DEPRESSION			
DEWPOINT TEMPERATURE			
CLOUD BASE ALTITUDE			

PROCEDURE D:

1. Go outside and use a sling psychrometer to measure the wet and dry-bulb temperatures. Record these data on the Report Sheet #2.
2. Complete Report Sheet #2 by determining and entering the wet-bulb depression and the dewpoint temperature.
3. Using the dry-bulb and dewpoint temperatures determined above, use the Generalized Graph for Determining Cloud Base Altitude to find the cloud base altitude for this day. Record this altitude on Report Sheet #2. Be sure to draw lines on Chart #1 showing the dry-bulb temperature and the dewpoint temperature coming together.

REPORT SHEET #2

DRY-BULB TEMPERATURE: _____ °C

WET-BULB TEMPERATURE: _____ °C

WET-BULB DEPRESSION: _____ °C

DEWPOINT TEMPERATURE: _____ °C

CLOUD BASE ALTITUDE: _____ km

DISCUSSION QUESTIONS: (Answer in Complete Sentences)

1. Why does the height of the cumulus cloud base change from day to day?

2. What would happen to the height of the cloud base if the dewpoint temperature were lower?

3. How would it be possible to have a day without any clouds?

4. What relationship would you expect to find between the air temperature and dewpoint temperature at ground level if the area is covered by fog?

5. What happens to the air temperature of a descending mass of air?

6. What happens to the dewpoint temperature of a descending mass of air?

7. Explain why a descending mass of air would tend to become drier.

CONCLUSION: Describe, step by step, how you can determine the base altitude at which clouds form.