

ES 106 Laboratory Week 6

MOISTURE IN THE ATMOSPHERE

Introduction

The first part of this laboratory examines the changes of state of water, how the water vapor content of the air is measured, and the sequence of events necessary to cause cloud formation. Water vapor, which is an odorless, colorless gas produced by the evaporation of water, comprises only a small percentage of the lower atmosphere (generally less than 4% by volume). However, it is an important atmospheric gas because it is the source of all precipitation, aids in the heating of the atmosphere by absorbing radiation, and is the source of latent heat (hidden or stored heat). No analysis of the atmosphere is complete without an investigation of water vapor in atmosphere, because it strongly influences humidity and precipitation. By observing, recording, and analyzing weather conditions, meteorologists attempt to define the principles that control the complex interactions that occur in the atmosphere.

The second part of this laboratory focuses on making weather observations. Weather plays an important role in our daily lives. We want to know what the weather will be, so that we can plan to bring umbrellas, put on sunscreen, drive cautiously, dress a certain way, or know when it will be nice for outdoor activities. People talk about weather. The weather is newsworthy. It can become headlines in local, regional, national, and international news reports. Weather forecasts are found in newspapers, on TV, on the radio, and a growing variety of websites on the internet. Weather forecasts provide short-term (hours, days or weeks) predictions of the state of our atmosphere.

Objectives

- Explain the adiabatic process and its role in cooling and warming the air.
- Calculate the temperature and relative humidity changes that take place in air as the result of adiabatic cooling.
- Make measurements of relative humidity and dewpoint temperature.
- Appreciate the role technology plays in helping make weather observations.

Useful Websites

- <http://www.nws.noaa.gov>
- http://www.eoearth.org/article/Atmospheric_humidity
- <http://nova.stanford.edu/projects/mod-x/id-moist.html>
- <http://www.temperatures.com/dewpoint.html>

Use your favorite internet search tools (e.g. Google, wikipedia), answer the following:

1.2

Name_____

Lab Day/Time_____

Pre-lab Questions – Complete these questions before coming to lab.

1. Define the following terms:

A. Relative Humidity

B. Dew-point temperature

C. Adiabatic temperature change

D. Condensation

2. What is the difference between dry adiabatic lapse rate and wet adiabatic lapse rate? Which is greater? Why are they different?

3. If a beaker can hold 600 mL of liquid and it is 60% full, calculate the volume of liquid in the beaker. (Show formula for calculation, with units.)

4. If a beaker can hold 600 mL of liquid and it has 150 mL, calculate the percentage of the beaker that is filled. (Show formula, with units.)