



Chapter 14. Design Challenge: What Factors Determine the Comfort Index of the Air? A Guided or Open-Inquiry Activity

IT IS SUGGESTED THAT THIS ACTIVITY BE DESIGNED AS A GUIDED-INQUIRY OR OPEN-INQUIRY TYPE. THIS ACTIVITY SHOULD CHALLENGE BOTH TEACHER AND STUDENT!

Purpose

The purpose of this investigation is to understand how the amount of water vapor in the air at various temperatures affects the way the human body responds. This is an extremely important basic concept for why one might feel either comfortable or uncomfortable at exactly the same temperature.

Think About This!

Have you ever heard meteorologists talk of combining the temperature and the humidity to get a better reading of the comfort index? This action is usually taken on a hot summer day when the air becomes saturated with moisture. Regarding hot summer days, have you ever heard the saying, “It’s not the heat but the humidity that causes the uncomfortable feeling.” On very cold days why might adding moisture to very dry air help one to feel more comfortable?



Probing Further

What do you think would happen to the rate of water evaporation if you put a pan of water in the sunlight on a day of low humidity and placed a similar amount of water in a similar pan on a day of high humidity? Why? You might try conducting such an activity several times and comparing the results.

Objectives for the Learner (Essentials of Inquiry)

These are rather broad outlines of what the objectives might address. More-specific objectives will need to be written to best address what is to be done with the activity.

Conceptual Theme: To develop a basic understanding of the change that takes place when water evaporates and changes from a liquid to a gas and how a change in temperature at various humidities affects this transformation.

Content: Developing basic information relating to the evaporation process and establishing a basic understanding of dew point and the relationship to relative humidity.

Skills: The focus is on the design of steps in conducting an investigation, using laboratory equipment safely, making careful observations, recording physical changes, forming conclusions, and describing and communicating results.

Scientific Habits of Mind: The importance of careful observations, respect for data, and verifying results.

Materials

Learner or teacher should each compile a list of required materials or decide together.

Setting the Stage for Student-Generated Question and/or Design Procedure for the Activity

Depending on whether this is a guided-inquiry or an open-inquiry activity will determine what the student must do. The teacher should examine a guided-inquiry activity and an open-inquiry activity to conduct an appropriate design discussion challenge. Challenge the student to design and conduct a procedure that will help produce a teacher- or student-derived testable question.

A thought starter might be: “At the same air temperature, is the rate of water evaporation the same in low humidity as it is in high humidity?” If not, does this in any way affect the feeling of comfort? Why? Why not?

Prior to starting the investigation, encourage the students to carefully plan the design and procedures.

Because many students have limited experience in experimental design, it is suggested that they examine the procedures and questions regarding some of the previous activities included in this publication. This might aid them in preparing an appropriate design for this activity.

If students have appropriate ideas on how to plan the experiment, encourage them to proceed but review their methods to ensure the safety of their designs.

ALL OF THE BASIC SECTIONS AND THE DIRECTIONS FOR PROCEDURE SHOULD BE STRONGLY BASED ON EXPERIENCES GAINED OVER THE LAST SEVERAL ACTIVITIES!