

Relative Humidity, Evaporation, and Latent Heat

Name: _____



#1. Determining Relative Humidity: Using room temperature water, cotton, string, and a thermometer, you will measure the relative humidity inside the classroom and then again outside in front of the building. Notice that you need to record degrees C and degrees F as you go along. Please do this in pairs.

Inside:

Dry bulb temperature (°C): _____ Dry bulb temperature (°F): _____

Wet Bulb Temperature (°C): _____ Wet Bulb Temperature (°F): _____

Relative Humidity: _____
(from chart – use °C)

Outside:

Dry bulb temperature (°C): _____ Dry bulb temperature (°F): _____

Wet Bulb Temperature (°C): _____ Wet Bulb Temperature (°F): _____

Relative Humidity: _____
(from chart – use °C)

#2. Determining Latent Heat: Using a similar setup as you did for the Relative Humidity experiments, experiment with rubbing alcohol and acetone (fingernail polish remover) to determine which substance is best at removing latent heat. Do this **outside**. As before, keep waving the soaked cotton around until the temperature bottoms out. Pour some of the acetone/rubbing alcohol into the glass beaker, and then soak your cotton from the beaker – otherwise your cotton will end up in the bottom of the bottle.

Rubbing Alcohol: Initial temp (°F): _____ Final Temp (°F): _____ Δ Temp = _____

[For initial temp, use your thermometer to determine the temp of the rubbing alcohol inside the bottle]

Acetone: Initial temp (°F): _____ Final Temp (°F): _____ Δ Temp = _____

[For initial temp, use your thermometer to determine the temp of the acetone inside the bottle]

Water: Initial temp (°F): _____ Final Temp (°F): _____ Δ Temp = _____

[For initial temp, use your thermometer to determine the temp of the water inside of the bottle]

Which substance **removed the most latent heat** with today's atmospheric conditions? _____

#3. Would your outdoor dog be more comfortable in Albuquerque with a temperature of 90°F and RH of 20% or in Houston with a temperature of 90°F and a RH of 50%? Albuquerque Houston Not Enough Info

#4. You are scheduled to run a marathon on your choice of three days. You'd like to pick the day that will be the most comfortable – this means that **your sweat will be the most effective** in cooling you. (calculations are required to answer this – please show your work)

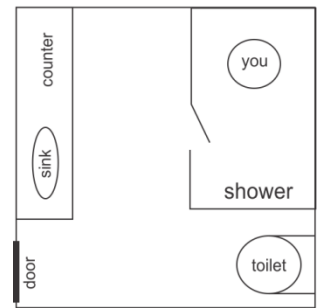
Monday: Temp = 85°F; Dew Point = 50°F

Wednesday: Temp = 90°F; Dew Point = 40°F

Friday: Temp = 95°F; Dew Point = 35°F

#5. The layout for your bathroom is shown to the right. You have the bathroom door closed and are taking a shower. While you are taking a shower, the shower door is also closed. The temperature of the air inside your shower is 84°F. A thermometer on the counter is also showing 84°F. However, when you open the shower door, you suddenly feel colder. Why is this happening? Relate your answer to the relative humidity.

Bathroom Layout (from above)



#6. In Albuquerque many homes have “Swamp Coolers” [more officially called ‘evaporative coolers’]. They make cool air by blowing air through a moist pad (usually on the roof). Why do you suppose that one does not find any swamp coolers in the southeastern US? Be as specific as you can.

#7. Your body temperature is 98.6°F. If you were digging ditches on a day that was also 98.6°F, would your sweat cool you? Explain why or why not. Assume that the relative humidity is 50%.

#8. June is a very hot month in Albuquerque, and the air is also very dry during this time. If you are a swimmer, you notice that outdoor pools are much colder than covered pools, even though the covered pool is not heated. The outdoor pools remain cold even though they are in the hot sun all day. Why does this happen? Why are the covered pools warmer even though they are not in the sun?