HUMID AIR

Links Between Dew Point, Temperature and Relative Humidity

Air is never completely dry; it always "holds" some water. This means some water vapor molecules are always present among the air molecules. Both water and air molecules are always moving. The hotter they are, the faster they move.

Water in the liquid state is composed of water molecules that move too slowly to break the molecular bonds that hold them together. In order to enter air as water vapor, water molecules bonded together in the liquid state must gain enough energy to break free of the molecular bonds that weld them. The energy they need is **heat energy**, created by rising temperatures in the air and on the ground.

In their random movements, some of the water vapor molecules in the water enter the air and some of those already in the air return to the water.

> **Think about a parking lot**. Cars enter and park and other cars leave. When the lot is full of cars, it can be thought of as **saturated** with cars. In a busy, saturated parking lot, cars that leave are replaced immediately by other cars.

If you think of water vapor molecules as cars, and the air as the parking lot, you can more easily understand saturation of the air. The air at a given temperature has room only for a certain amount of water vapor molecules. Like cars continuously moving in and out of a parking lot, water molecules continue to move in and out of the air.

Saturation of the air occurs just as saturation of the parking lot occurred. *As water vapor molecules return from the air to the water, they are replaced immediately by water molecules leaving the water and entering the air.* As long as this exchange is stable, the air is saturated with water molecules. At the point of saturation, if more water molecules try to crowd into the air, water will begin to condense onto the nearest object, thus producing dew, fog or clouds.

Remember: The hotter the ground and the air, the faster the molecules of water and air move. The faster they move, the closer they can come, and still have the energy to resist bonding.

The higher the temperature, the more water molecules can crowd into a body of air. Therefore, hot air can hold more water vapor molecules than cool air and, so, often feels "sticky" or wet.

RELATIVE HUMIDITY

The amount of water vapor in the air is called the **humidity**. Humidity and **dew point** are two measures used by meteorologists to describe the amount of water vapor in the air. Each measurement — relative humidity and dew point temperature — tells you something different about the air and its moisture content.

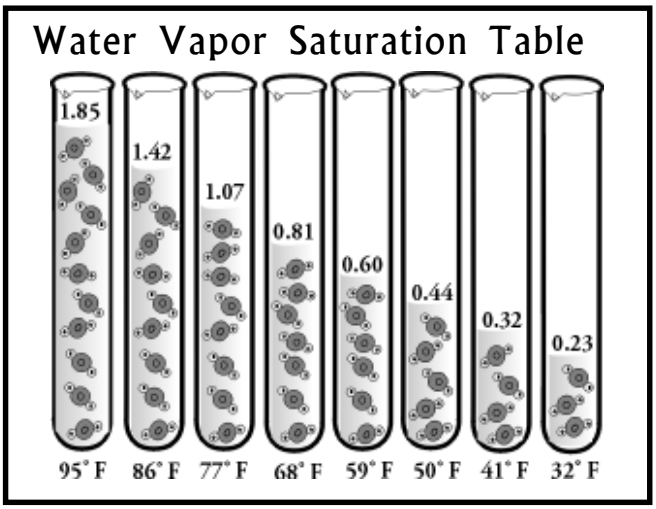
The humidity figure reported is called the **relative humidity**. Relative humidity describes the amount of water vapor that is actually in the air of a given temperature compared to how much the air could hold at the given temperature.

For example, if air with a temperature of 80° is said to have a relative humidity of 50%, that means that it is holding *half* the amount of water it could hold. The relative humidity can change if the moisture changes or if the temperature changes. When humidity is 100%, the air is saturated and the dew point temperature and the air temperature are equal.

DEW POINT TEMPERATURE

Dew Point Temperature is another way to describe the humidity in the air. The chart below shows the total amount of water vapor that can be present in one cubic yard of air at a given temperature at the point of saturation (**Dew Point Temperature**). What happens as the temperature rises?

Dew Point Temperature is a useful way to describe the relative humidity of air. On a weather map, compare the air temperatures and dew point temperatures.



- **When the dew point temperature is close to the temperature of the air, the air is nearly saturated.**
- **When those temperatures (air and dew point) rise into the 70s, the air feels "sticky" and the humidity is very high. Dew points in the 40s or lower are considered dry.**

Dew point can also be used to estimate the low temperature for an area after dark. On a clear night with little wind movement, the condensing water vapor releases latent heat and warms the air a little. So, as the air cools to the dew point temperature, the resulting condensation will slow the fall of the temperature. If no major fronts move in to create a drastic change in the temperature, the air is not likely to get colder than its initial dew point during the night.