

Wet Bulb Temperature



Wet Bulb Thermometer
(Picture Courtesy: Crossmr,
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We observed extreme heat this summer which is being linked to climate change by experts. The Intergovernmental Panel on Climate Change (IPCC) released its 2022 report on climate change and the extreme heat conditions this year added new technical terms to the vocabulary used by the public in daily-life conversations. “Wet Bulb Temperature” is one of those words.

Wet Bulb Temperature is related to humidity in the air and thus it is crucial in terms of human health. Studies predict that prolonged exposure to wet bulb temperature of 35 degree could be fatal even for a healthy person. The IPCC report says that if carbon emissions are not reduced drastically in the near future, the wet bulb temperature will approach the dangerous level of 35 degrees.

Scientifically, the wet bulb temperature is measured with the help of a thermometer and wrapping a wet wick around the bulb of the thermometer. If the air is dry the evaporation of liquid from the wick cools, and the temperature lowers. The wet bulb temperature is the temperature at which the evaporation process in the wet wick around the thermometer begins. The evaporation process depends on the humidity of the air. If humidity is higher, the wet bulb temperature will be higher.

If wet bulb temperature rises, this means the temperature and humidity have simultaneously risen – the human body finds it hard to sweat and fails to control the body temperature, which may be dangerous. According to the IPCC, humidity rises around 7 percent for each one degree rise in temperature. Global warming and rising temperatures cause rise in humidity and thus higher wet bulb temperature for prolonged times.

Similarly, Dry Bulb Temperature is referred to as the ‘air temperature’ measured by the thermometer without being affected by the humidity of the air.

Relative Humidity



Preservation of food products requires humidity controlled atmosphere



Water condensation on the car window glass due in high humid day (Images Courtesy: Flickr)

The air in atmosphere cannot hold infinite amount of water vapour. At a temperature and an atmospheric pressure, the total amount of water vapour available in air is called the specific or absolute humidity. The relative humidity is the amount of air available in the air divided by the total amount of humidity the air can hold at the current temperature and air pressure. It is generally written in terms of percentage. Ideally, relative humidity of 30-50% is comfortable for humans.

Dew Point Temperature



Hygrometer, Made in Germany around 1879 exhibited at Museum of Science and Industry at Chicago (Picture Courtesy: Daderot, Wikimedia Commons)

Often small droplets of water are seen on plant leaves in the morning during winters. The droplets are known as dew. The Dew Point Temperature is the temperature when the water vapour in the air starts condensing out of the air. Now, why is this temperature is so important?

It is the lowest temperature at which the air becomes saturated with water vapour. Above the Dew Point, moisture stays in the air; it doesn't condensate at normal conditions. Dew Point temperature indicates the level of humidity in the air. If the Dew Point is well below dry air temperature, relative humidity of the air should be low. At higher relative humidity, the Dew Point temperature becomes close to the dry air temperature.

Dew Point Temperature remains the same in an environment until more water vapour is not added to the environment or removed from it. Dew Point Temperature and Wet Bulb temperatures are related, dew point temperature cannot be higher than the wet bulb temperature. Both become equal when air has 100% relative humidity.

The dew point temperature is measured with the help of a hygrometer. This device has a polished mirror that cools down when air is passed over it. When dew forms on the mirror, the temperature is called the dew point temperature of the air.

Sensible Temperature

Have you observed that it feels too hot in humid weather even after the temperature is not that much? There is a term called 'sensible temperature' – it is different for real temperature during humid weathers. It is the perceived temperature at a particular atmospheric condition. Humidity largely affects the sensible temperature. At different humidity levels, the sensible temperature is different for the same dry air temperature. At the same dry air temperature, it feels hotter at high humidity in air and less hot at lower humidity.

At high humid condition, it becomes hard for human body to regulate the temperature of the body through sweating as evaporation of the sweat becomes hard. In dry weather, evaporation of sweat from the skin keeps the body cold. Under high humidity conditions, it becomes hard for the sweat to get evaporated in the air and thus the human body has to release large amounts of sweat to maintain the body temperature, which often causes dehydration. Thus, the human body feels the temperature higher during humid seasons, even after the dry air temperature is not that much.



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