

# Science on the Slopes

Environmental Education & Wellness Program



Physical Science

## Humidity & Evaporation's Importance to Snowmaking

*How Do We Know How Much Water Vapor is in the Air & Why Does it Matter?*

### Relative Humidity

You may have heard that **humidity** is the amount of water vapor in the air. There is another term, **relative humidity**, which stands for how much possible water vapor can be in the air based on the air's temperature. In general, air particles are closer together during colder temperatures and so when they are crowded, they can not hold as much water vapor in the spaces between them, meaning the air is **saturated**. Since the particles in warm air are spread farther apart from each other, warmer air has more space to hold water vapor as it evaporates.

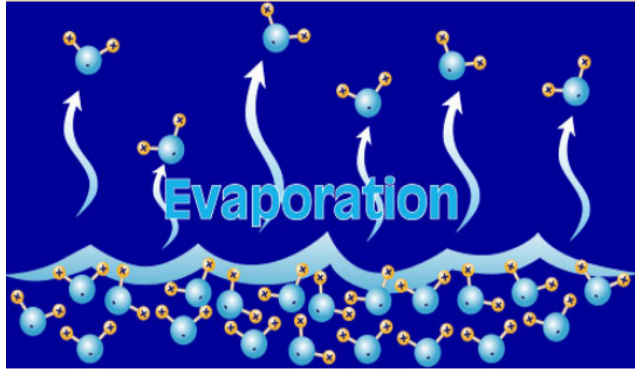
### How do low humidity and evaporation improve the conditions for making snow?

When it comes time to make snow, snowmakers have learned that water droplets shooting out from the snow guns will freeze more quickly when the air is dry or has a low humidity. When humidity is low (meaning the air is not saturated with water vapor), some water droplets in the air will have room to evaporate (change state from a liquid to a gas). During evaporation, heat energy is taken away from the surrounding air which cools down the air. Once the air is cooler, then the water droplets shooting out of the snow guns will freeze into snow faster.

### Check Your Understanding:

*Choose the three positive outcomes for snowmaking due to low humidity:*

- Water droplets in the air have more room to evaporate*
- Water droplets in the air have less room to evaporate*
- Evaporation of water droplets actually cools the surrounding air*
- Cooler air means faster freezing of water shooting out of snow guns*



**Evaporation** is a well known stage of the water cycle, but there is more to understand about how heat energy is lost when water evaporates. You may have experienced these examples yourself. Think of a time when you stepped out of the shower with a few droplets of water on your skin, and you felt a slight chill as you entered a dry room. This is because your body lost heat energy as the water on your skin

evaporated. Another example of evaporation causing cooling is when your body is cooled off as it sweats or perspires. [Read more](#)

<http://clipart-library.com/clipart/151642.htm>

Answer from above check your understanding: a., c., d.

## What Does the Wet Bulb Temperature Tell Snowmakers?

The **wet bulb temperature** is a measure of both how cold it is and the amount of moisture in the air. Basically, the wet bulb temperature combines the two important factors of humidity and evaporation into one measurement. The wet bulb temperature also gives a good estimate at how cool the surrounding air will get from the evaporation of water. To know when it is the most efficient conditions to make snow, snowmakers use computer software to monitor the relative humidity and the wet bulb temperature. When it is really cold outside, relative humidity and evaporation do not play such an important role with snowmaking. [To learn how to make your own wet bulb thermometer follow this link](#) or return to the home page.

## How Low Should the Temperature Be to Start Making Snow?

If the temperature is around 30 F (minus 1 C), you need a fairly low relative humidity of less than 40 percent for good snow-making conditions. If the temperature is colder than 20 F (-6.7 C), you can make snow fairly easily even if the relative humidity is 100 percent! *It's a delicate balance between temperature and humidity.*

Source : <https://adventure.howstuffworks.com/Jan 26, 2022>

Source: <https://opensnow.com/news/post/snowmaking-explained>