

Vapor Pressure

From the user, an air temperature (T) and a dewpoint temperature (T_d) are given. To convert the saturated vapor pressure and/or the actual vapor pressure, the temperature values must be converted to degrees Celsius ($^{\circ}C$). For information on how to do this see the link below:

<http://www.wrh.noaa.gov/Saltlake/projects/wxcalc/formulas/tempConvert.pdf>

Then, the saturated vapor pressure (e_s) and the actual vapor pressure (e) can be calculated using the formula listed below:

$$e = 6.11 \times 10^{\frac{7.5 \times T_d}{237.7 + T_d}} \qquad e_s = 6.11 \times 10^{\frac{7.5 \times T}{237.7 + T}}$$

For a bonus answer, after calculating the vapor pressures the relative humidity (rh) can be calculated using the formula below:

$$rh = \frac{e}{e_s} \times 100$$

The vapor pressure answers will be in units of millibars (mb) or hectoPascals (hPa). To convert the vapor pressure to other units, see the link below:

<http://www.wrh.noaa.gov/Saltlake/projects/wxcalc/formulas/pressureConversion.pdf>