

### Question #78813

A mixture of air and water vapour at 1.013 bar and 16 degree C has a dew point of 5degree C. Calculate the relative and specific humidity's?

#### Answer:

Define the saturation pressure from the saturated steam table:

$$P_s(5^\circ\text{C}) = 872.6 \text{ Pa},$$

$$P_s(16^\circ\text{C}) = 1818.8 \text{ Pa}.$$

The relative humidity is defined as:

$$\varphi = \frac{P_s(5^\circ\text{C})}{P_s(16^\circ\text{C})} = \frac{872.6}{1818.8} = 0.480 = 48\%.$$

The specific humidity is defined as:

$$x = \frac{P_s(5^\circ\text{C})}{P - P_s(5^\circ\text{C})} = \frac{872.6}{1.013 \cdot 10^5 - 872.6} = 0.00540 \text{ kg/kg}.$$

NOTE: you can find a saturation steam table at

<https://www.nist.gov/sites/default/files/documents/srd/NISTIR5078-Tab1.pdf>

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