week 9

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Question1)

we have to get the weather information from the forecast website:

City:Piacenza

Date:7th December

Temperatura effettiva	4°C	4°C	6°C	9°C	4°C	4°C	4°C
Temperatura percepita	3°C	3°C	5°C	9°C	3°C	2°C	2°C
Precipitazioni	0 mm	0 mm	0 mm	0 mm	0 mm	0 mm	0 mm
Umidità	96 %	95 %	87 %	71 %	94 %	94 %	90 %
Pressione atmosferica	1019 hPa	1019 hPa	1019 hPa	1018 hPa	1019 hPa	1019 hPa	1020 hPa
Intensità del vento	6 km/h	6 km/h	6 km/h	4 km/h	6 km/h	8 km/h	8 km/h
Direzione del vento	NO	NO	NO	O	S	S	SE

if we took the information of the third raw we`ll have:

- Relative Humidity = 90% - Total Air Pressure (P) = 101.8 kPa - Effective Temperature (T) = 6 °C

first of all By plotting relative humidity and effective temperature on Psychrometric Chart (which is available in the presentation pdf), we have:

Absolute Humidity (ω) = 0.005 ($kgvapor$)($kgdryAir$).....5 grams of water vapor in 1 kg of dry air

And also (Wet-bulb temperature = 5 °C)

then,to calculate the mass of water vapor in the air, we can use the following formula as we discussed in the class: mv = (PvV) /(RvT) Where Pv is the partial pressure of the water vapor, V

is volume of the room, Rv is the gas constant and T is the temperature of the place in Kelvin scale. - We know from the presentation that ω = 0.622Pv Pa and since the temperature is below 50 °C, water vapor is an ideal gas and P(Total Pressure) = Pv + Pa therefore Pa = P - Pv. The mentioned formula can be rephrased as ω = (0.622×Pv)/($P - P$v) .

We found out that ω = 0.005($kgvapor$)/($kgdryAir$)

and the total air pressure based on our location is 101.8 kPa so:

0.005 =(0.622×Pv)/ (101.8 − Pv) so: Pv = 0.812 kPa

We will imagine that the dimensions of the classroom A are 5×10×6 meter, so our volume is equal to 300 m^3.

- R is a constant and is possible to be plotted from steam table and for water vapor it equals to

Rv = 0.4615

- T in our case is equal to 279 °K

By substituting the known parameters we can conclude: mv = (PvV)/ (RvT)

so:

mv =(0.812×300)/(0.4615×279) = 1.9 Kg