

Class 29
Humidity

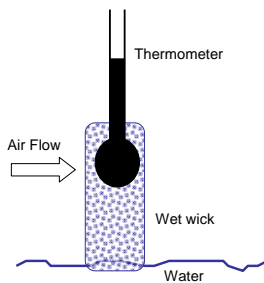


How Do You Measure Humidity?

- Cool the air and weigh the moisture
- Chemically absorb the moisture
- Correlate some other property, such as thermal conductivity
- Use IR spectra
- **Sling psychrometer**

How can I use something that I cannot pronounce?

Wet Bulb Temperature



- Thermometer has a wet cloth around bulb
- Air blows past cloth
- As water evaporates, the bulb is cooled
 - Like when you get cold when you get out of a swimming pool
- The difference between dry and wet bulb temperatures is related to relative humidity (RH)
 - No water will evaporate at 100% RH, so $T_{dry} = T_{wet\ bulb}$
 - Biggest ΔT with driest air

Sling Psychrometer



- Two thermometers
 - One dry
 - One kept in wet cloth
- Twirl the wet thermometer
 - High velocity air through cloth
- Measures:
 - Dry bulb T
 - Wet bulb T

Air-Water Systems

- Extremely common
- Chart developed for ease of use
- LOTS of data on chart!
- Based on “dry air” balance
 - Like on our exam!!

Psychrometric Chart

(yes, I know the obvious nickname)

Air-Water systems at 1 atm

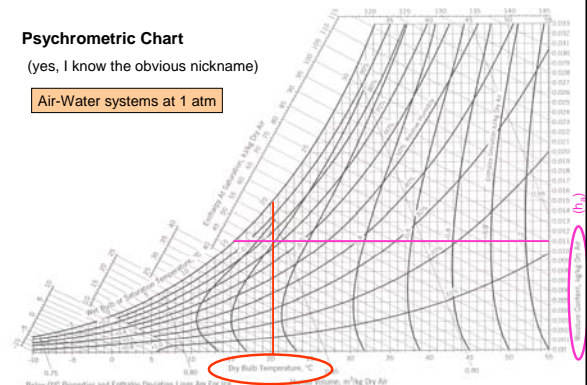
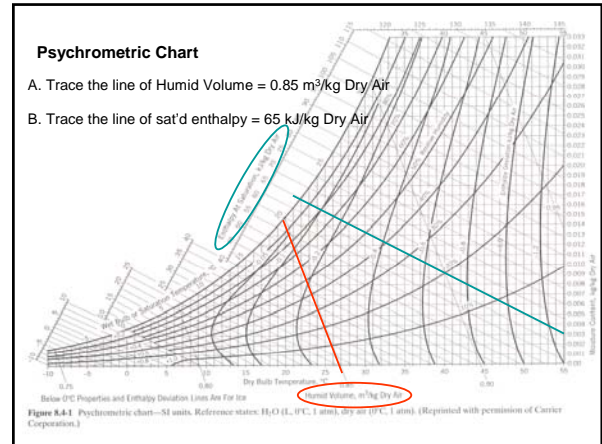
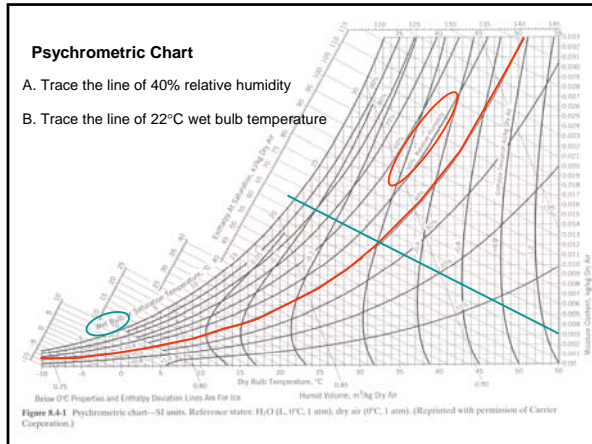


Figure A.4-1 Psychrometric chart—SI units. Reference states: H₂O (l, 0°C, 1 atm), dry air (0°C, 1 atm). (Reprinted with permission of Carrier Corporation.)



What if I want an enthalpy that is not saturated? (e.g., at 50% RH?)

- ΔH_{dev} given on chart
- $H_{true} = H_{sat'd} + \Delta H_{dev}$

