



มหาวิทยาลัยราชภัฏนครปฐม

9673204

Drying and Storage

Course Description

Theory of drying, sun drying, principles of air flow, drying of agricultural products by heated air, moisture content determination, relationship of moisture and temperature, equilibrium moisture content, design of dryers storage

Professional Interest Statement:

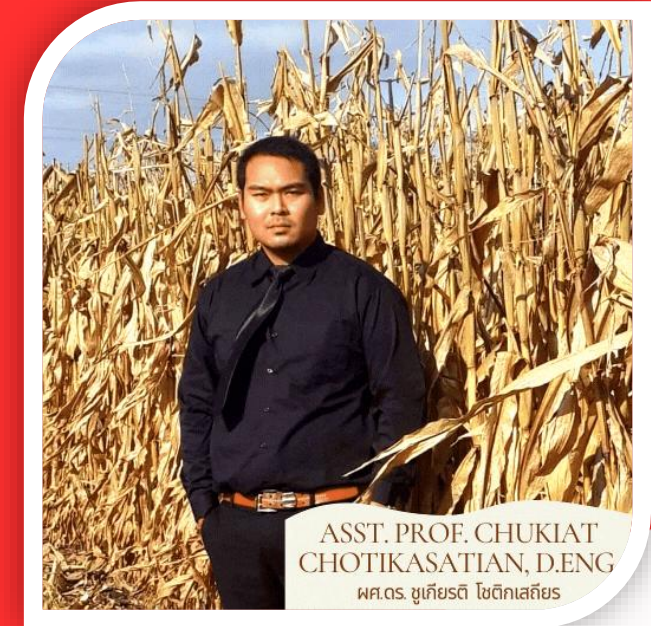
- Monitoring CO₂/O₂ concentrations to assess biological activity and reduce post-harvest losses
- Establishing verification criteria for unacceptable insect infestation levels
- Supporting fumigation and grain storage management decisions
- Developing agricultural product drying and intelligent drying systems



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Assistant Professor Dr. Chukiat Chotikasatian

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Nakhon Pathom Rajabhat University



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NPRU

Lecture 2.1 – Psychrometrics

(Bonus!!!)

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Study Question – Lecture 2.1

*Where can we access an online psychrometric calculator,
and how do we use it?*

04



Lecture 2.1 – Psychrometrics

(Bonus!!!)

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Outline– Lecture 2.1

1. *The Properties of Air Represented on a Psychrometric Chart*
2. *Online psychrometric calculator*

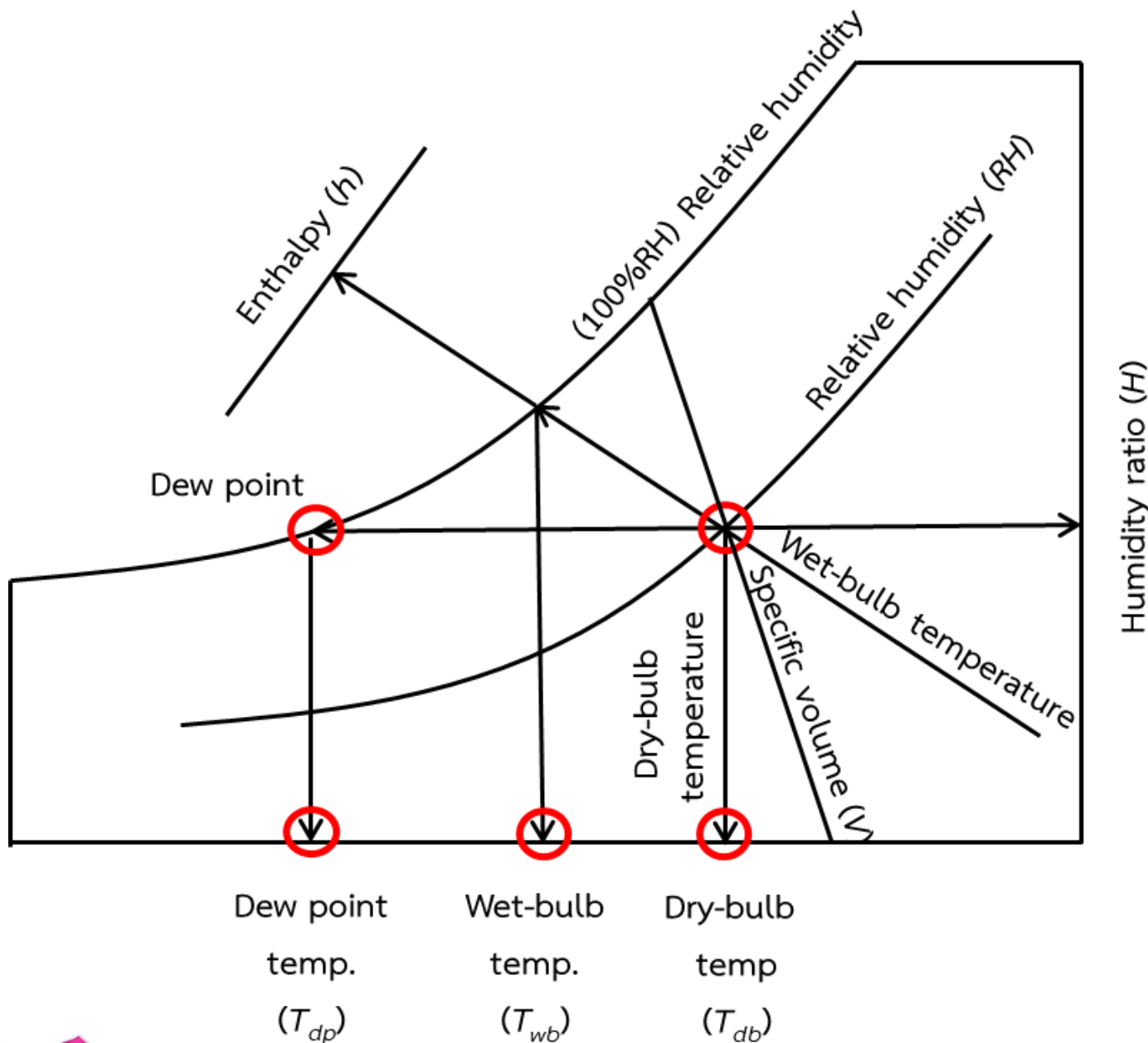
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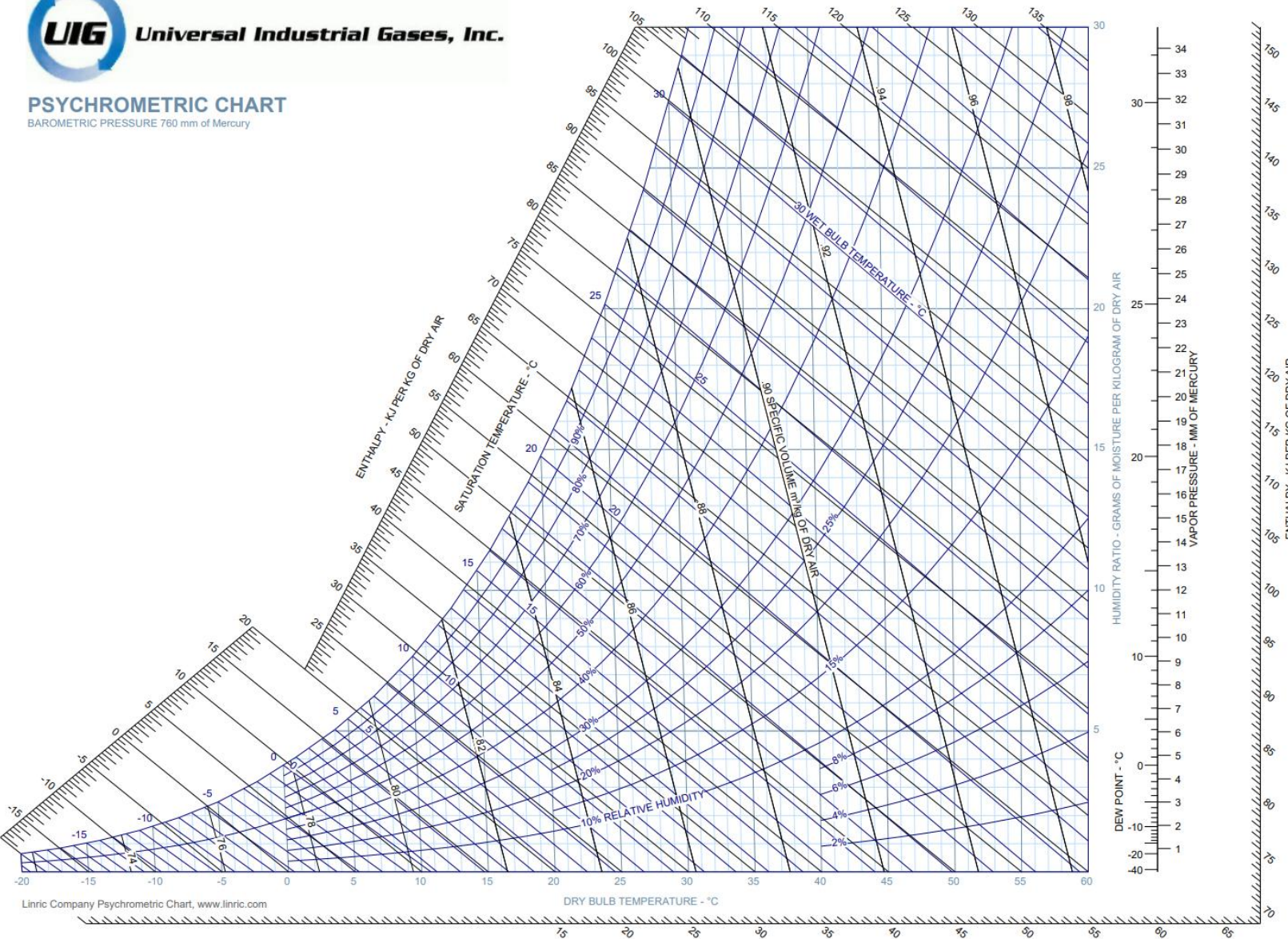




Psychrometric Chart

By knowing at least two independent air properties, the remaining psychrometric properties can be determined from the chart





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Example 1

At standard atmospheric pressure (101.32 kPa), moist air has a dry-bulb temperature of 37°C and a relative humidity of 60%. Using a psychrometric chart, determine the other air properties

References: Universal Industrial Gases, n.d.

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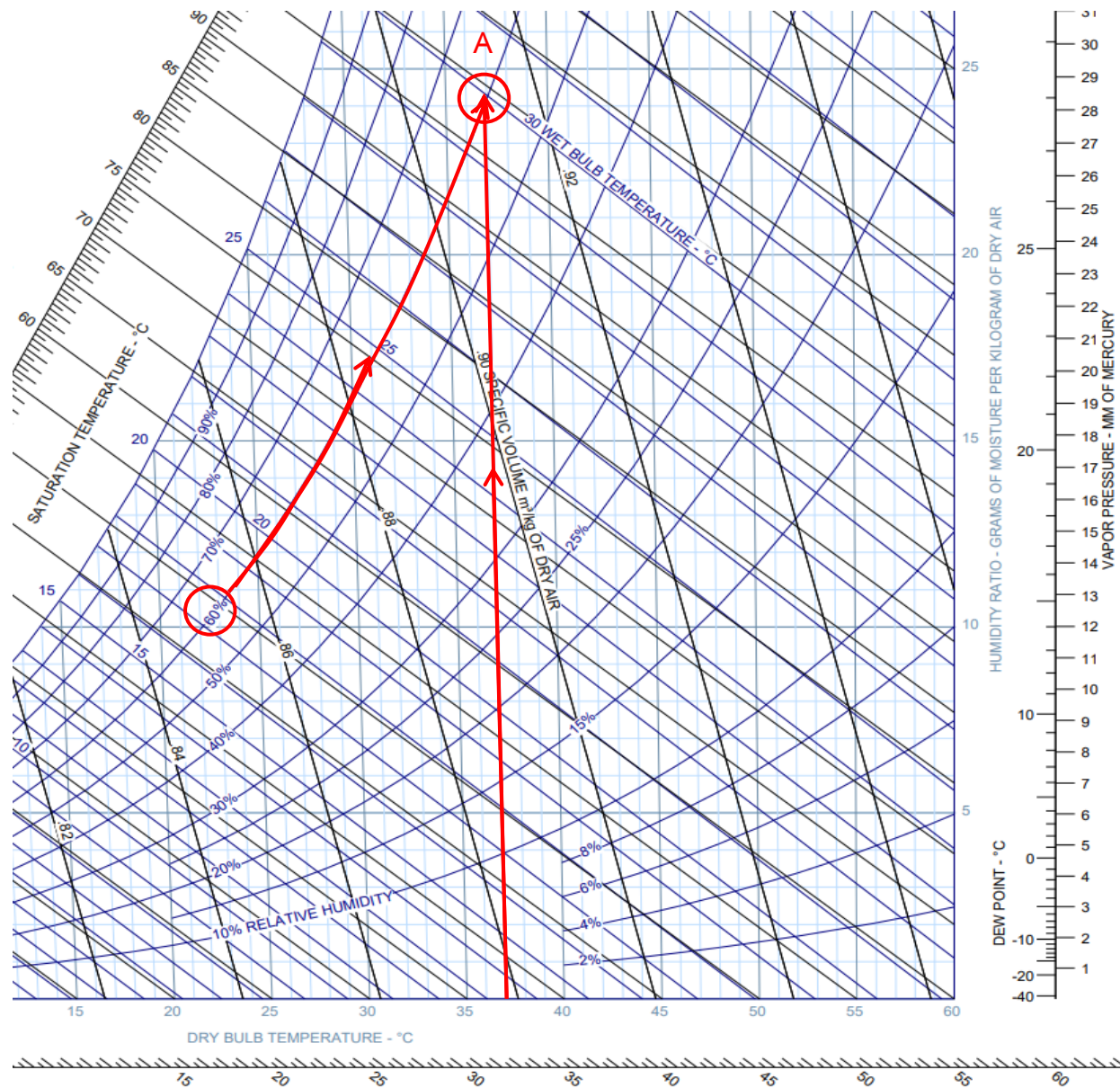
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Example 1

At standard atmospheric pressure (101.325 kPa), moist air has a dry-bulb temperature of 37°C and a relative humidity of 60%. Using a psychrometric chart, determine the other air properties

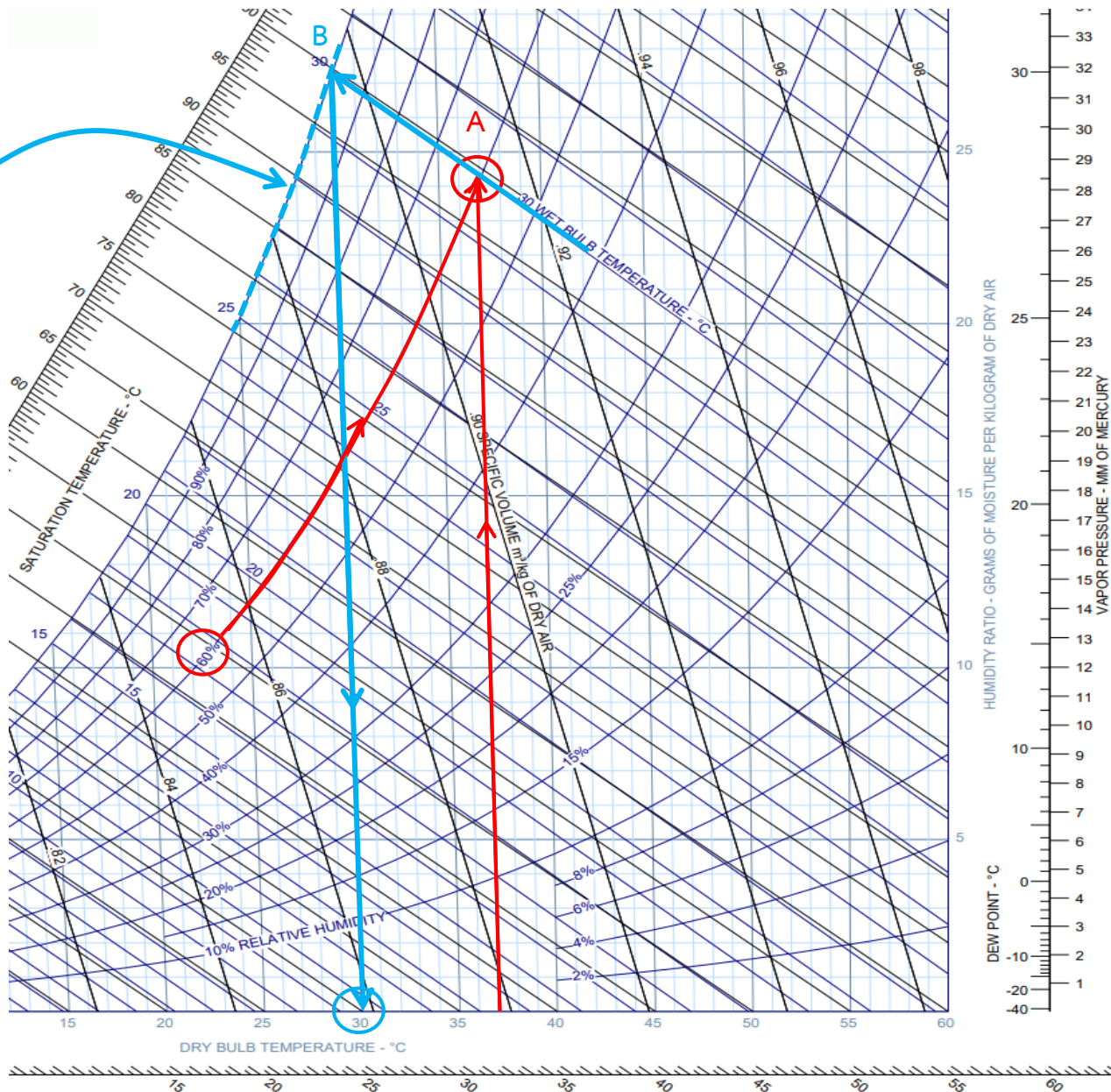


$$T_{db} = 37^{\circ}\text{C}$$

References: adapted from
Universal Industrial Gases (n.d.)



RH=100%



$T_{wb}=30^{\circ}\text{C}$

$T_{db}=37^{\circ}\text{C}$

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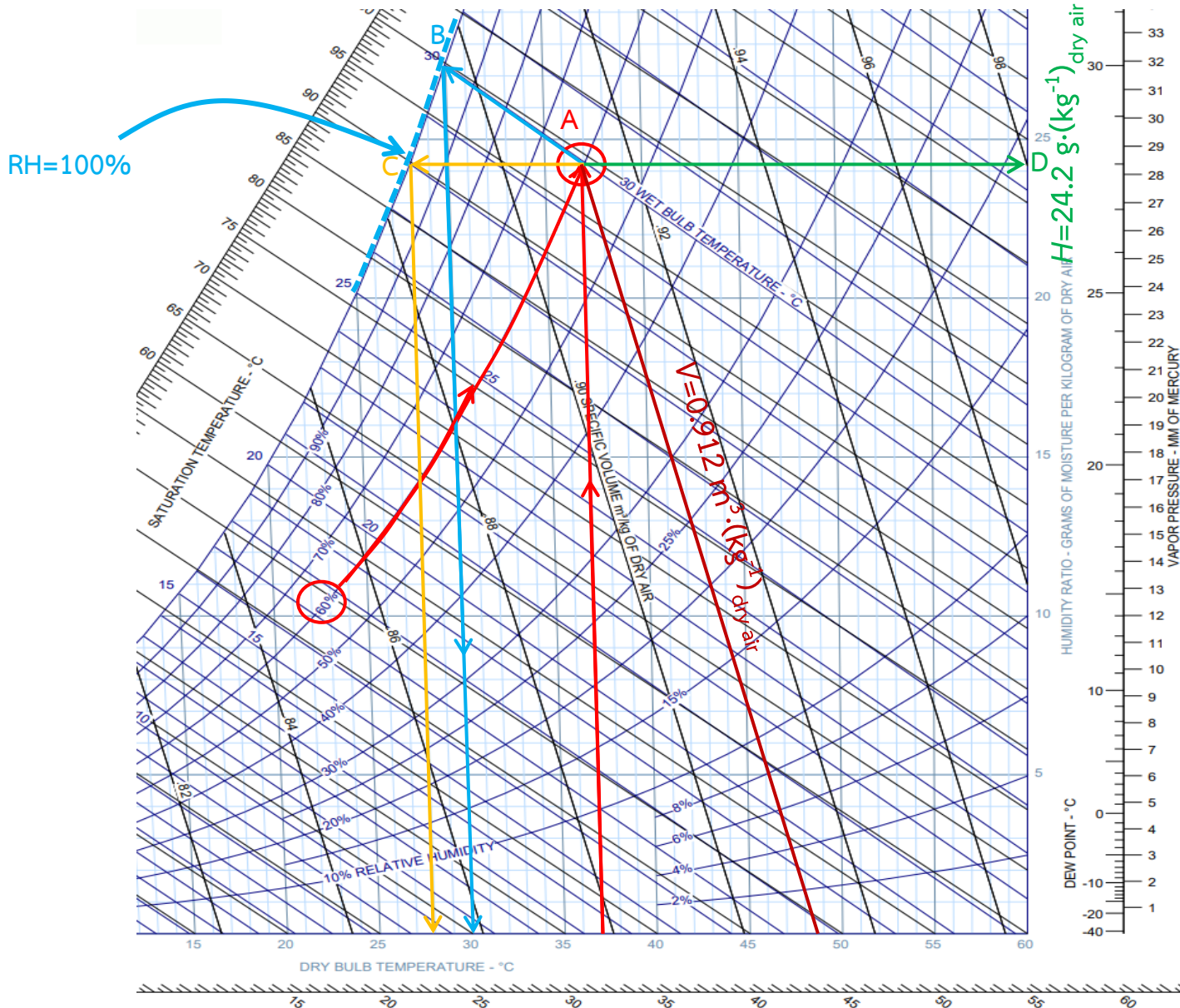
Wet-bulb temperature

$T_{wb} = 30^{\circ}\text{C}$



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References: adapted from
Universal Industrial Gases (n.d.)



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Dew-point temperature

$$T_{dp} = 28^\circ\text{C}$$

Humidity ratio

$$H = 24.2 \text{ g} \cdot (\text{kg}^{-1})_{\text{dry air}}$$

Specific volume

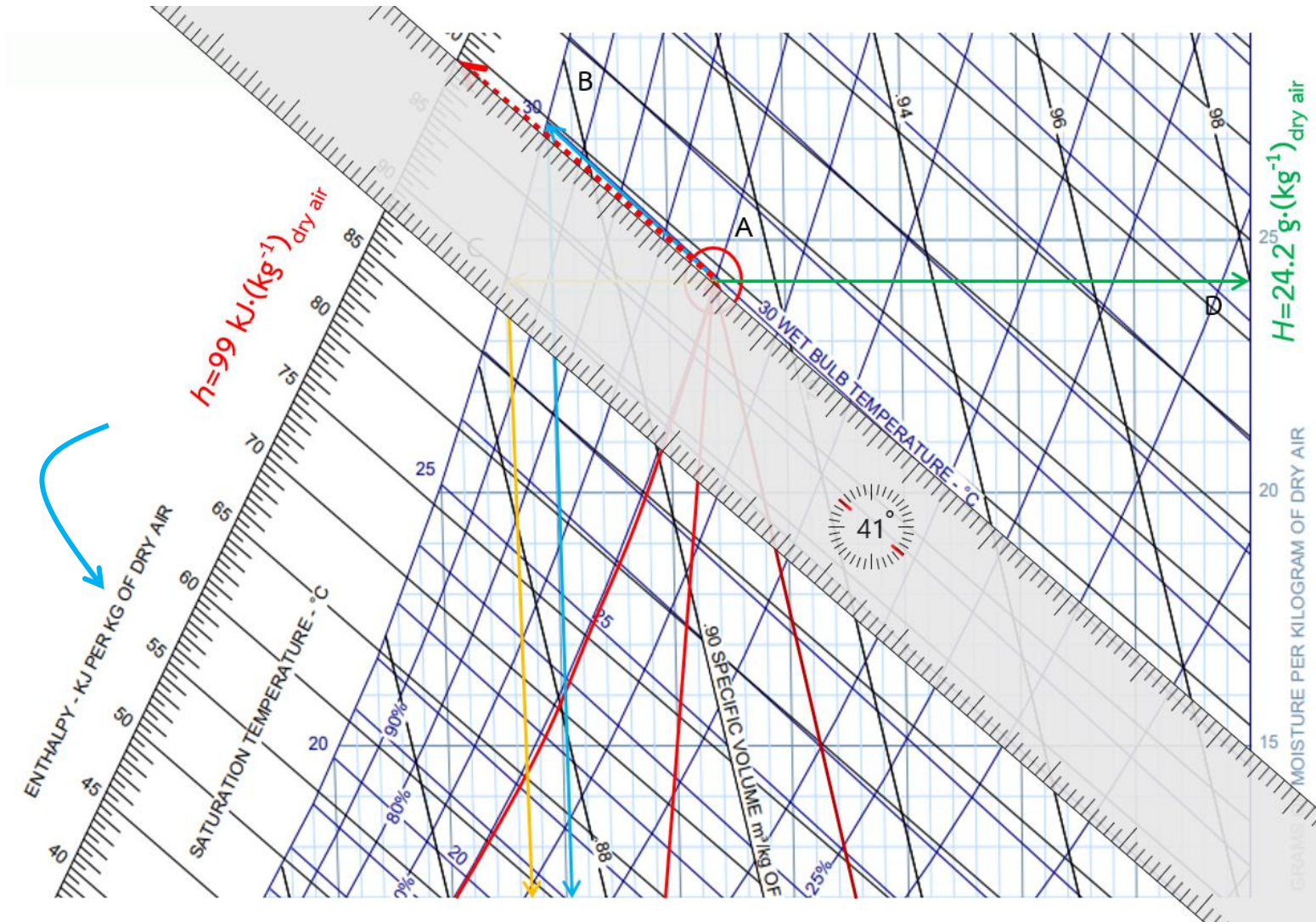
$$V = 0.912 \text{ m}^3 \cdot (\text{kg}^{-1})_{\text{dry air}}$$



$T_{dp} = 28^\circ\text{C}$ $T_{wb} = 30^\circ\text{C}$ $T_{db} = 37^\circ\text{C}$

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References: adapted from
Universal Industrial Gases (n.d.)



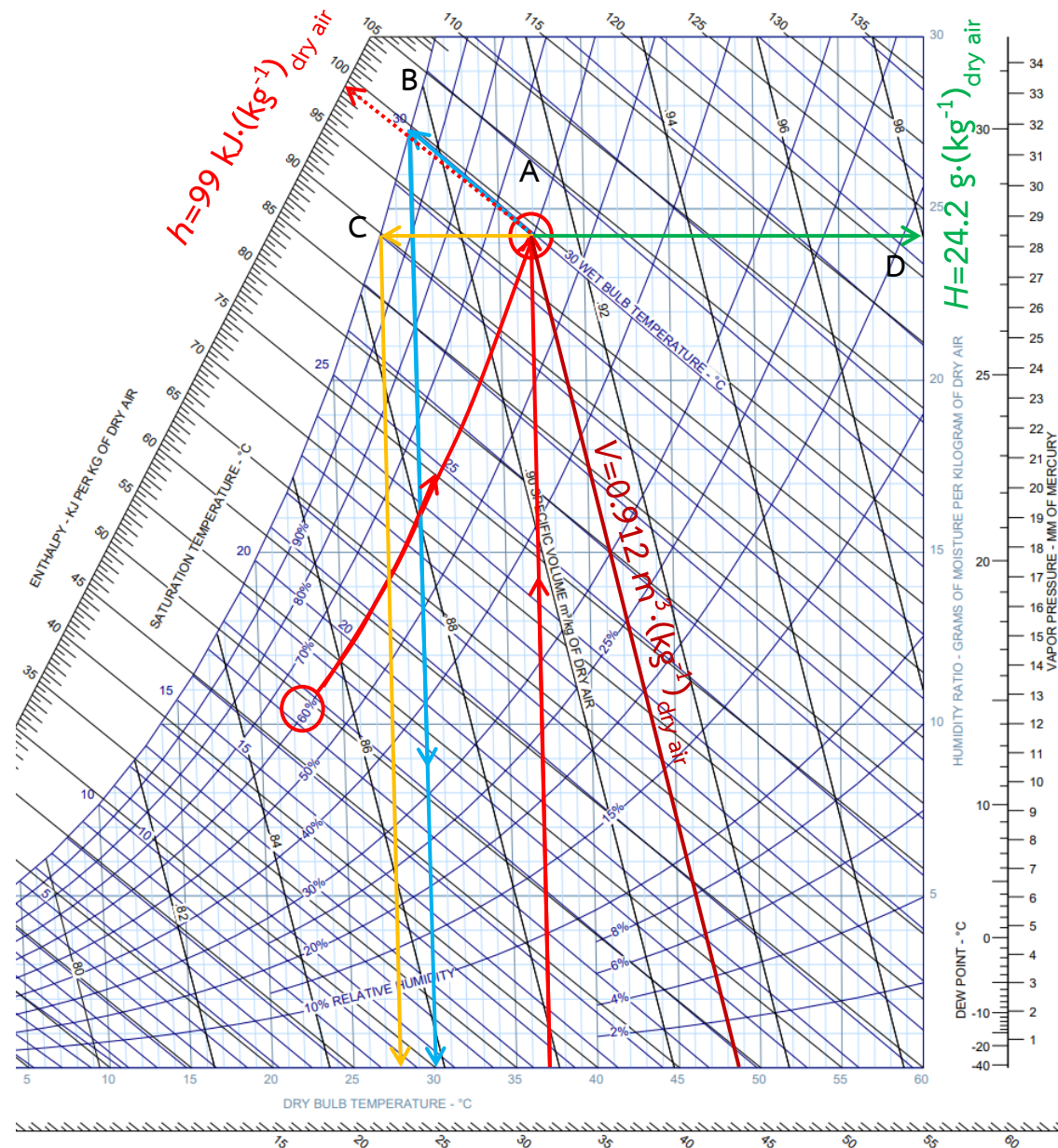
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Enthalpy

$$h = 99 \text{ kJ} \cdot (\text{kg}^{-1})_{\text{dry air}}$$





$T_{dp}=28^{\circ}\text{C}$ $T_{wb}=30^{\circ}\text{C}$ $T_{db}=37^{\circ}\text{C}$

Wet-bulb temperature

$$T_{wb} = 30^{\circ}\text{C}$$

Dew-point temperature

$$T_{dp} = 28^{\circ}\text{C}$$

Humidity ratio

$$H = 24.2 \text{ g} \cdot (\text{kg}^{-1})_{\text{dry air}}$$

Specific volume

$$V = 0.912 \text{ m}^3 \cdot (\text{kg}^{-1})_{\text{dry air}}$$

Enthalpy

$$h = 99 \text{ kJ} \cdot (\text{kg}^{-1})_{\text{dry air}}$$



Online Psychrometric Calculator

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Example 1

At standard atmospheric pressure (101.32 kPa), moist air has a dry-bulb temperature of 37°C and a relative humidity of 60%. Using a psychrometric chart, determine the other air properties

Psychrometric Calculator

Inputs			Outputs	
Unit Chosen:	☒ SI	☐ IP*	Atmospheric Pressure	1.013238759795 bar
Parameter Name	Value	Unit	Saturated Vapor Pressure	62.80969415874 mbar
Dry Bulb Temperature	37	C	Partial Vapor Pressure	37.68581649524 mbar
Wet Bulb Temperature	29.85077921460	C	Water Vapor Content	168.1959407185 kg/kg
Relative Humidity	60	%	Enthalpy	98.89470827738 kJ/kg
Dew Point Temperature	27.93223662871	C	Specific Volume	0.911428748037 m3/kg
Altitude	0.0	m		
Calculate			Disclaimer	
*Select IP units for inputs				

Reference: <https://people.tamu.edu/~i-choudhury/psych.html>



Online Psychrometric Calculator

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Example 1 (Cont.)

Atmospheric Pressure (P)

= 1.0132 bar = 1013.2 mbar

Partial Vapor Pressure (P_v)

= 37.6858 mbar

Humidity Ratio (H)

$$H = 0.62198 \times \frac{P_v}{P - P_v}$$

$$H = 24.03 \text{ g} \cdot (\text{kg}_{\text{dry air}})^{-1}$$

Psychrometric Calculator

Inputs			Outputs	
Unit Chosen:	☒ SI	☐ IP*	Atmospheric Pressure	1.013238759795 bar
Parameter Name	Value	Unit	Saturated Vapor Pressure	62.80969415874 mbar
Dry Bulb Temperature	37	C	Partial Vapor Pressure	37.68581649524 mbar
Wet Bulb Temperature	29.85077921460	C	Water Vapor Content	168.1959407185 kg/kg
Relative Humidity	60	%	Enthalpy	98.89470827738 kJ/kg
Dew Point Temperature	27.93223662871	C	Specific Volume	0.911428748037 m3/kg
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Reference: <https://people.tamu.edu/~i-choudhury/psych.html>



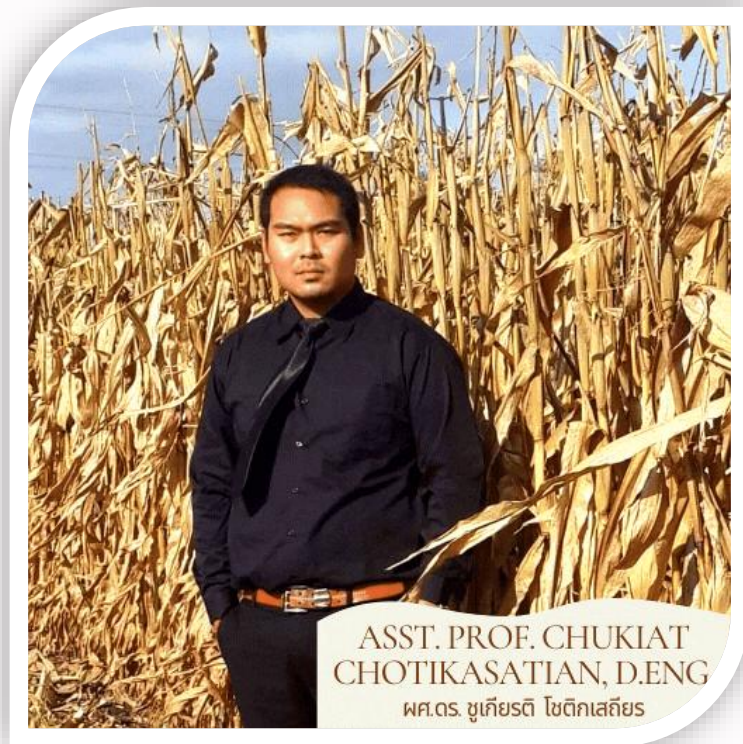
Summary

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1. Manual calculation of air properties from a psychrometric table may cause errors
2. Errors may occur from chart reading, interpolation, or unit conversion
3. An online psychrometric calculator can help reduce these errors
4. Users can enter known values such as dry-bulb temperature, relative humidity, and atmospheric pressure
5. The calculator provides air properties more accurately and efficiently





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Thank you very much for your kind attention.

Any Questions?

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Study Question – Lecture 2.1

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04



References

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Universal Industrial Gases. (n.d.). **Psychrometry: moist air properties calculations.**

Retrieved April 12, 2021, from <http://www.uigi.com/psychrometry.html>

Texas A&M University (n.d.). **Psychrometric Calculator.** Retrieved April 17, 2026,
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