

# CO<sub>2</sub> Measurement Technology & Applications

*Helping you make a better measurement.*

## Webinar Presenters



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# Agenda & Takeaways

## Agenda

- NDIR
- Electrochemical
- Safety Applications
- IAQ & DCV
- Growth optimization

## Takeaways

- Learn how the technology works
- Learn about pressure and temperature effects
- Tips for measuring in some common applications

# Electrochemical Sensors

Meas. Sci. Technol. **22** (2011) 072001

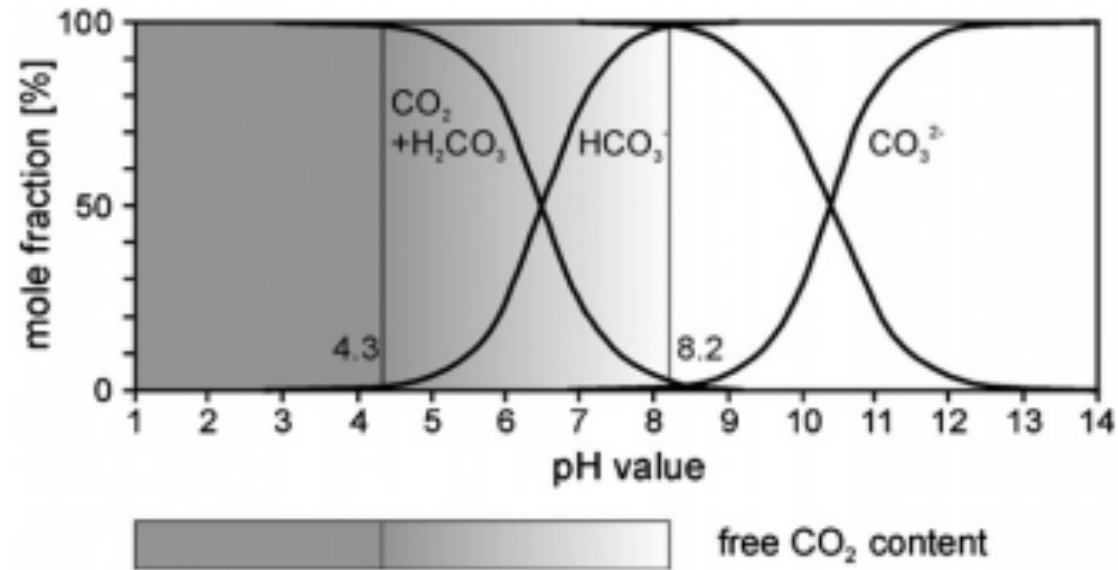
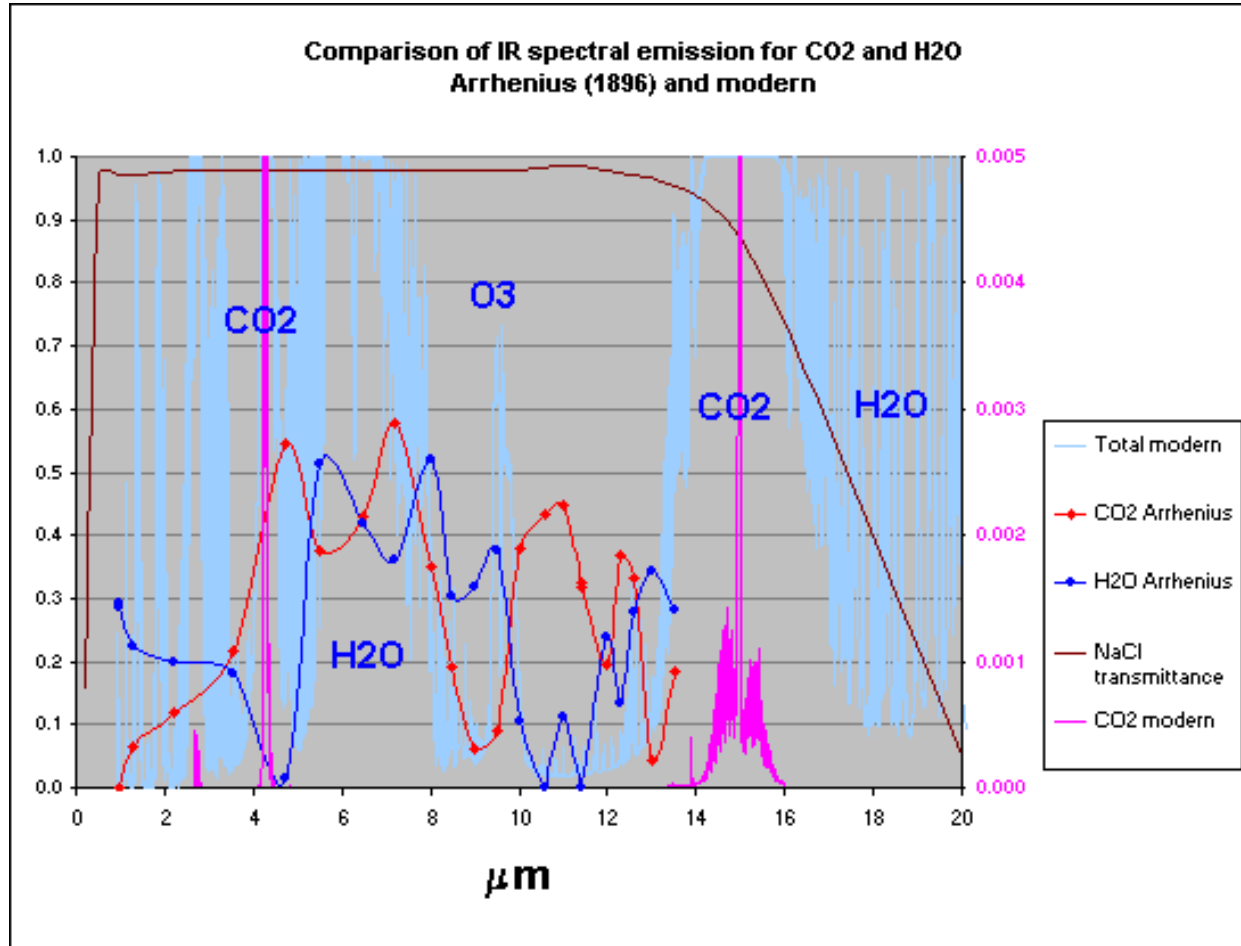
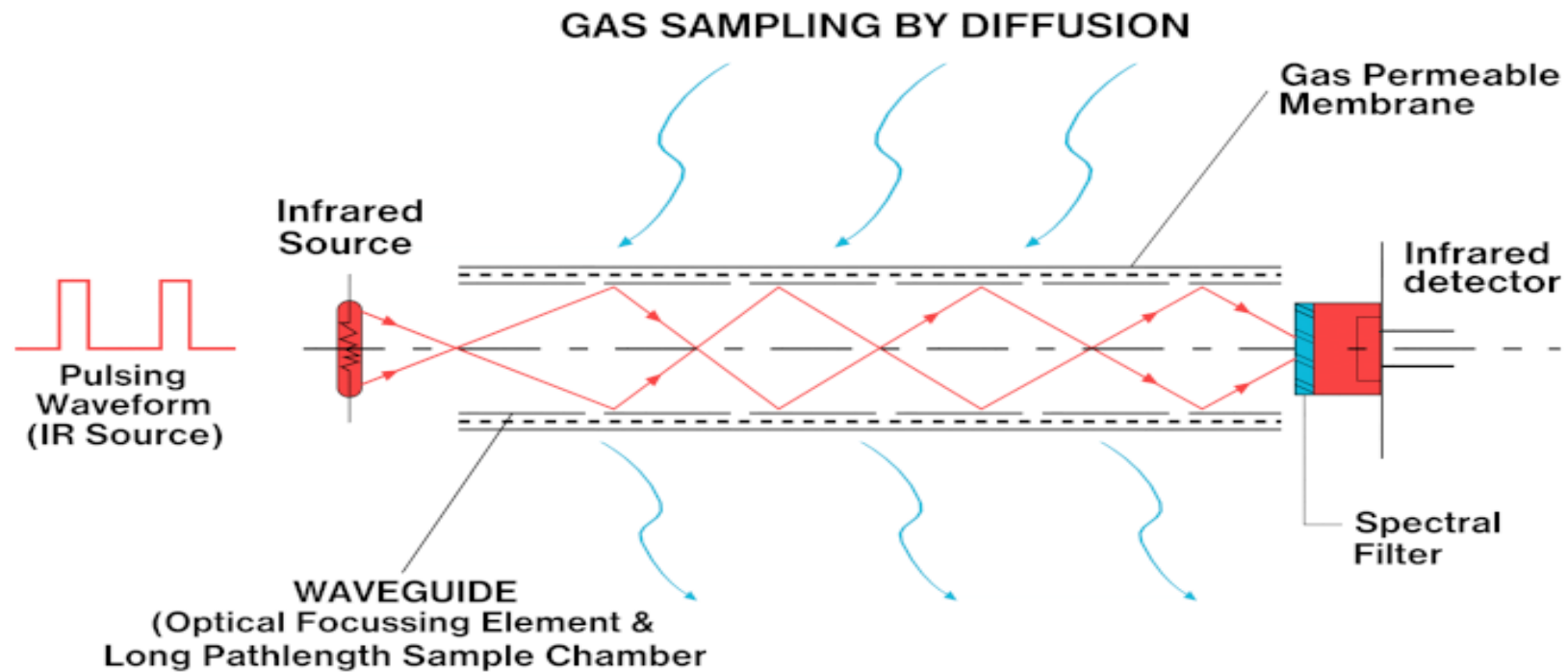


Figure 1. pH dependence of the carbonate system.

# NDIR (Nondispersive infrared)

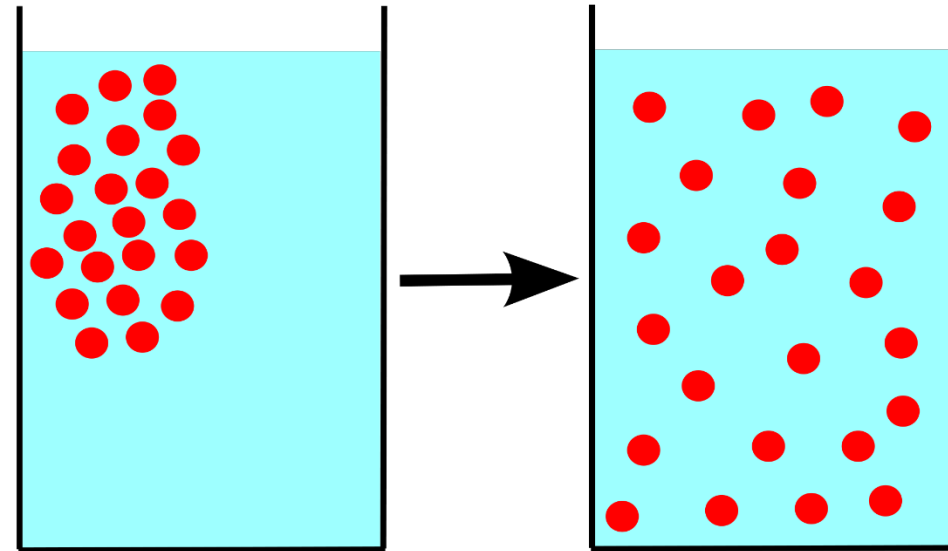


# NDIR (Nondispersive infrared)



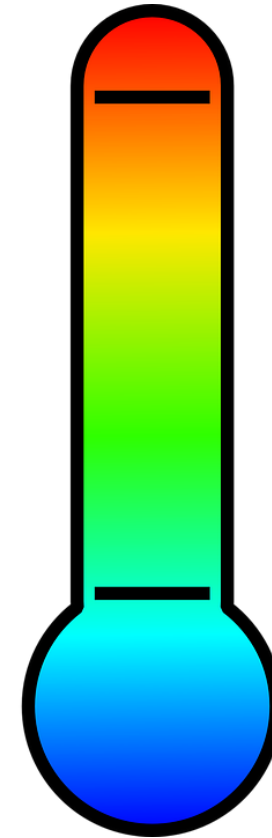
# Important Facts - NDIR CO2 Measurement

- Pressure variations affect the measurement (if compensation is not applied)
  - As pressure increases, the ppm reading increases
  - As pressure decreases, the ppm reading decreases
  - Adjustment should be made for measurements not at sea level.



# Important Facts - NDIR CO2 Measurement

- Temperature variations affect the measurement (if compensation is not applied)
  - As temperature increases from 25C, ppm measurement decreases
  - As temperature decreases, ppm measurement increases





# Important Facts – NDIR CO2 Measurement

- Changes in relative humidity affect the measurement.
  - Ask the manufacturer for tables or formulas to compensate for temperature, pressure and relative humidity.



# Comments & Questions



If we don't get to your question today, we'll respond via email after the webinar.

# Applications



# CO2 Safety & Comfort Levels (ppm)

350 – 450	400 – 1,200	> 1,000	5,000	38,000	> 100,000
Fresh air outdoors	Room air	Fatigue and loss of concentration become apparent	Maximum permissible value at the workplace during an 8-hour workday	Breathing air (direct exhalation)	Nausea, vomiting, loss of consciousness and death

# CO<sub>2</sub> Measurement Applications

## Main application categories:

- Safety - to warn of life threatening levels
- Indoor air quality (IAQ)
- Environmental optimization for growth certain organisms



# Safety

- Fermentation (beer and wine)
- Soft drink bottling plant
- Underground parking
- Restaurants



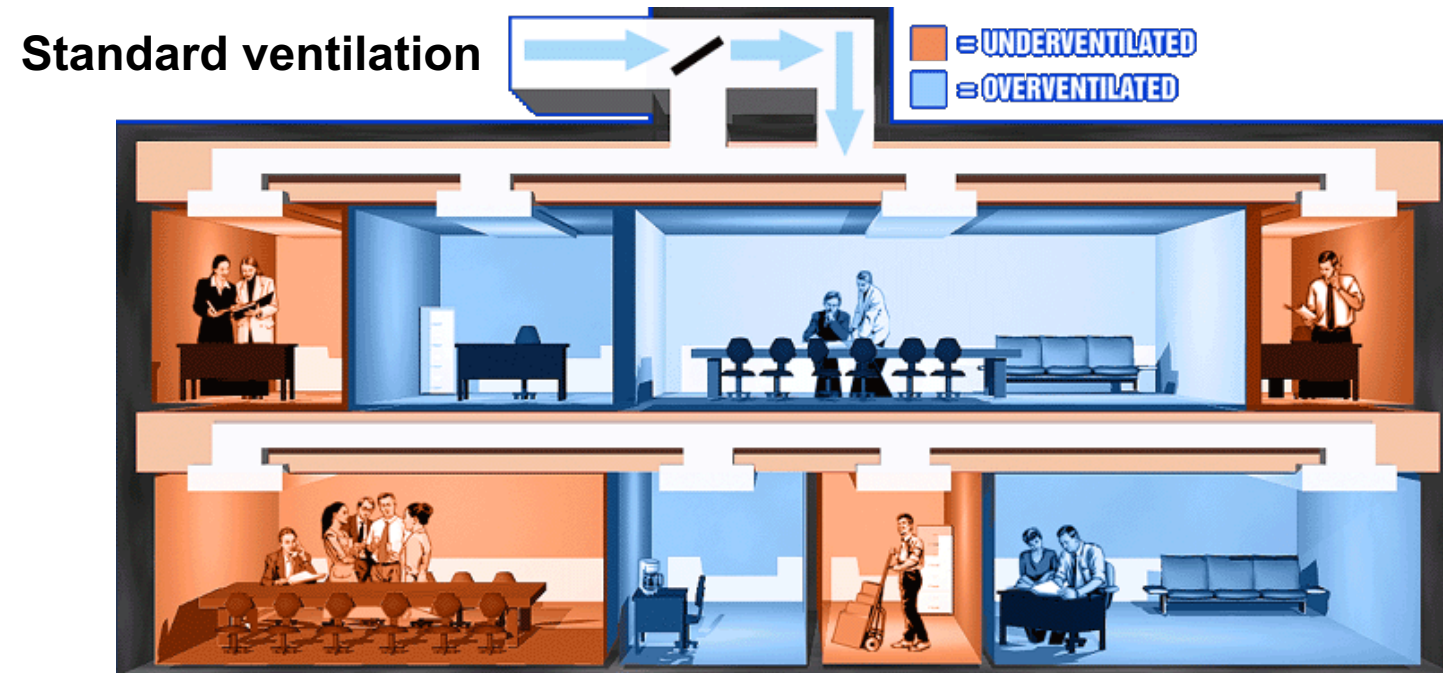
# Indoor Air Quality (IAQ)

- Office buildings
- Classrooms
- Sport facilities
- Convention centers



> 1000 ppm = fatigue and loss of concentration

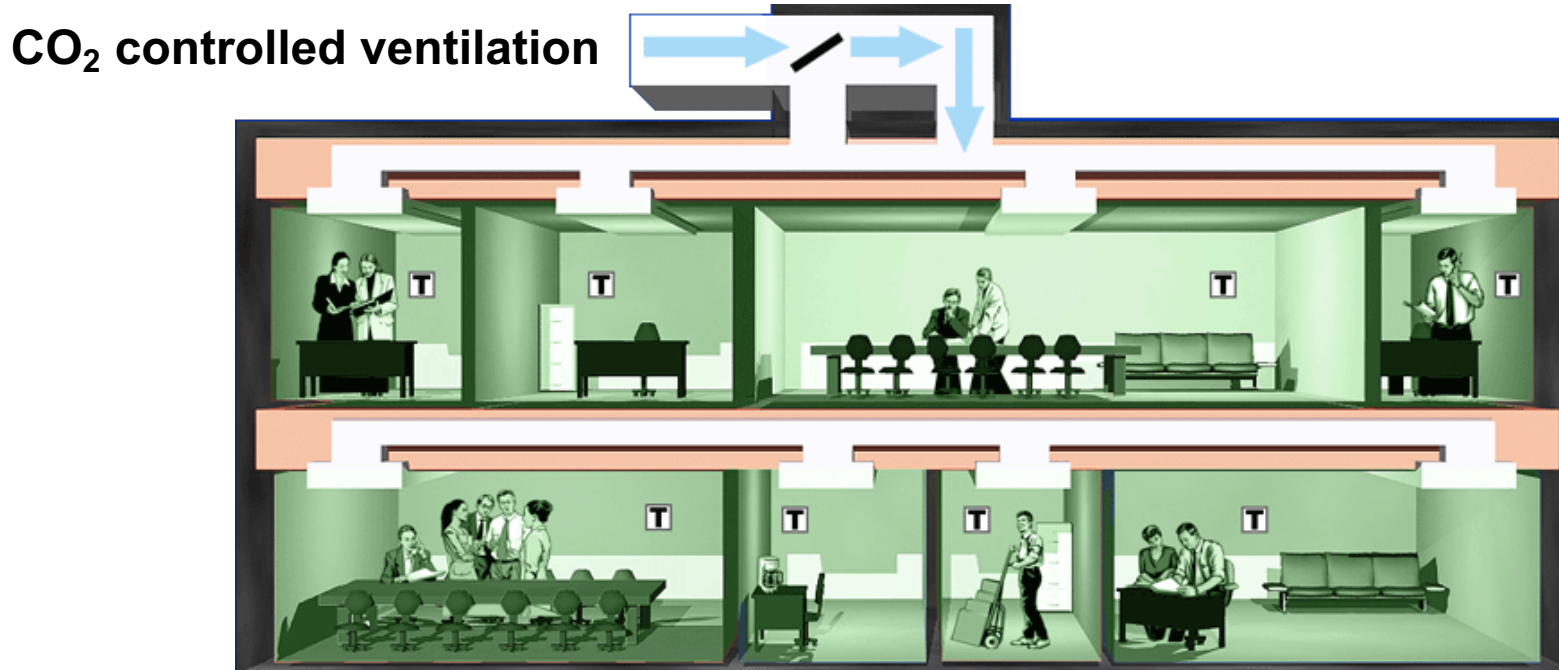
# Demand Control Ventilation (DCV)



- All areas are either over or under ventilated
- Fixed ventilation rate based on maximum occupancy
- Wasted energy or bad ventilation



# Demand Control Ventilation (DCV)



- Ventilation based on actual occupancy
- Always perfect working conditions
- Saved energy

# Optimized Growth Environments

- Greenhouse
- Chicken hatchery
- Mushroom farm
- Incubator



# Comments & Questions



If we don't get to your question today, we'll respond via email after the webinar.

# Next Webinar

## **Product Webinar – Clean Room Panel Monitor (CRP5)**

- Tuesday, April 19, 1:00PM EDT

## **Product Webinar – EX Approved Instruments**

- Tuesday, May 3, 1:00PM EDT
- Register at [www.rotronic-usa.com/product-webinars](http://www.rotronic-usa.com/product-webinars)

## More Resources

### **Rotronic Humidity Academy**

[www.rotronic-usa.com/humidity-academy](http://www.rotronic-usa.com/humidity-academy)

Check out the eNewsletters: Fun Facts, Mapping Matters and T<sup>3</sup>

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