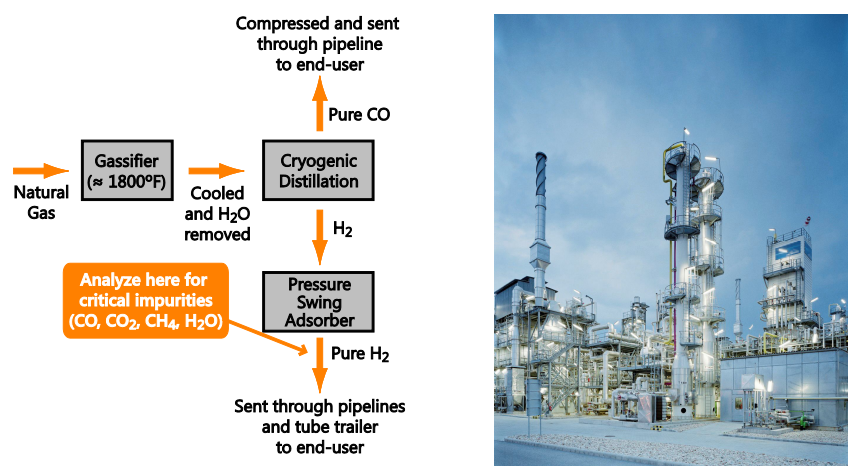


Trace Detection of Carbon Monoxide in Hydrocarbon Feedstock Processing Using Continuous-Wave Cavity Ring-Down Spectroscopy (CW-CRDS)

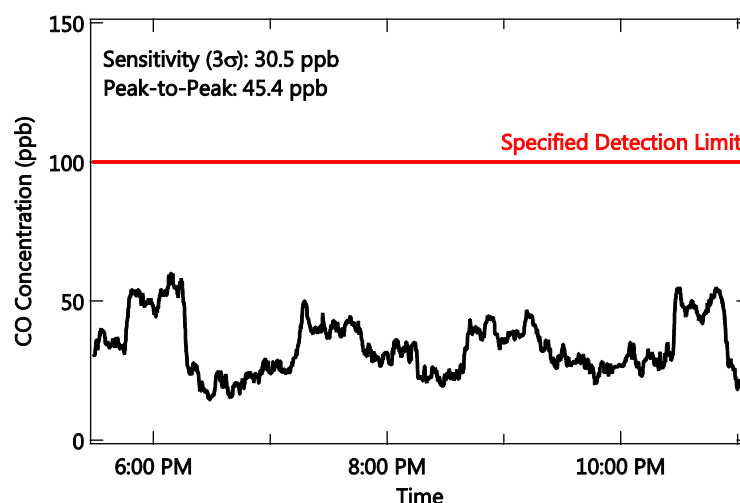
Yu Chen and Erika Coyne
Tiger Optics LLC, 250 Titus Avenue, Warrington, PA 18976, USA

Protecting HyCO and SMR Processes



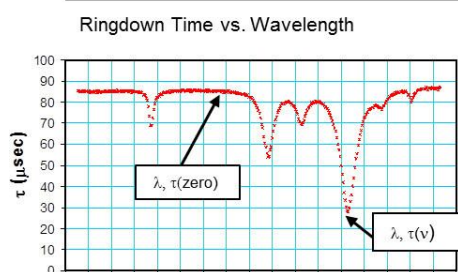
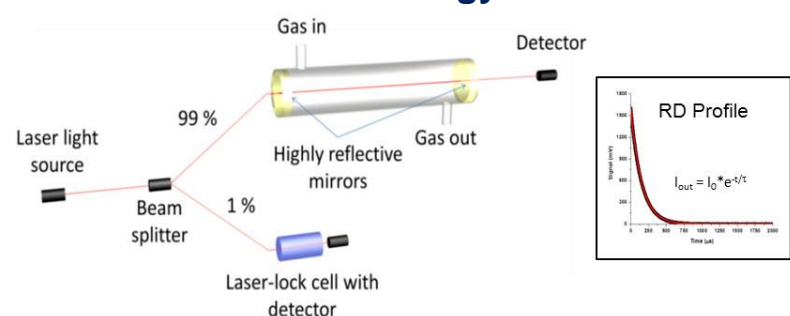
Performance for Carbon Monoxide Measurement

CO-rekt CO Baseline Performance



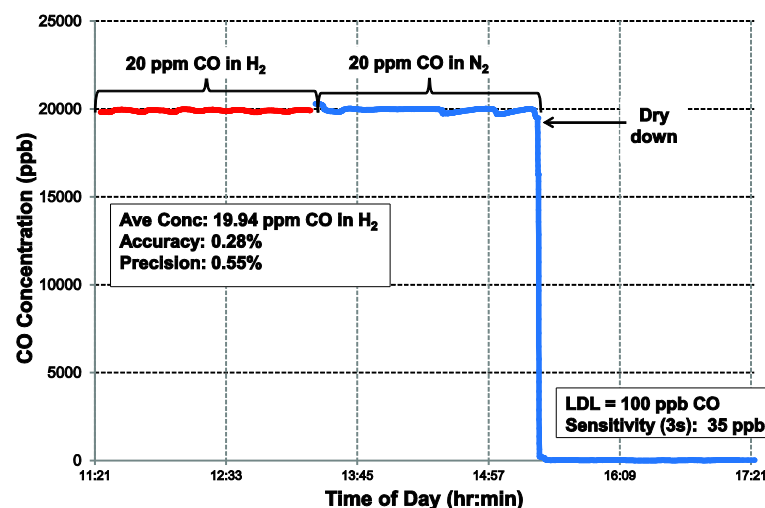
- No baseline drift
- LDL is peak-to-peak variation at baseline over 24-hours
- Consistent performance, exceeding LDL of 100 ppb

CW-CRDS Technology = Ideal Solution



- Absolute, time-based technique
- Concentration is determined by difference between $t(v)$ and $t(zero)$
- Highly sensitive due to path length
- Very specific – no interference
- Free from drift

CO-rekt CO Measurement in N₂ and H₂



- Accurate and reliable measurement independent of gas matrix
- Rapid speed of response <15 sec from 0-20 ppm and from 20 ppm to < LDL, ideal for process control!

Introducing the CO-rekt™



- Continuous online monitoring
- New product design for Class I, Div. 2 hazardous areas
- Wall-mount for tight quarters
- Wide dynamic range
- Excellent sensitivity with ppb-level detection limits (LDL)
- Fast speed of response
- Available for CO, CO₂, H₂O, CH₄

CO-rekt Performance Specifications

Performance In Hydrogen	Range	LDL	Sensitivity
CO	0-2000 ppm	100 ppb	70 ppb
CO ₂	0-12 ppm	10 ppb	7 ppb
H ₂ O (Low range)	0-16 ppm	1.2 ppb	1.0 ppb
H ₂ O (High range)	0-400 ppm	8 ppb	6 ppb
CH ₄	0-100 ppm	10 ppb	7 ppb

Accuracy is ±4% or ½ LDL, whichever is greater

The CO-rekt Reduces Costs & Increases Reliability!

No calibration required

- Avoid costly mistakes that can trip plant – protects uptime bonuses, avoids downtime penalties
- No extensive user training
- No complicated sample conditioning or control system
- Reduce complex, biweekly calibration to simple, semi-annual validation

No moving parts

- Insensitive to vibrations
- Chopper-free

No costly service

- 99% of issues solved remotely
- Save on daily service rates (plus travel and expenses)