

## Hydrogen Purity Analysis in Hydrogen-Carbon Monoxide Plants Product: CO-rekt™

As the name suggests, HyCO plants produce large amounts of hydrogen (H<sub>2</sub>) and carbon monoxide (CO), serving mainly oil refineries and chemical companies. Precise, continuous CO monitoring of feedstock is essential for post-purification process control. Much as any residual CO damages hydrogen quality, it also serves as an indication of breakthrough in the costly adsorbent beds used for purification. Fast, precise and continuous analysis allows users to maximize adsorption efficiency, without risking product quality. For, high levels of CO can go on to damage end-users' vital catalysts or processes. Additional impurities, such as methane (CH<sub>4</sub>) and carbon dioxide (CO<sub>2</sub>), are also critical to mitigate.

In the HyCO process, downtime caused by instrument malfunctions, technician errors and frequent calibration requirements hurts profits, incurring costly fines from end-users, exorbitant repair costs, unplanned downtime and loss of throughput. It's a plain fact that the incumbent technology, chiefly NDIR (non-dispersive Infrared technology), is far from optimal for this application, causing headaches for analyzer technicians.

Tiger's **CO-rekt™** analyzers have proven highly beneficial in HyCO and, similarly, SMR (Steam Methane Reformer) processes for analysis of CO and other contaminants in petrochemical feedstock. That's because our CW-CRDS (Continuous Wave Cavity Ring-down Spectroscopy) technology is ideally suited for process monitoring, where performance factors, like robustness, uptime, throughput, low maintenance and ease of use are at a premium. Indeed, one user, who has deployed our CO-reakts widely, calculates a 13-month payback on investment.



**Tiger Optics CO-rekt analyzer**

### Hydrogen Purity

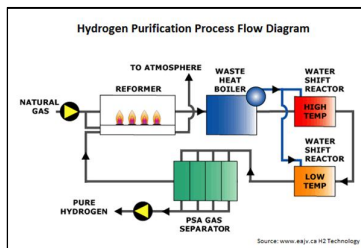
Sourcing high-purity hydrogen is critical to many diverse industrial applications where impurities impair yields. It is required for:

- Chemical production
- Metal refining
- Oil refining
- Food processing
- Semiconductor fabrication



### How Tiger Helps

In HyCO plants, Pressure Swing Adsorption (PSA) technology, shown schematically in Figure 1, is used for hydrogen purification and recovery from various process streams.



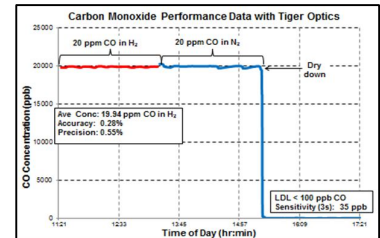
**Figure 1. Hydrogen Purification with PSA**

Installed post-PSA, the CO-rekt ensures appropriate levels of impurities, such as CO, CO<sub>2</sub> and CH<sub>4</sub>, are maintained in the process stream.

### Tiger's CO-rekt

Typical concentration levels of interest for HyCO plants are between 100 ppb and 20 ppm of CO in hydrogen. The CO-rekt can easily measure over this range. Below is performance data shown in both hydrogen and nitrogen, indicating accuracy that surpasses our published specifications of ±4% and less than 0.6% precision. (We take pride in offering analyzers that operate well within

their published specifications.) The speed of response is virtually instantaneous: 90% in less than 15 seconds, making ours the "CO-rekt" choice for process control!



**Figure 2. CO Performance Data**

(For more on how Tiger's analyzers work, please click [here](#).)

### The CO-rekt cuts costs & increases uptime

Currently, the most common technique for CO measurement in HyCO plants is Non-Dispersive Infra-red (NDIR) equipment, which has a high propensity to drift and is prone to spectral interference and temperature dependence. As a result, it requires frequent calibration, rendering it laborious and costly to maintain. In addition, it employs a fragile chopper that easily breaks, tripping the plant and incurring downtime fines and frequent, high-ticket service visits.

By contrast, Tiger Optics' CW-CRDS analyzers experience no temperature drift or spectral interference. The Tiger Optics analyzer requires no calibration, obviating the need for complex, costly calibration gas sampling systems, human intervention and frequent, risky movement of cylinders. With no interruptions for maintenance or unplanned shutdowns, the CO-rekt affords extremely low cost of ownership and allows you to operate continuously online.

In addition, the CO-rekt, with Z purge, has a Class I, Division 2 certification for use in hazardous locations. It is engineered in a NEMA-enclosure with a space-saving, wall-mount design for narrow instrument sheds. (An X purge non-classified version is also available.)

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