

# Standard Operating Procedure

**Task:** ToxgardII CO detector calibration

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## Background:

- CO is an odorless, colorless, tasteless, poisonous gas. The permissible exposure limit (PEL) for CO set forth by OSHA is 50 ppm for eight hours. The immediately dangerous to life or health (IDLH) value set forth by the US National Institute for Occupational Safety and Health (NIOSH) is 1200 ppm. *However, if any amount of CO is detected in the laboratory, steps must be taken to stop the leakage and potential exposure to CO.* Personal detectors must be worn to avoid possible intoxication due to leaks.

## Training Requirements:

- Lab safety training
- Working with CO

## Potential Hazards:

- Inhalation of a toxic gas
- Injuries from failure of pressurized gas cylinder

## Special PPE Requirements:

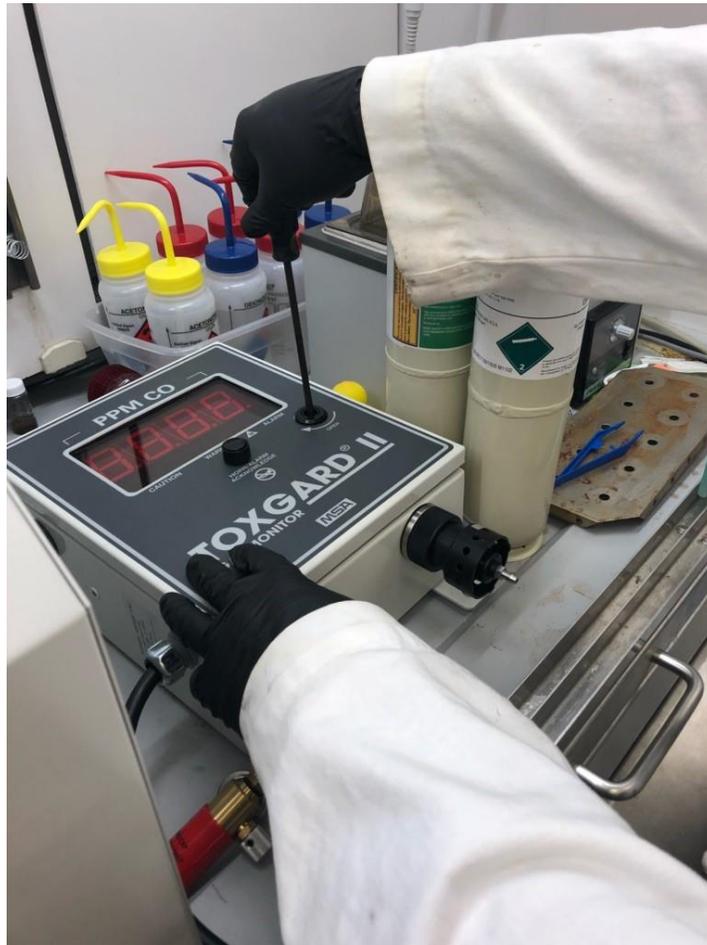
- Personal CO detectors

## Materials Needed:

- CO (300 ppm) gas bottle (Span gas)
- Air (21% oxygen/ 79% nitrogen) gas bottle (Zero gas)
- MSA Flow Controller
- Tubing for gas/detector connection
- Flathead and Phillips screwdriver

## Procedure:

1. Unplug ToxgardII and dismount from the wall using the Phillips screwdriver
2. Place inside a fumehood and open the door (with the detector still unplugged) using a flathead screwdriver
3. Once open, connect ToxgardII to a power source and allow the ppm reading to stabilize

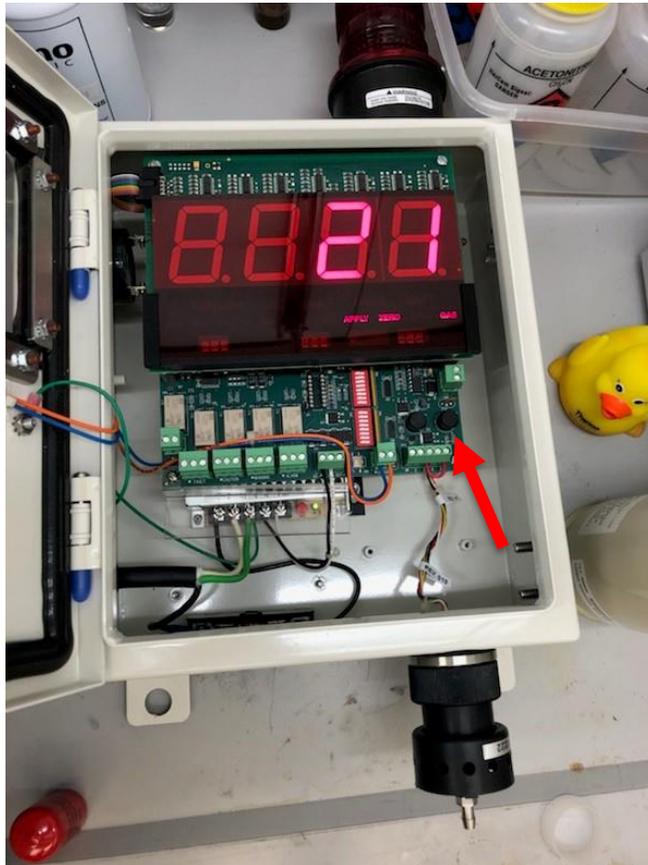


4. Connect the narrow end of the tubing to the top of the MSA Flow Controller



5. Connect the Flow Controller to the zero gas (21% oxygen in nitrogen) bottle

6. Press and hold down the black “Cal” button inside the box until the word “SPAN” appears on the screen (small letters)



7. When prompted to “Apply zero gas”, connect the other end of the tubing to the sensor inlet (this prompt comes within a few seconds of pressing and releasing “Cal”)



8. Open the Flow Controller (silver knob) to allow “zero” gas to flow to the detector
9. After ~30-45 seconds, the word “End” will appear in big letters on the screen, shortly followed by “Apply span gas” in small letters
10. When this prompt appears, *carefully* remove the Flow Controller from the “zero” gas and connect it to the “span” gas bottle (300 ppm CO). *Note: You only have 30 seconds to switch between the two bottles.*



11. Before the end of the 30 second countdown, open the Flow Controller to allow CO gas to flow to the sensor. The ppm value on the screen will increase over the course of 15-20 seconds to 300 ppm and will take 20-30 seconds to stabilize at around 300 ppm.
12. After the reading stabilizes, the screen will read “End”. Close the silver valve on the Flow Controller and disconnect the tubing from the sensor. The ppm reading will rapidly begin to drop.
13. **Ensure you have closed the Flow Controller valve.** *Carefully* transport the “span” gas bottle to a different fumehood and disconnect the Flow Controller from the bottle. A small amount of gas will be released. Allow for the gas to dissipate through the fumehood before moving the bottle/Flow Controller back to the Calibration Kit briefcase.
14. Make a note that ToxgardII is undergoing a calibration. Any flow of gases like CO, or H<sub>2</sub> can affect the reading on the sensor and the efficacy of the calibration. Allow the calibrated ToxgardII to sit in a fumehood undisturbed for ~12 h.
15. Disconnect ToxgardII and close the door with the flathead screwdriver.
16. Mount ToxgardII by the ventilated cabinet again.

#### References and Related SOPs:

- Working with CO SOP
- Grainger Carbon Monoxide Facts: <https://www.grainger.com/content/qt-236-carbon-monoxide-facts>
- OSHA Carbon Monoxide Fact Sheet: [https://www.osha.gov/OshDoc/data\\_General\\_Facts/carbonmonoxide-factsheet.pdf](https://www.osha.gov/OshDoc/data_General_Facts/carbonmonoxide-factsheet.pdf)

- Dräger Pac 5500 Single-Gas Detection Device:  
[http://www.draeger.com/sites/assets/PublishingImages/Products/cin\\_pac\\_3500/US/pac-5500-pi-9094170-en-us.pdf](http://www.draeger.com/sites/assets/PublishingImages/Products/cin_pac_3500/US/pac-5500-pi-9094170-en-us.pdf)
- Honeywell Analytics Single-Gas detectors:  
[http://www.honeywellanalytics.com/~media/honeywell-analytics/products/toxipro/documents/english/ss01132c\\_toxipro\\_spec\\_sheet\\_flr\\_7-25-12.pdf?la=en](http://www.honeywellanalytics.com/~media/honeywell-analytics/products/toxipro/documents/english/ss01132c_toxipro_spec_sheet_flr_7-25-12.pdf?la=en)
- Centers for Disease Control and Prevention, US National Institute for Occupational Safety and Health (NIOSH): Carbon monoxide:  
<http://www.cdc.gov/niosh/idlh/630080.html>