Redesigning Carbon Monoxide Detectors for Industrial Environments

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Carbon monoxide (CO) detectors are not fit for all labor conditions. Depending on a worker's condition (ex. if they are outdoors, if they have asthma), the person may be more sensitive to CO, making the general classification of danger (50 PPM of CO) ineffective. To solve this problem, the classic CO detector was redesigned. If a worker's sensitivity to the gas was higher, the detector's sensitivity had to increase. For those working in outdoor environments (such as tunnels, manholes, and vehicle repair shops), classic CO detectors were not effective because they're designed for indoor environments. To fix both problems, a CO detecting wristband with increased sensitivity was created. The first variable tested was sensitivity. By using a color-changing carbon monoxide detector (a white strip that turns black) and a photoresistor, an LED was able to be powered, serving as the exposure indicator. To make the color-changing detector more sensitive, it was modified to be initially darker and smaller, reducing the amount of energy/gas required to start the chemical reaction (color change). To test sensitivity, the modified detector and the unmodified detector were placed underneath a car exhaust pipe and were recorded to see which one turned black the fastest. After 1 minute and 13 seconds of exposure, the modified detector turned completely black. After 1 minute and 22 seconds, the unmodified detector turned completely black. The design was successful, as the speed of the reaction increased. The final experiment revolved around the functionality of the photoresistor. Did the light turn on when the detector turned black? After configuring the circuit board, it successfully triggered the red LED to turn on when the detector turned black.

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