

Handheld methanol and formaldehyde detectors enabled by adsorption filter



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Toxic methanol

Methanol is poisonous when ingested or inhaled, resulting in thousands of deaths every year. Here, we present a low-cost and handheld methanol detector, promising for measuring methanol concentration in the headspace of beverages,¹ hand sanitizers² and biofuels as well as in breath³ for rapid screening of methanol intoxication. Selectivity is achieved by an adsorption filter⁴ that can be readily extended also for the detection of other analytes such toxic formaldehyde⁵ omnipresent in indoor air.

Detector concept

Selectivity





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Abstract

Methanol poisoning from consumption of laced beverages or sanitizers claims thousands of deaths every year.¹ Here, we present a low-cost and handheld methanol detector (Figure 1a) for selective detection of methanol in the headspace of liquids and human breath. Selectivity is achieved by an adsorption filter² of Tenax TA that separates compounds as in gas chromatography, while a Pd-doped SnO₂ gas sensor downstream detects the target analyte.³ This detector accurately predicted methanol concentrations from >250 drinks,⁴ hand sanitizers,⁵ biofuels and distillates (Figure 1b) with stable performance during >100 days of continuous operation. We tested the device also on methanol-spiked breath of 20 intoxicated volunteers, where it reliably detected toxic methanol concentrations for rapid diagnosis and assessment of severity.⁶ As a result, this detector shows immediate applicability for screening of methanol by law enforcement, healthcare workers and laymen.



Figure 1: (a) The handheld detector during measurement. (b) Actual methanol concentration versus concentration as determined by the handheld detector in a variety of drinks, sanitizers, biofuels and distillates.

References

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