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Building a better bomb sniffer

Handheld device detects an explosive that is easy to make but hard to detect

By Rachel Ehrenberg

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A handheld device that sniffs out the same powerful explosive employed by the would-be shoe bomber may be coming soon to an airport near you. Chemists have developed a sensor that detects minute amounts of TATP, an explosive favored by terrorists because it is easy to make and difficult to detect.

The new sensor consists of a postage stamp-sized array of dyes that change color when they react with certain compounds. When air containing triacetone triperoxide, or TATP, is drawn toward the sensor, it passes over a chemical catalyst. Some of the TATP in the air reacts with the catalyst and the resulting mixture hits the dyes. The ensuing chemical reactions yield a specific color pattern that is discernable within minutes, researchers report in the Nov. 10 *Journal of the American Chemical Society*.

“When the challenge is to identify a particular compound it is very difficult to do it with a single sensor,” says materials scientist Howard Katz of Johns Hopkins University in Baltimore. “But what they have done — a multisensor array that gives you a specific pattern of dots — this is the right direction, the direction we need to be going.”

TATP, sometimes called the Mother of Satan, is easy to make from readily available ingredients: acetone, hydrogen peroxide and an acid. None of those ingredients contains nitrogen, the most common target for current bomb-sniffing technologies. In fact, the explosive is pretty featureless chemically speaking, making it difficult to detect by standard techniques. But the new sensor reacts to minute quantities of TATP, detecting amounts as low as 2 parts per billion, says chemist Kenneth Suslick of the University of Illinois at Urbana-Champaign, who led the new work.

The sensor isn't affected by changes in humidity and doesn't confuse TATP with household products such as mouthwash, shampoo, laundry detergent, bleach, vinegar or Jim Beam whiskey, Suslick and his Illinois colleague Hengwei Lin report. The team is now taking steps to convert their prototype into a commercially available device that could be waved over suitcases or placed inside walk-through sniffers in airports.

SUGGESTED READING :

- ▶ R. Ehrenberg. Nose knows noxious gases. Science News Online, Sept. 15, 2009.
- ▶ A. Cunningham. Smells like the real thing: Sensing systems that mimic noses and taste buds. Science News. Vol. 170, July 15, 2006, p. 40. Available online to subscribers:

CITATIONS & REFERENCES :

- ▶ H. Lin and K. S. Suslick. A colorimetric sensor array for detection of triacetone triperoxide vapor. Journal of the American Chemical Society. Vol. 132, Nov. 10, 2010, p. 15519. doi: 10.1021/ja107419t