WHAT HAPPENS TO THOSE SAMPLES

One sample takes three people and ten to 15 minutes to collect. One person takes the sample, one receives it, and one records it. Each sample is taken using a forensically secure sample kit. It's completely sterile and contains a cylindrical scoop and two to three sizes of sealed containers and a secondary and sometimes even tertiary plastic pack to protect it. If you happen to find actual "neat" (unadulterated) agent, it goes into toxic-transport containers, which are made of material a bit like an airplane's black box. These are put in wooden boxes with cork lining, and those are put in stainless steel with a bolt-down lid. Inside is powdered activated charcoal to absorb any potential leakage. They're wrapped two to three times in a protective coating. Biomedical samples such as blood or urine are typically stored in glass with nonreactive caps and seals and then packed in two to three layers for protection.

Once a sample is taken, it's given a unique number. Investigators document when it was taken, who took it and where, and the weather conditions. Planes fly the samples to OPCW's main lab in Rijswijk, Netherlands. OPCW keeps part of the sample for its records, and it might keep part for the country the samples were taken from. Other samples are sent off to a network of labs, labeled only by a number. Sometimes the labs receive actual samples and sometimes they get blanks, or spoofs with some other chemical. Everything has to be controlled.

Liquid samples can be tested with detector paper, which is similar to a large piece of litmus paper. It changes colors if an agent is present. The other major liquid-sample technology is Fourier-transform infrared spectroscopy. When a sample is placed in the machine, infrared light shines through it. The molecules inside the liquid will bend or reflect the light in certain ways, which the machine compares to its library of standard compounds.

Gas samples are placed in a detector called an AP4C, which uses flame spectrophotometry (see below). Another detector, called the Cam, uses ion-mobility spectrometry. The ions from different agents move across a screen, and their travel time is an indicator of what elements are present.

HOW IT WORKS

THE AP4C DETECTOR

Proengin's AP4C detector analyzes gas and vapor samples using flame spectrophotometry. After a sample is sucked in through the intake port (1), it passes over a small hydrogen flame (2). The sample burns in the flame, producing a light wave, the color of which is determined by the elements present, such as phosphorus (3). That spectrum passes through a focus lens (4) and onto a sensor (5). The results are run through a processor (6), which analyzes the sample for the presence of four basic elements that are common in chemical weapons: phosphorus, hydrogen-nitrogen-oxygen bonds, arsenic, and sulfur. The AP4C has no onboard library. It does not identify the possible agent. It simply detects the presence of one. The waste is expelled through the exhaust (7). The entire process requires very little sampled product and takes under two seconds to complete.

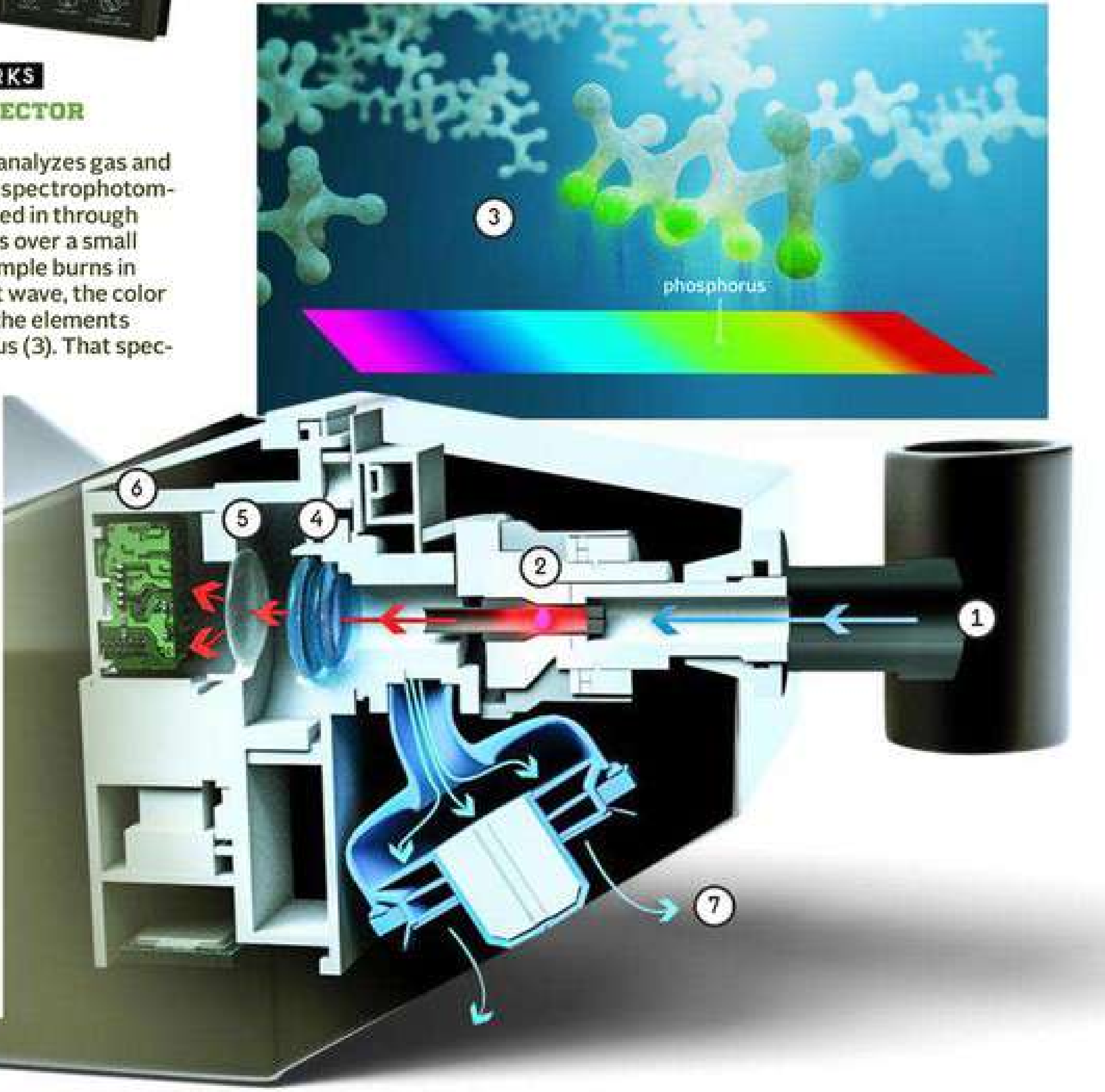

ILLUSTRATION BY SINELAB