

Is it too late to determine which chemical weapons were used in Syria?

Probably not, but it's better to act sooner than later.

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The Syrian civil war reached a nadir on August 21 when rockets with toxic chemical agents were launched at the suburbs of the Ghouta region just outside the capital city of Damascus. Officials have not yet confirmed how many died as a result of the chemical attack, but more than 100,000 lives have been claimed by the overall uprising since it broke out two years ago between supporters of Pres. Bashar al-Assad's regime and those who called for his expulsion.

United Nations inspectors working to determine the nature of the deadly agents used in last week's attack have faced multiple challenges, including delays in reaching the site where the blasts occurred. Having originally granted investigators permission to access the site on August 25, Syrian officials later said the team could not enter until 24 hours later. On August 26 the team managed to reach the site after coming under fire from unidentified snipers.

The setback could prove disastrous if the chemical remains of the weapons have evaporated or expired. But if perpetrators used a persistent nerve agent such as sarin, traces of the toxin should linger in the soil for up to 29 weeks.

Scientific American spoke with Charles Blair, senior fellow on state and nonstate terrorist threats with the Federation of American Scientists, about the challenges of pinning down a toxic culprit.

[An edited transcript of the interview follows.]

What happened at 2:00 A.M. in the Ghouta region of Syria on Wednesday, August 21?

There are some visuals, but apparently there were thuds or explosions releasing a chemical agent that was dispersed throughout the area, harming a large number of people in a small space. That begins the debate: What was it? There will never be a definitive answer. The U.N. team's only charge was determining if there was a chemical agent or not, not who delivered it. But it's pretty safe to say the attack was chemical. The battle is what people consider counts as proof.

What kind of testing is done to find out what chemicals were used in the attack? Is it all done on-site?

The team that goes in can either do on-site testing or they can take it to one of 20 facilities outside the country that are certified to conduct off-site testing. One of the benefits of off-site testing is that the devices there are usually more advanced. Usually they do a combination of both. So in this case you take a sample and split it into eight [parts], which are then sealed to prevent contamination. Two of the eight [parts] are analyzed on-site. One goes to the inspector state party, and one is sent to be analyzed off-site. Each sample is weighed and reweighed before and after shipment to ensure no tampering takes place.

The samples then go through gas chromatography–mass spectrometry (GC–MS) analysis, which breaks down the sample into its various chemicals. Then they identify them by comparing what they have with a database of more than 2,000 chemicals. [Editor's note: A GCMS instrument comprises two parts. The gas chromatography (GC) component separates the chemical mixture into pure chemicals based on the ease with which they evaporate; the mass spectrometer (MS) identifies and quantifies the chemicals based on their structures.]

Is there an expiration date for detection of these chemicals?

If it was sarin, they have 29 weeks to detect the degradation components. There have been rumors that it's too late to detect or that



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UN inspectors are currently determining whether or not the Assad regime used chemical weapons against civilians in Syria.

sarin evaporates. What happens is it goes into the soil. If there were bursts of sarin in the area say, nearby a crater, the bottom of that crater would be a great place to find sarin remnants. With such a large number of people killed in this attack, there is evidence that large amounts of the chemical—if it was sarin—was used. I expect it lingered in certain areas.

Is there a main degradation component that you look for when you're looking for evidence that sarin may have been used in an attack?

The main one is IMPA, or isopropylmethylphosphonic acid. That's the main chemical marker. There are others that exist, but as far as my research goes that's the one I focus on.

Some experts have said it looks like a combination of the nerve agents sarin, used in two terrorist attacks in Japan in the 1990s, and VX, which some suspect was used in the Iran–Iraq War in 1980–88. Is that possible? Do you agree?

With VX we're not sure. Some scientists think it's more persistent, meaning it sticks around, but there's also evidence that maybe it doesn't. To my knowledge VX was not used in the Iran-Iraq War. What we do know is that VX can be up to 100 times more toxic than sarin. If we look at the history of chemical warfare, it used to be that you'd either want an agent that was persistent and did its business on the surface or you'd want a gas agent that did damage in the air quickly and dispersed. If VX were both of those things, that would be a game changer.

How easy is it to make these types of weapons?

It's very challenging. Take Libya, for example. They had a chemical weapons program. The first thing they made in high quantities was mustard gas, which is poisonous and lethal, but is not terribly difficult to make. Then they tried nerve agents. That was just a bridge too far for them. One of the things that made it so difficult was that the US was interfering with their ability to get the precursors, the materials they'd need to make the weapons in the first place. In the end they abandoned the effort and chose to rely on their nuclear program.

Syria and Israel are among the only countries not to have signed or ratified the 1972 Biological and Toxin Weapons Convention (Syria signed but never ratified and Israel never signed), which required signatories to stop bioweapons work and destroy existing stockpiles. Did this play a role in the attack?

There are seven states that have not signed. The significance of the Convention is its role in upholding a social construction of reality in which these sorts of weapons are viewed as beyond the pale, as taboo. The more people that adopt that narrative, the bigger the taboo becomes.

Syria was not a member, but it made sense for them not to be. They wanted a form of defense against Israel. They created a stockpile for defense against other states. I really don't think they would ever have envisioned using it against insurgents. But because they are not a part of the Convention, and there's no world government, they didn't feel compelled not to use chemical weapons.



There are only three reasons I can think of that the regime would've done this: One, they have an incredibly complicated chess game that's out of this world and somehow part of a rational strategy that I can't understand. Two, this was an element of Pres. Bashar al-Assad's regime. Or three, the regime itself is beginning to lose touch with reality, which can happen if you're isolated. We've seen it happen to terrorist regimes over and over.

You can't automatically accept any of the answers. So then you look at the opposition—they had a lot more to gain through the use of chemical agents. From their perspective, [the opposition] likely understood that it would trigger a large-scale US intervention. So you could have had a situation where they said yes, people are going to die, but more will die if we don't do this [to] trigger US intervention.