

Chemicals burning at Texas plant are unstable if not cooled

September 1 2017, by Seth Borenstein



Mike Cossey, of Bureau Veritas, uses an air monitor to check the quality of air at a police roadblock marking the 1.5-mile perimeter of the evacuation area around the Arkema Inc. chemical plant Thursday, Aug. 31, 2017, in Crosby, Texas. The Houston-area chemical plant that lost power after Harvey engulfed the area in extensive floods was rocked by multiple explosions early Thursday, the plant's operator said. The Arkema Inc. plant had been left without refrigeration for chemicals that become volatile as the temperature rises. (AP Photo/Gregory Bull)

The chemicals that exploded at a Texas plant are so unstable that they must be kept cool or they can ignite a runaway scenario.

Experts say that's what happened when the Arkema Inc. chemical plant lost power after Harvey engulfed the area in floods. Arkema executive Richard Rennard said the fire was caused by the chemicals degrading because of the lack of refrigeration.

The chemicals that caught fire at the plant outside Houston were organic peroxides, a family of unstable compounds used for making a variety of products, including pharmaceuticals and construction materials.

Those are some of the most reactive chemicals around, which is good for manufacturing, but all too dangerous in massive flooding, said Marco Kaltofen, president of Boston Chemical Data.

"The problem with organic peroxides is they react with themselves. That's why we refrigerate them," said Kaltofen, who is also a nuclear and chemical engineering researcher at Worcester Polytechnic Institute.

Organic peroxides are used in [chemical](#) manufacturing to kick-start and keep producing reactions that generate new chemicals.

While they are safe and useful chemicals when handled properly, if it gets too hot or there is some other sparking situation, "at some point it just runs and you can't stop it," said Patrick Dussault, a professor of chemistry at the University of Nebraska in Lincoln. "These can be chain reactions."



The Arkema Inc. chemical plant is flooded from Tropical Storm Harvey, Wednesday, Aug. 30, 2017, in Crosby, Texas. The plant, about 25 miles (40.23 kilometers) northeast of Houston, lost power and its backup generators amid Harvey's dayslong deluge, leaving it without refrigeration for chemicals that become volatile as the temperature rises. (Godofredo A. Vasquez/Houston Chronicle via AP)

Information that Arkema posted online for one of the chemicals says its flashpoint is 97.7 degrees (36.5 degrees Celsius), which is nearly body temperature. It can easily get to 98 degrees in a car or building without power or air conditioning in Houston during the day in August, Kaltofen noted.

Hydrogen [peroxide](#) molecules have two [carbon atoms](#) and two oxygen atoms. Normally the oxygen atoms are bound to each other. When that bond breaks, the freed [oxygen atoms](#) more easily bind with other [atoms](#), which is what is useful in making polymers, Dussault said. But when that

process happens, they release energy and heat. And that decomposition then promotes the instability of its neighbors and so on, he explained.

The Texas plant "made exactly the same error that they did at Fukushima," Kaltofen said.

The backup generators at Japan's Fukushima nuclear plant were too low and they got flooded in the tsunami. Similarly, Arkema's backup system proved too prone to extreme flooding, Kaltofen said.

And in both situations once it starts, there's little that can be done safely to stop it, he said.

© 2017 The Associated Press. All rights reserved.

Citation: Chemicals burning at Texas plant are unstable if not cooled (2017, September 1)
retrieved 23 April 2024 from
<https://phys.org/news/2017-09-chemicals-texas-unstable-cooled.html>

<p>This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.</p>
--