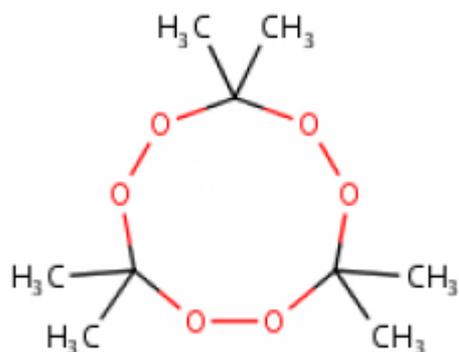


TATP: The Chemistry of 'Mother of Satan' Explosive



By Alex Berezow — November 14, 2018



Credit: Toxnet [1]

A Florida man ([who else?](#) [2]) has been arrested for making a particular explosive, which has been given the not-so-subtle nickname "Mother of Satan." What is it?

Chemists call it triacetone triperoxide (TATP), and it is one nasty molecule. (See the diagram of its molecular structure.) TATP is extremely unusual. Note that it has 9 atoms contained in a single ring, which is not particularly common among molecules. But that's not what makes it nasty. What makes it truly the Mother of Satan is all of the oxygen atoms in it.

As our resident chemist, Dr. Josh Bloom, [explained](#) [3], molecules that contain a lot of "trapped" gases tend to be unstable. That is, molecules that contain a relatively high number of nitrogen and oxygen atoms compared to carbon atoms are potentially explosive. The active ingredient in dynamite, called nitroglycerin, is jam-packed with nitrate (NO₃) groups that are quite eager to escape. This eagerness is why nitroglycerin explodes.

Another destabilizing feature of TATP is the presence of oxygen-oxygen bonds. In organic chemistry, oxygen atoms are typically bonded to carbon or nitrogen atoms, but not to each other. Molecules that contain oxygen-oxygen bonds are referred to as peroxides, and TATP contains not just one such arrangement but three.

Surely, such a horrible compound can only be synthesized by professionals in the laboratory, right? Nope. You can make it in your kitchen, or as Dr. Kenneth Suslick, a chemistry professor at the University of Illinois, once told me for a [BBC article](#) [4], "Anyone who could follow a recipe to make a pumpkin pie could follow the recipe to make TATP." [Chemistry World](#) [5] describes how easy it is:

"The internet provides precise instructions on how to make acetone peroxide, the suicide bombers' weapon of choice. Common household ingredients - paint thinners (acetone), bleach or antiseptic (hydrogen peroxide), and a powerful drain unblocker (>85 per cent sulphuric acid) - can be obtained from hardware stores and pharmacies."

That's it. Indeed, terrorists all over the world, including the "Shoe Bomber" and those who attacked Paris in 2015, used TATP. A graduate student in the UK [made 40 grams of it by accident](#) [6].

Detonating the "Mother of Satan"

As easy as it is to synthesize, detonating TATP is even easier. Simply touching the powder could cause it to explode. That's why [bomb makers are often missing fingers](#) [7].

The Florida man who was arrested claims that he was just making fireworks. Uh-huh. Celebrating the Fourth of July early, we suppose?

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Links

[1] <https://toxnet.nlm.nih.gov/cgi-bin/sis/search/a?dbs%20hsdb%3A%40term%20%40DOCNO%207835>

[2] <https://www.reddit.com/r/FloridaMan/>

[3] <https://www.acsh.org/news/2016/07/11/why-stuff-explodes>

[4] <https://www.bbc.com/news/science-environment-35022731>

[5] <https://www.chemistryworld.com/news/acetone-peroxide--ordinary-ingredients-for-an-extraordinary-explosive/3000082.article>

[6] <http://cenblog.org/the-safety-zone/2017/02/how-a-student-unintentionally-made-an-explosive-at-u-bristol/>

[7] <https://www.thetimes.co.uk/article/tatp-is-suicide-bombers-weapon-of-choice-5n3std5h50r>