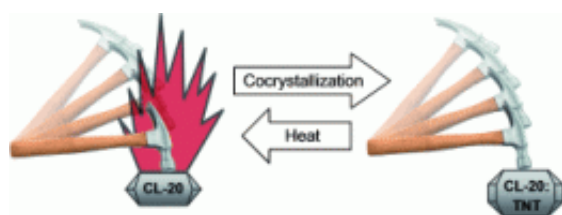


University chemists devise means to stabilize explosive CL-20

September 9 2011, by Bob Yirka



(PhysOrg.com) -- University of Michigan colleagues Adam Matzger and Onas Bolto have devised a means for making the transport and use of the highly explosive material CL-20 more stable. They describe in their paper published in *Angewandte Chemie International Edition*, how mixing it in just the right way with TNT, creates something called a cocrystal that can be transported relatively safely.

Hexanitrohexaazaisowurtzitane, known more commonly as the explosive CL-20, is a highly explosive material that is used primarily for propelling rockets. The U.S. Navy would like to use it in more applications such as for powering missiles but the transport of it has been problematic due to its high [volatility](#). In other words, if you jostle it, it blows up; sort of like nitroglycerine in old movies. Now however, Matzger and Bolto appear to have found a solution to the problem: mix it with TNT.

TNT, as most everyone knows, is a relatively safe explosive that has

been used to blow up a variety of things for many years. So much so that it has come to be used as base measure in describing the explosive power of bombs, etc. It's main drawback however, is that its explosive power isn't all that great when compared to others, such as CL-20.

Turns out though, when you mix the powerful CL-20 with the safe handling TNT, you get a third material that is almost as safe to use as TNT, but has more explosive power. This is because they form a cocrystal (crystal like structures where the two components are neutral). Better yet, if you heat the resultant cocrystal, the two separate into their original components. This means that explosives personnel could mix the two, transport it to where it needs to go (say a launch pad) then heat it up, separate out the CL-20, then use it to launch the missile or rocket. Simple as that.

Well maybe not quite as simple as that, seeing as how after separating, the CL-20 is a little more volatile than before mixing it with the [TNT](#), due to defects in its structure. Still the new process looks like a promising way to allow for safer transport of highly explosive materials.

More information: Improved Stability and Smart-Material Functionality Realized in an Energetic Cocrystal, *Angewandte Chemie International Edition*, Volume 50, Issue 38, pages 8960–8963, September 12, 2011. DOI: 10.1002/anie.201104164

Abstract

CL-20, a high-power explosive suffering from high sensitivity, has been cocrystallized with TNT to produce a novel high-power, low-sensitivity explosive. This cocrystal can be used directly for explosives applications or stored in this insensitive form then activated by heat to return it to its high-sensitivity form.

© 2011 PhysOrg.com

Citation: University chemists devise means to stabilize explosive CL-20 (2011, September 9)
retrieved 26 April 2024 from

<https://phys.org/news/2011-09-university-chemists-stabilize-explosive-cl-.html>

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.