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Bis-oxadiazole could replace TNT and other explosives in military ordnance

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The chemistry of explosives is a delicate matter. A little less carbon, a little more nitrogen, and the right amount of oxygen can transform a relatively inert substance into quite the showstopper.

For more than 100 years, TNT has been the premier mixture of chemicals for blowing things up, and it's even used as a metric to measure the yield of nuclear explosions and other monumental blasts. But new research out of Los Alamos National Laboratory and the Army Research Laboratory has discovered a new chemical, bis-oxadiazole ($C_5H_4N_6O_8$), that has many of the advantages of TNT, is thought to be less toxic to produce, and makes a bigger bang.

"It would be about 1.5 times the power of TNT," says David Chavez, an explosives chemist at Los Alamos who worked on the new molecule. "So fairly energetic, quite a nice improvement compared to TNT."

Oxadiazole has a calculated detonation pressure 50 percent higher than that of TNT.

According to chemical modeling, bis-oxadiazole should have a detonation velocity of around 8.18 km/s and detonation pressure of 29.4 gigapascal, compared to around 7.8 km/s and 26 gigapascal for Composition B. And from what the chemists know about the new material, any residue from manufacturing it should decompose much more easily in the environment.