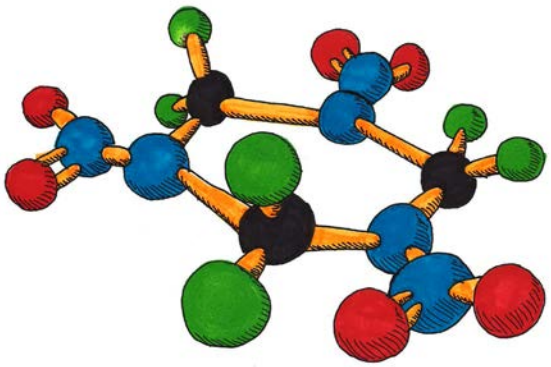
What is a “high” explosive?

The basic idea of chemical explosives is that they produce large quantities of gas very quickly. There are two mechanisms for doing this. Low explosives are usually a mixture of fuels and an oxidizer that burn rapidly, or deflagrate. Once the reaction starts, it is like any chemical reaction and depends on surface areas in contact, heat, and the concentration of the materials. Black powder is one example, and it does not explode unless it is confined, for example, in a firework. Without being confined, black powder makes a hiss and a poof (technical term) of smoke.



High explosives, such as the RDX in the drawing, have the fuel and the oxygen built into the same molecule. The molecule is like a wound-up spring waiting for a stimulus to release its energy. That stimulus is a shock wave that travels through the material much faster than the flame of low explosive deflagration. This is called detonation. High explosives have a quality called “brisance” which is their ability to shatter objects. This makes them useful for mining rock or artillery shells, but unwanted as artillery propellants, where low explosives are preferred because they are gentler on the guns.

Los Alamos explosives researchers are steadily improving the safety, stability, and even environmental friendliness of explosives.

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