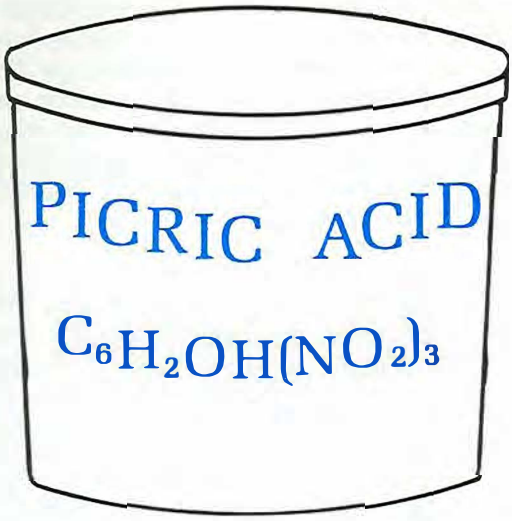

The Problem Is Academic
The Solution Is Elementary

by
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HAZARD

Chemistry is a staple in the curriculum of many educational institutions. Notwithstanding, many school administrators rate low grades for demonstrated aptitude in subject application. In New York City, and in communities nationwide, administrators have had to reassess the physical safety of their schools due to the belated recognition of the severe danger presented by hazardous substances long-forgotten in storage. School personnel and parents are beginning to recognize the urgent need to inspect school buildings for old, surplus, or contaminated chemicals.

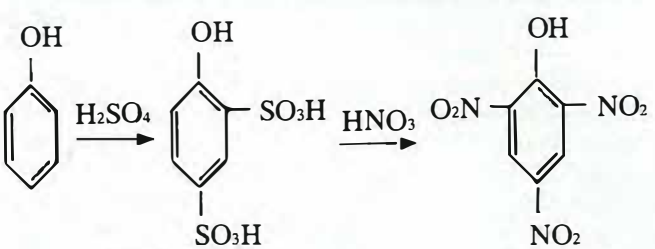
One of the most hazardous of a number of unstable chemicals often overlooked in routine school chemical audits is Picric Acid. The primary problem with the use of Picric Acid in schools is the lack of a strict, universally imposed, system of containment and maintenance within tight management procedures.

Notable for its lack of diligence in housekeeping was the school which discovered a Picric Acid supply dated 1911. Fortunately, the discovery averted a catastrophe. When, as in this case, it is not stored properly and is left forgotten on a shelf to dry out (an eventual certainty) Picric Acid becomes severely unstable—undergoing decomposition and exhibiting explosive, toxic and corrosive properties.

MANUFACTURE AND HANDLING

Picric Acid, which has the chemical formula $C_6H_2OH(NO_2)_3$, is also known as Trinitrophenol, Picronitric Acid, and Carbazotic Acid. It is produced by mixing nitric acid (a highly reactive oxidizing agent) and phenol, a crystalline compound derived from benzene, which is itself processed from petroleum.

After manufacture, the highly unstable product is stabilized by the addition of distilled water. Recommended practice is to store and ship Picric Acid "wet," a term denoting a water content in excess of 10 percent. Even so, when quantities over 25 pounds are shipped wet, the Department of Transportation classifies Picric Acid as a Class A explosive (maximum hazard potential).



Phenol-2,4-disulfonic acid — Picric acid

CHARACTERISTICS AND USE

Picric Acid has an explosive capacity greater than TNT (a.k.a. Trinitrotoluene, Trinitrotoluol). During World War II Picric Acid was used in projectiles for seacoast cannon and in armor-piercing shells. It has also been used as a booster explosive and as a partial substitute for mercury fulminate in detonators. However, a tendency to runaway sensitivity (uncontrollable, rapid reaction under certain conditions) has limited its military use.

Mixtures of Picric Acid and other nitro compounds have a lower melting point than pure Picric Acid and can be efficiently melted and cast at temperatures below 212° F. This application has been extensive.

Picric Acid is frequently an ingredient in the manufacture of dyes and medicines and is used in metalworking. In laboratories it serves as an excellent coloring medium for microscopic examination of plant tissue and for marking laboratory animals.

HIGH EXPLOSIVE CHARACTERISTICS

Dry Picric Acid is designated a High Explosive. The following paragraph defines this category.

"High Explosive" is the designation for solid materials having the property of detonation (sudden, violent explosion) when initiated by a number 8 electric blasting cap. High Explosives do not function by burning, but most will burn when ignited by flame. Many will burn quietly if the quantity is small, or if the

material is spread over a large area. If in large quantity, or confined, or packaged for shipment, High Explosives tend to explode en masse without warning. (In comparison, Low Explosives have the property of deflagration, that is, burning progressively with great heat and intense light over a relatively sustained period of time.)

High Explosives may be detonated by elevated temperatures, as these examples show.

TNT will detonate in one second at 932°F.

Mercury Fulminate will detonate in one second at 644°F.

Picric Acid will detonate in one second at 671°F.

An explosion of High Explosives may also be initiated by severe shock. Sensitivity of explosives to shock may be measured in several ways, two of which are (1) the impact pendulum test and (2) the drop test.

(1) In the impact pendulum test a heavy pendulum is allowed to swing down over a sample of explosive in a dish-shaped, inclined container, arranged to permit little clearance between the pendulum and the sample. The resulting contact is a combination of shock and rubbing. The height from which the pendulum is allowed to swing to explode the sample is a measure of the sample's sensitivity to this test.

(2) The drop test consists of placing a sample of explosive upon an anvil and allowing a five-pound weight to drop onto it. The height from which the weight must drop to explode the sample is a measure of its sensitivity to shock. (Note: A solid explosive material tightly fitted into a container is extremely shock-sensitive.)

Comparative results of a drop test of a five-pound weight on several samples of explosives are shown in the box below.

EXPLOSIVE	HEIGHT (Inches)
TNT	20
Picric Acid	14
Nitroglycerin	4
Mercury Fulminate	2

FIRE DEPARTMENT OPERATIONS

In New York City, the handling and removal of explosive materials is under the jurisdiction of the Police Department. The "Mayor's Plan For Coordinated Action At Emergencies" provides guidelines for the actions of participating agencies at the scene of such operations. Under this plan the ranking Police Department officer assumes command and functions as overall coordinator of operations. The ranking Fire Department officer reports to the Police Commander and offers any required assistance.

In any explosive materials situation, and regardless of whether operating in concert or alone, Fire Department operations are limited as follows.

(1) Receipt and confirmation of relevant information, for transmittal to the Police Department.
(2) Identification of information sources.
(3) Determination of location and description of suspect material.
(4) Determination, isolation and protective confinement of area at risk.
(5) Peripheral search.
(6) Evacuation of exposed persons from the danger area.
(7) Preservation of evidence.
(8) Employment of Fire Department Hazardous Materials Unit to greatest effect.

In no event are Fire Department members authorized to perform hands-on operations involving explosive materials. Current state-of-the-art practices offer NO COMPLETELY SAFE methods for handling explosives. ▲

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Help Your Child to a Healthy Heart

Reprint Courtesy
N.Y. Heart Association, Inc.

"My Johnny is such a roly-poly. He eats whatever he wants and as much as he wants. It's fine with me 'cause I don't want him to look thin and sickly. He'll outgrow his babyfat."

"I gave my fourteen-year-old daughter permission to smoke. I know she'll do it anyway whether I let her or not. I'm the envy of her friends because I said it's o.k. Besides, my husband and I smoke."

"Our t.v. is on day and night. The kids enjoy it and I don't mind because I can keep an eye on them and not have to worry that they're running around outside. No matter how much t.v. they watch, it's still a treat for them to stay up an hour extra to see a special."

Sound familiar? You bet! Unfortunately, the way many people choose to reward their children can, in the long run, prove to be punishment. That's because the life styles of today's children may be laying the groundwork for the development of heart disease in later years.

According to a 1980 issue of *Circulation* magazine, "It is generally accepted that atherosclerosis (hardening of the coronary arteries, which can cause heart disease) begins in childhood and progresses in adolescence and young adulthood, even though serious manifestations do not appear until middle age or later."

The general feeling is that modifying controllable