

# SARIN

*The History and Politics of a Chemical Warfare Agent*

## Sarin: A Nerve Agent

Sarin, a.k.a. GB, and its other organophosphorus relatives (VX, etc.) are members of the class of chemical weapons known as "nerve agents." These compounds target the central nervous system where they serve as cholinesterase inhibitors, blocking nerve impulse transmission across synapses. This effect can be lethal.

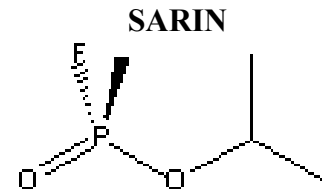
From Sarin's MSDS:

"Symptoms of overexposure may occur within minutes or hours, depending upon dose. They include: miosis (constriction of pupils) and visual effects, headaches and pressure sensation, runny nose and nasal congestion, salivation, tightness in the chest, nausea, vomiting, giddiness, anxiety, difficulty in thinking and sleeping, nightmares, muscle twitches, tremors, weakness, abdominal cramps, diarrhea, involuntary urination and defecation. With severe exposure symptoms progress to convulsions and respiratory failure."

Japan subway: Vomiting of blood

For detoxification:

- Treat contaminated area with 10% NaOH solution
- In humans: "administer, in rapid succession, all three Nerve Agent Antidote Kit(s), Mark I injectors (or atropine if directed by physician)."



Isopropylmethane fluorophosphonate

**Common Names:** GB, Zarin

A volatile, colorless, odorless liquid

**Least-Effect Dose:**

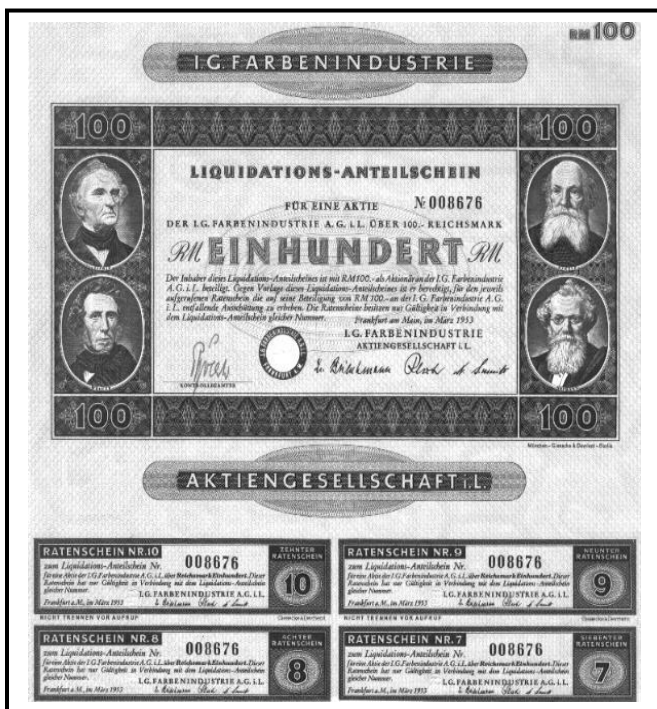
0.002 mg/L over 15 inhalations

**Lethal Dose:**

0.07 mg/L over 15 inhalations

*or*

1.7 g on skin (for a 70 kg human)



## The History of Nerve Agents

- 1936 Dr. Gerhard Schrader, a chemist at IG Farben, discovered the first of the organophosphorus nerve agents, Tabun, en route to finding more effective pesticides. The project had started in 1934.
- 1942-45 Germans develop the first generation "G" nerve agents. Schrader and colleagues make 2000 new compounds. 12,000 tons of Tabun synthesized, very little Sarin made.
- Post war Intense research is directed toward organophosphorus compounds. Better understanding of their mechanism of action leads to better defense but also to the more deadly "V" nerve agents in the mid-1950s.
- 1961 US synthesizes VX for use as a chemical weapon.
- 1972 Structure of VX published.

# The Politically Lethal Effects of Nerve Agents in the '90s

## Iraq (Early 1990s-present)

- Principal Gulf War chemical weapons: mustard, G-series nerve agents.
- Iraq developed binary technology for CW delivery during the Gulf War.
- Iraqi stockpiles of sulfur "mustard" agents and nerve agents were seized and are now serving as a means to test and practice CW disposal methods: base-catalyzed hydrolysis and bleaching under acidic conditions, where VX solubility is higher. Aerial bombs filled with volatile nerve agents (as much as 320 L!) had to be vented or exploded in controlled areas.
- 1996: Soil samples from Northern Iraq contained a VX hydrolysis product, strong evidence that Hussein used nerve agents against the Kurds. On September 7, the US attacked Iraq in retaliation for its aggression against the Kurdish people. Clinton used the spotlight to lobby for the "Chemical Weapons Convention" to bind nations to destroy their CW stockpiles.
- UNSCOM, led by Richard Butler, has continued inspections of Iraqi plants to ensure, in part, that stockpiling of CW agents has not restarted. Limited Iraqi cooperation has led to continued air strikes against key targets, including suspected plants, as well as air defense and army locations.



Saddam Hussein



Richard Butler

## Japan: The 1995 Tokyo Subway Attack

- Allegedly (trial in progress as of 4/19/99), the Japanese doomsday cult *Aum Shinri Kyo* led by guru Shoko Asahara deposited a case full of volatile liquid Sarin on a subway train in Tokyo during the morning rush hour of March 20, 1995.
- 12 people died and another 5,300 were made ill, many with permanent damage to their visual, digestive, and respiratory systems. Those who died were asphyxiated by a combination of loss of control of the respiratory muscles as well as choking build-up of mucus. Witnesses later described the agony of those who lay dying. The cult has also been accused of a 1994 Sarin attack in Nagano that killed 7 and injured 150 people.
- The *Aum Shinri Kyo* cult is still recruiting, raising capital, and buying real estate to add to their commune. They believe that they are immune from Japanese law.
- Cult insiders have testified to Asahara's plans to target several US cities.

## The 1998 US/Sudan Conflict

- In the wake of the US Embassy bombing in Kenya, the US attacked a Sudanese pharmaceutical plant in addition to a terrorist training ground in Afghanistan. Between 14 and 24 cruise missiles were fired at the plant, where the US claimed to have found traces of a VX precursor in the soil. US intelligence claims the plant had ties with bombing suspect Osama Bin Laden, as well as Iraq. Bin Laden was rumored to have plotted to use CW agents on US troop encampments in the Middle East.
- A suspicious level of "unprecedented secrecy" accompanied the US bombing operation. Sudanese officials vehemently denied any CW production, and both Iraq and Sudan denied any VX production contract, alleged by the US. The Sudanese claims have been bolstered by an independent soil analysis overseen by a University of Boston professor. All tests showed no abnormal levels of any nerve agent, nerve agent precursors, or degradation products. The US still maintains its veil of secrecy surrounding the possibly misjudged attack.