



Chemical

SAFETY AND SECURITY TRAINING

Aspects of Chemical Security Dual-use Chemicals

SAND No. 2000-0390P
Sandia is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company, for the United States Department of Energy's National Nuclear Security Administration under contract DE-AC04-94-OR-21400.



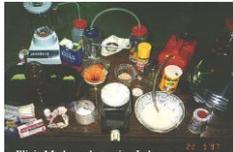
Chemical dual-use awareness

Dual use chemicals: Chemicals used in industry or everyday life that can also be used in a manner to cause harm or injury.



Dual-use chemical example: Pseudoephedrine

- Pseudoephedrine is a common ingredient in cold medicines
- Precursor to crystal methamphetamine
- Recipes for conversion available on web



- Clandestine meth labs in US during 2002
 - Caused 194 fires, 117 explosions, and 22 deaths
 - Cost \$23.8 million for cleanup
 - deaths of livestock
 - contaminated streams
 - large areas of dead trees and vegetation

US DEA, http://www.deadiversion.usdoj.gov/pubs/brochures/pseudo/pseudo_trif644.htm, viewed Dec 2007



Dual use chemicals: Chlorine



- Incidents in which chlorine gas cylinders are blown up with explosives
 - Chlorine likely stolen/diverted from water purification plants or oil industry
 - Civilians and non-combatants injured
- Chlorine first used in WWI as a chemical weapon

From http://www.longwarjournal.org/archives/2007/03/al_qaedas_chlorine_w.php downloaded Jan 2008.



Dual-use chemicals: Cyanide



Therence Koh/AFP/Getty Images



- Widely used in mining and metal plating industries, but is also a well known poison
- Product tampering*
 - Tylenol capsules
 - laced with KCN
 - 7 deaths, fall 1982, Chicago, Illinois, USA
 - Led to tamper-proof product packaging
- Popular with criminals and terrorists because it is relatively easy to obtain
- K/NaCN is an Australian Group CW agent

* Tylenol Crisis of 1982 - Wikipedia, The Free Encyclopedia 22 Nov 2007, 06:04 UTC. Wikimedia Foundation, Inc. 28 Nov 2007 <http://en.wikipedia.org/w/index.php?title=Tylenol_Crisis_of_1982&oldid=173056508>

Dual-use chemicals: Rodenticides



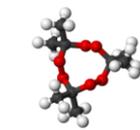
FIGURE. Package of Chinese rodenticide implicated in the poisoning of a female infant aged 18 months - New York City, 2004
Photo/New York City Prison Central Kitchen

- Zinc phosphide
 - Hydrolyzes to phosphine
 - Suicides in Egypt
- Anticoagulants (warfarin)
 - Suicides, attempted murder, accidental poisoning from corn meal
- Dushuqiang (Tetramethylenedisulfotetramine)
 - Rat poison banned worldwide in 1984, but still available in China
 - Three intentional poisonings in China
 - 5 other incidents reported between 1991 and 2004

Ann. Emerg. Med., Vol. 45, pg. 609, June 2005

Dual use chemicals: TATP

- Triacetone triperoxide (TATP)
- By-product, phenol synthesis
- Invisible to detectors looking for N-based explosives
- Made using acetone, hydrogen peroxide, strong acid (HCl, sulfuric)
- Favored by terrorists "Mother of Satan"
 - Sept 2009 arrest of N. Zazi, NY and Denver
 - July 2005 London suicide bombs
 - 2001 Richard Reid "shoe bomber"
 - 1997 New York subway suicide bomb plot



CAS 17088-37-8

Wikipedia downloaded Oct 2009
http://en.wikipedia.org/wiki/Acetone_peroxide

Dual-use Chemicals: Explosives

- Theft of conventional explosives
 - Chemical suppliers
 - Users such as mines or construction sites
- Diversion of industrial or laboratory chemicals
 - Chemical suppliers
 - Chemical factories
 - Academic teaching or research laboratories
 - Disposal sites





Dual use: Fertilizer Bomb



Photo: US DOD

- Ammonium nitrate fertilizer and fuel oil (diesel, kerosene)
- Used to bomb Alfred P. Murrah building in Oklahoma City, OK, USA
 - with nitromethane and commercial explosives
 - 168 dead, including children
 - April 1995



Dual use chemicals: Sodium azide

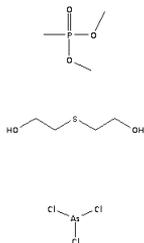


- Widely available from older automobile airbags
 - 1980s to 1990s
- Toxic by ingestion
- Reacts explosively with metals
 - Biological laboratory drains have exploded from discarded waste solutions containing NaN_3 as a preservative.
- Has been found in possession of terrorists



Dual-use chemicals: Precursors

- **Dimethyl methyl phosphonate (DMMP)**
 - Flame retardant for:
 - building materials, furnishings, transportation equipment, electrical industry, upholstery
 - Nerve agent precursor
- **Thiodiglycol**
 - Dye carrier, ink solvent, lubricant, cosmetics, anti-arthritis drugs, plastics, stabilizers, antioxidants, photographic, copying, antistatic agent, epoxides, coatings, metal plating
 - Mustard gas precursor
- **Arsenic Trichloride**
 - Catalyst in CFC manufacture, semiconductor precursor, intermediate for pharmaceuticals, insecticides
 - Lewisite (Agent L, Schedule 1 CWC) precursor



From: Chemical Weapons Convention: Implementation Assistance Programme Manual (on CD)



Diversion of industrial / laboratory chemicals: Bali bombing

- Amrozi purchased chemicals used to make bombs
- One ton of potassium chlorate* purchased in three transactions from the Toko Tidar Kimia fertilizer and industrial chemicals store in Jalan Tidar, Surabaya, owned by Sylvester Tendean.
 - Claimed he was a chemical salesman.
 - Obtained a false receipt saying he purchased sodium benzoate.
 - Tendean lacked proper permit to sell this chemical, didn't know the chemical would be used to make a bomb.
- Details of Aluminum powder purchases not known

* Some press reports state potassium chloride, but this is clearly an error
<http://www.smh.com.au/articles/2003/06/09/1055010930128.html>
<http://www.thejakartapost.com/news/2002/12/18/amrozi-owns-possessing-chemicals.html>





International Chemical Controls



International chemical control groups



ORGANISATION FOR THE PROHIBITION OF CHEMICAL WEAPONS

Chemical weapons convention

The Australia Group

Export controls



Organization for the prohibition of chemical weapons (OPCW)



- International group headquartered in The Hague, Netherlands
 - <https://www.opcw.org/index.html>
- Chemical weapons convention (CWC)
 - International treaty which bans the development, production, stockpiling, transfer and use of chemical weapons
- Promotes international cooperation in peaceful uses of chemistry
- Protecting each other



OPCW: Promotes international cooperation in peaceful uses of chemistry



- Associates program
- Analytical skills development course
- Conference support program
- Research projects program
- Internship Support Program
- Laboratory Assistance Program
- Equipment Exchange Program





OPCW: Protecting each other



- Each member state can request assistance from other member states in the event of a threat or attack, including chemical terrorism
- This can take the form of expertise, training, materials, and/or equipment








Australia Group

- An informal arrangement to minimize the risk of assisting chemical and biological weapon (C&BW) proliferation.
 - Harmonising participating countries' national export licensing measures
 - Started in 1985 when Iraq CW program was found to have diverted chemicals and equipment from legitimate trade
- 40 nations plus European Commission participate





Australia Group: Export Controls

- Controls exports of:
 - 63+ Chemical weapon agent precursor chemicals
 - Dual-use chemical manufacturing facilities and equipment and related technology
 - Dual-use biological equipment and related technology
 - Biological agents
 - Plant pathogens
 - Animal pathogens
- Includes no-undercut policy
 - Countries won't approve an export that another member country denied



