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Dr. Bottei has listed no financial interest/arrangement that would be considered a conflict of interest.



Health Hazards of Clandestine Methamphetamine Laboratories

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All Hazard Preparedness



Nationwide Phone Number

Works just like 911



24 hours a day, 7 days a week



What Poison Centers Do

- 24/7 immediate treatment advice for:
 - * Ingestions of household products
 - * Overdoses of therapeutic, illegal, foreign, & veterinary drugs
 - * Chemical exposures on the job and HazMat spills
 - * Bites of snakes, spiders and other venomous creatures
 - * Plant and mushroom poisonings
 - * Bio-chemical terrorism events
- Poison information and poison prevention
- Public and professional education
- Research, toxicosurveillance & data collection



DISCLAIMER

Making Meth is a really **BAD** idea

It is also a **FELONY**

It can **KILL YOU** or get you **KILLED**

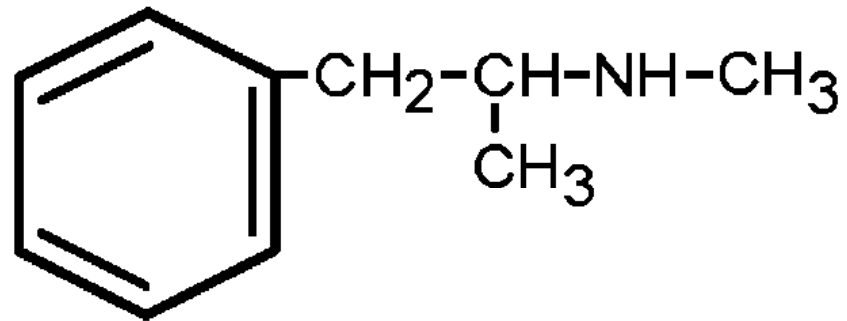
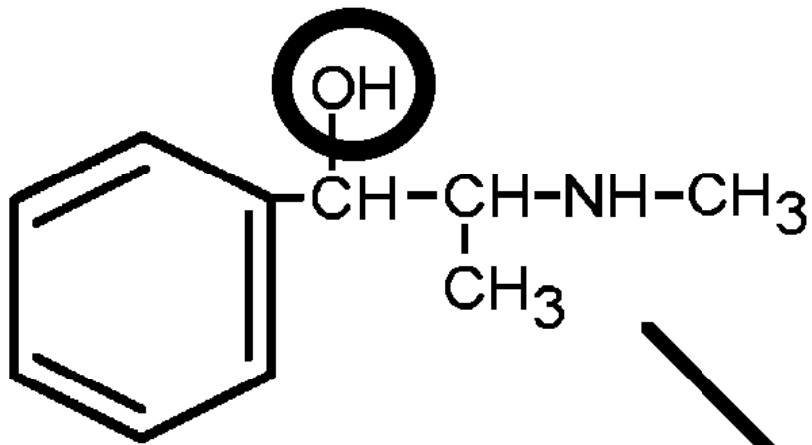
DON'T DO IT !!!!!

Neither I, nor the Iowa Poison Center, nor the Iowa Department of Public Health, nor the Iowa Health System, nor the University of Iowa Hospitals and Clinics, nor Drake University, nor UNMC, nor Creighton University advocate, promote, or condone the use, sale, purchase or synthesis methamphetamine. All content is solely the opinion of the presenter.

Please do not call the FBI / DEA / DHS



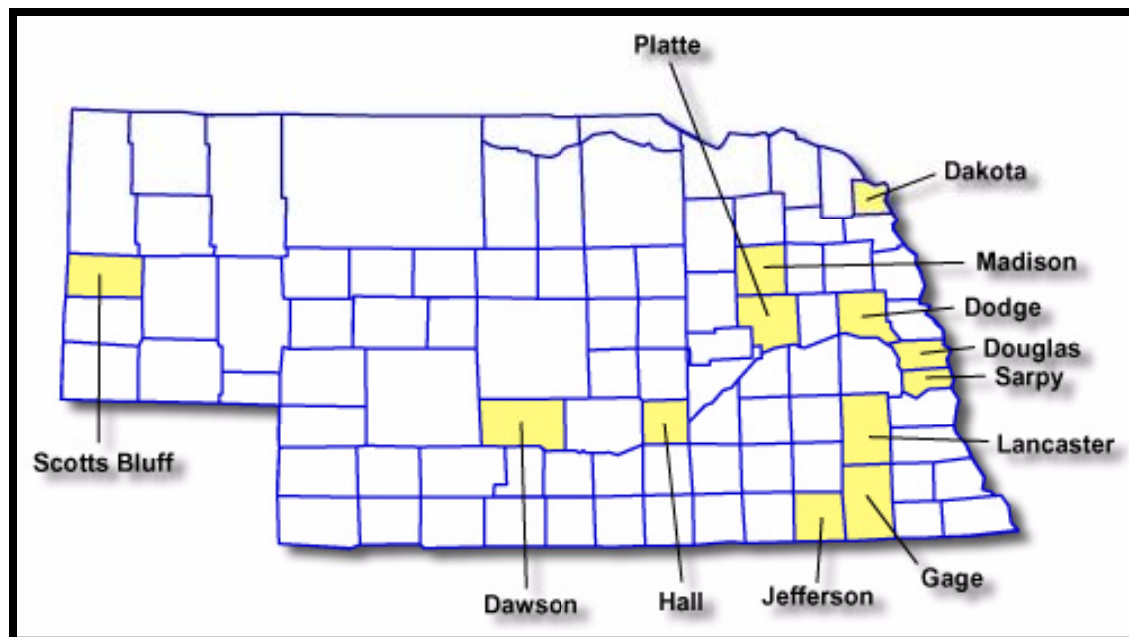
Ephedrine / Pseudoephedrine



Methamphetamine



Nebraska and Methamphetamine

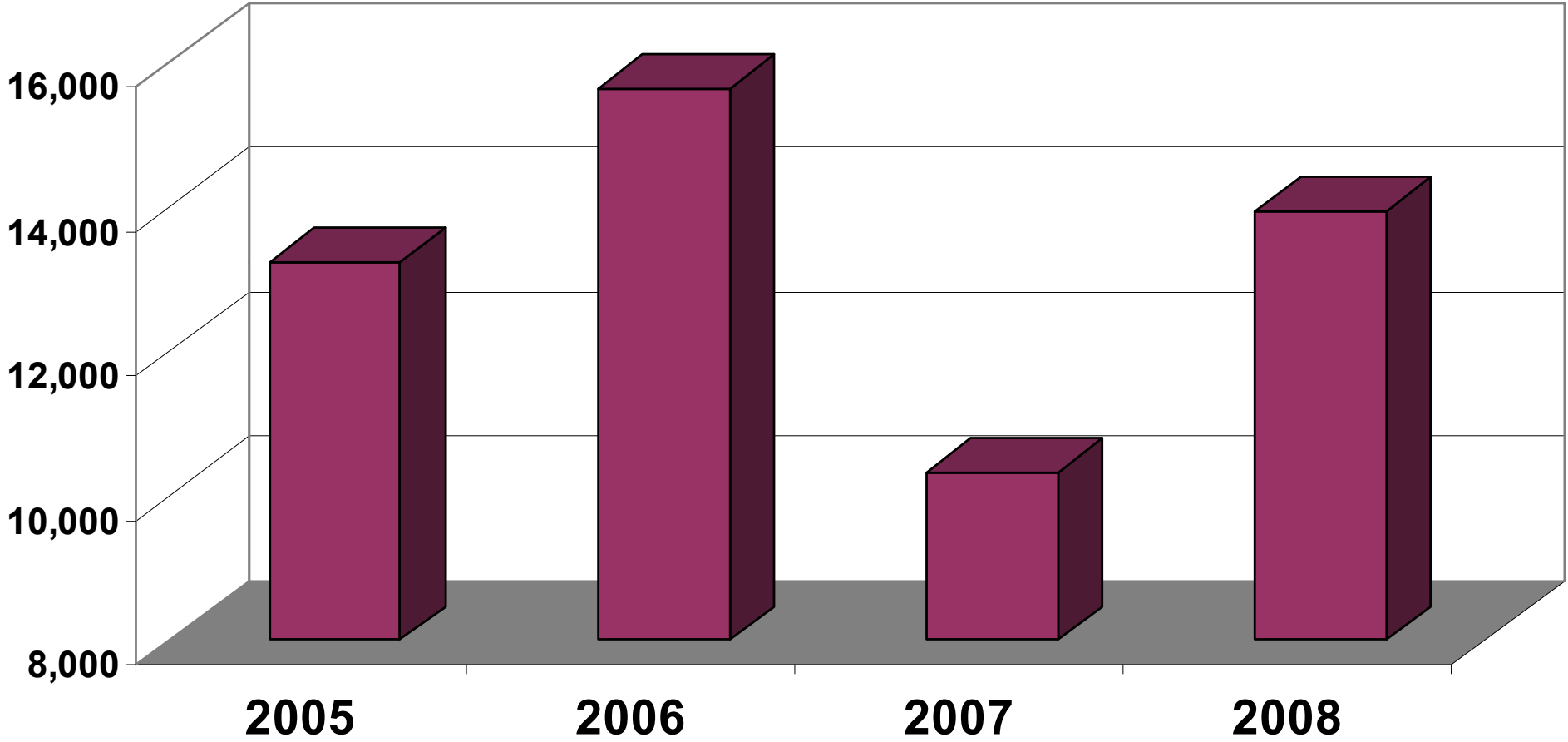


- In 1996, the Midwest High-Intensity Drug Trafficking Area (HIDTA) Program was started (IA, ND, SD, MO, NE, KS)
- National Methamphetamine Threat Assessment 2009 stated the availability of meth stabilized and probably increased in 2008 due to increased domestic production

<http://www.whitehousedrugpolicy.gov/HIDTA/ne.html>



Federal Meth Seizures, US (in pounds)

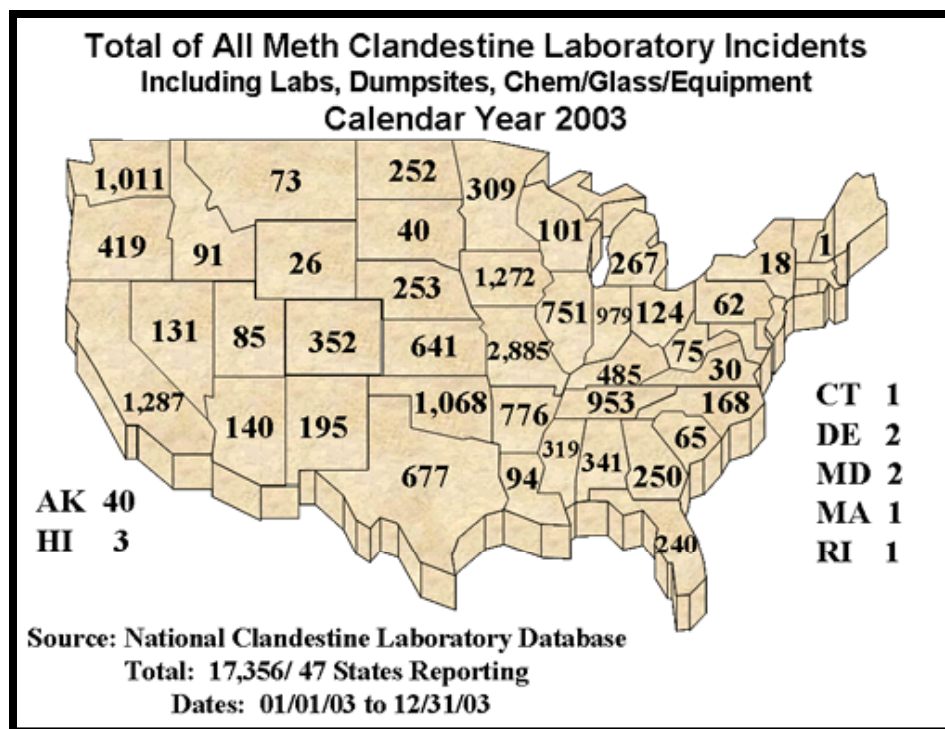


Nebraska and Methamphetamine

- Less than 18 pounds of methamphetamine seized by federal agents in 2008 (US DEA)
- Three articles, July to December, 2009, stated NE State Patrol seized 42 pounds of meth
- 2009 National Meth Threat Assessment lists Columbus and North Platte, NE, as cities reporting increase in smurfing



Incidents v. Laboratories 2003

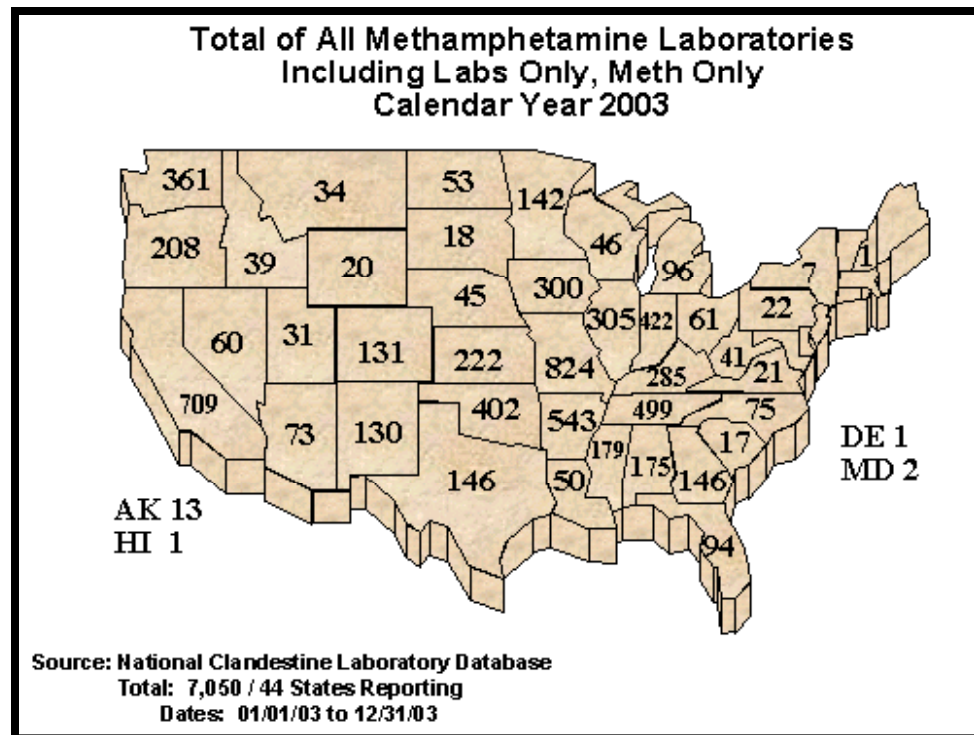


INCIDENTS

Total: 17,356
 NE (21): 253

LABORATORIES

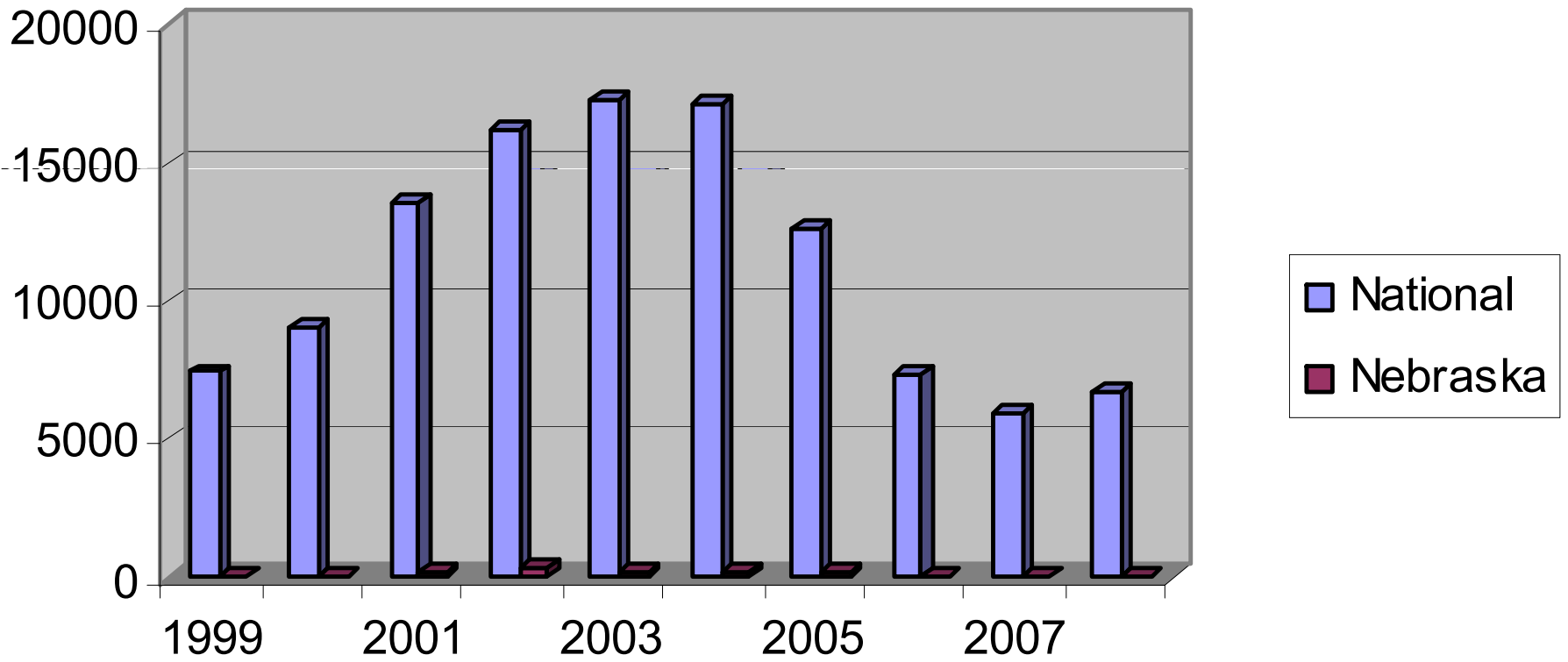
Total: 7,050
 NE (29): 45



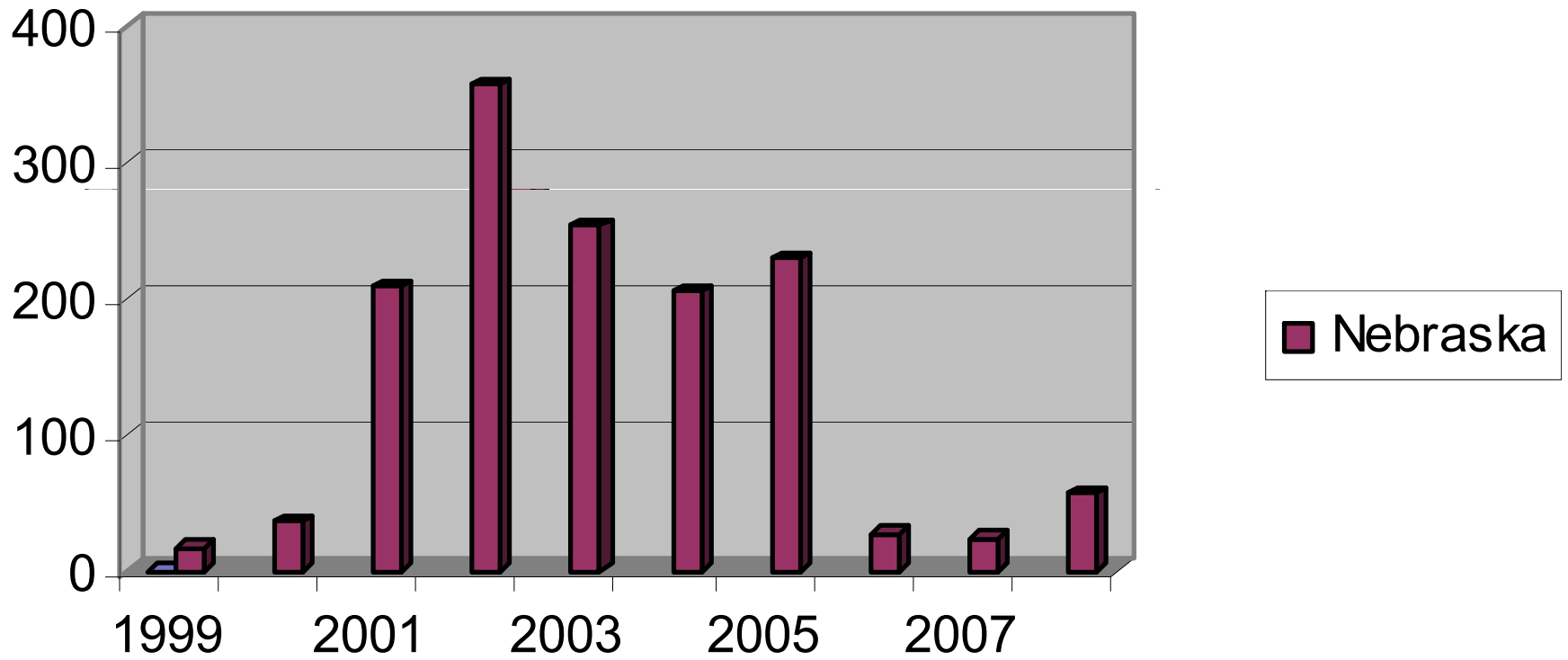
http://www.justice.gov/dea/concern/map_lab_seizures.html



Clandestine Meth Lab Incidents



Clandestine Meth Lab Incidents



Methamphetamine Synthesis

The Anhydrous Method

“Birch Reduction” “Cold” “Nazi” “Anni”

1. Extract / obtain ephedrine or pseudoephedrine
2. Add anhydrous ammonia and lithium metal
3. Let reduction run (~3 hours) then quench with water
4. Add sodium hydroxide
5. Extract methamphetamine with toluene
6. Salt out the free base
7. Purify (if necessary)



Extraction of Pseudoephedrine



Inactive ingredients acacia, candelilla wax, corn starch, FD&C red no. 40 aluminum lake, FD&C yellow no. 6 aluminum lake, hydroxypropyl methylcellulose, lactose monohydrate, magnesium stearate, pharmaceutical glaze, poloxamer 407, polyethylene glycol, polyethylene oxide, polysorbate 60, povidone, sodium benzoate, sodium lauryl sulfate, stearic acid, sucrose, talc, and titanium dioxide. Printed with edible black ink.



Getting the Fillers Out

- The polymers, soaps, and waxes are destroyed with either acid or alkali hydrolysis
- Extract ground up PE tablets with 91% isopropanol
- Boil extractant with KOH to hydrolyze the fillers
- Extract with toluene
- If do acid hydrolysis, need do repeated toluene extraction / re-crystallization



Hydrocarbon Hazards

- Universal Properties
 - * Fires and explosion
 - * Simple asphyxiant
- CNS Depression
 - * Toluene, trichloroethane, benzene, ether, naphtha
- Irritants
 - * Toluene, benzene, naphtha, acetone, etc
- Cardiac sensitization
 - * Arrhythmias
 - * Toluene, TCE, benzene
- Toluene (chronic)
 - * CNS demyelination
 - * Myopathy
 - * Renal damage
- Benzene (chronic)
 - * Aplastic anemia and AML
- Ether
 - * Heavier than air
- Chloroform
 - * Liver and renal toxicity
 - * 1-3d after ingestion



Methamphetamine Lab Fires



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Metals: Lithium and Sodium

- Lithium used more frequently than sodium
- Typically stripped out of lithium batteries
- Caustic metal
- When burned, produces toxic lithium oxide
- Reacts violently with water, producing heat and hydrogen gas



- Must be stored under oil



Anhydrous Ammonia

- Highly water soluble gas; reacts with water in mucous membranes of eyes, nose, and throat
- Converted → NH_4OH in an exothermic reaction
- Causes caustic / alkali burns
- Inflammation, edema, ulcerations, sloughing
- If to alveoli, get pulmonary edema and bleeding
- May cause alkali burns to the cornea
- Frostbite from rapid release of gas from tank



ST. LOUIS POST DISPATCH

Thursday, September 2, 2004

Man is killed in explosion of anhydrous ammonia in car

A man was killed and a woman was critically injured Wednesday when a tank of anhydrous ammonia exploded in the rear of their vehicle near Stanton, according to the Franklin County Sheriff's Department.

The department says the explosion and accident occurred about 5:30 p.m. on county Route JJ north of Interstate 44, about 50 miles southwest of St. Louis. The report said the car apparently was moving when the tank exploded.

Names of the two occupants of the vehicle were not released. The woman was able to walk to a nearby residence. She was taken by ambulance helicopter to a hospital in the St. Louis area for treatment of severe burns, the report says. The man was pronounced dead after emergency personnel tried to revive him.

Anhydrous ammonia is a corrosive gas used in fertilizer, but its transportation is regulated by state law. It must be documented and carried in proper containers. It also is used in the illegal manufacture of methamphetamine. The report said an investigation was under way.

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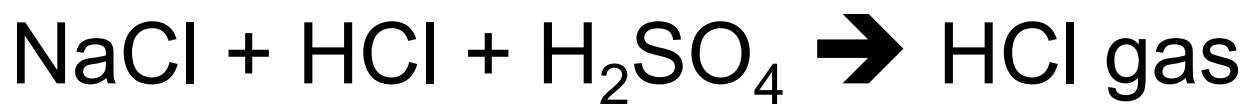
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Salting Out Methamphetamine



Acids and Bases

- All highly reactive
 - * Also: Strong acid + Strong base → violent exothermic rxn
- Acids
 - * Hydroiodic, phosphorous, hydrochloric, and sulfuric
 - * Cause coagulation necrosis
 - * Give off toxic fumes
- Bases
 - * Sodium hydroxide, potassium hydroxide
 - * Cause liquefactive necrosis and saponification with deeper damage



With friends like these ...

- 52yo M comes to ER from a friend's garage after accidentally drinking:
 - Beer and anhydrous ammonia
 - or
 - Beer and engine cleaner and 3 degreasers
- He is diaphoretic and vomiting blood
- EGD: large laryngeal edema and severe esophageal and stomach burns
- The friends store HCl, which they use to make meth, in beer bottles in the garage



High Water Solubility Airway Irritants

- Dissolve in moisture of eyes, nose, upper airway
- Produces immediate symptoms = warning sign
- Large inhalations affect lower airways also
- HCl, H₂SO₄, NH₃, hydrogen sulfide
- Symptoms:
 - * Tearing, cough, SOB, edema, laryngospasm
- Treatment:
 - * Good supportive care, nebulized beta-agonists and anticholinergics, consider steroids



Low Water Solubility Airway Irritants

- Does not dissolve in upper airway moisture
 - * Does not have immediate warning properties
- Nitrogen Oxides
 - * Direct reaction with lung tissue
 - * Converted into peroxynitrites, nitrous acid, and nitric acid
- Symptoms
 - * May be delayed for several hours
 - * Cough, dyspnea, sputum production then pulmonary edema
 - * Lesser exposures: cough and dyspnea for several weeks
- Treatment
 - * Good Supportive Care, removal from source



Gasses

- Simple Asphyxiants
 - * Hydrocarbons, hydrogen, dry ice (carbon dioxide)
 - * Displaces oxygen from the atmosphere
- Chemical Asphyxiants
 - * Phosphine, hydrogen sulfide
 - * Prevents the body from using oxygen



Other Methods of Meth Manufacture



Red Phosphorus / Iodine Method

Substitutes for the anhydrous ammonia / lithium step



Phosphorous and Iodine

- Red Phosphorous

- * Over heated → toxic oxides + white phosphorous
- * Matchbook RP is ~30% antimony sulfide; S_5Sb_2 is converted into hydrogen sulfide during processing
- * White phosphorus: cellular poison, significant burns, luminescent and pyrophoric

- Iodine

- * Commonly get I_2 crystals from tincture of iodine
- * Strong oxidizer, corrosive, irritant gasses
- * Allergic reactions have occurred



Hydrogenation Devices

- Inside of extinguisher needs a chemical-resistant coating
- Palladium catalyst preparation
 - * HNO_3 , formaldehyde, HCl
 - * H_2SO_4 , HClO_4
- Mix acetic acid, HCl , PE
- H_2 gas to 30-40 PSI(g)
- Heat to 80-90°C x 2-3 hours



The “One Bottle” Birch Method

Unpurified PE + Solvent

+

NH_4NO_3 + NaOH

+

Lithium metal



BOOM !!!

+

Bad Product



Human Hazards

- Firearms VERY common
- Surveillance systems becoming more common
- Booby-traps and bombs encountered, especially in sophisticated or larger labs
- Labs fire bombed when the police were still inside

Light bulb bomb
booby-trap



Toxic Waste Dump

- **1** pound of meth → **6-7** pounds of toxic waste
- Meth lab clean up averages \$2,500 to \$5,000
 - * Certified chemical disposal is also costly
 - * MT spent \$631,884 in FY01 cleaning up 86 labs



Protecting Yourself

- If you have not been specially trained to enter or investigate a clandestine meth lab,

DON'T GO IN !!!

- Call the appropriate authorities
- Level B PPE (full body covering, positive pressure SCBA, appropriate gloves) as a minimum until specific chemicals and hazards identified
- Cooks and victims who are contaminated, not just exposed, should be appropriately decontaminated



Drug Endangered Children

- Children's Risks
 - * Chemical exposures via inhalation, ingestion, transdermal, and cuts
 - * Nasty life style, abuse, neglect, deplorable conditions
- Experimental Meth Cook
 - * Teddy bear 1 foot from cooking area: pH1, 3100mcg/100cm² and 2100mcg/100cm² on the toy's sweater and fur respectively
 - * Carpet 20 ft away from cooking area: 6.02mcg/100cm²



Drug Endangered Children

- 2002 (national): 2023 residing in lab, 1373 exposed to toxic chemicals, 1026 into protective custody, 26 injured, 2 killed
- 2008 (national): 1,019 children affected, 6 injured, 0 killed
- UC Davis: 50% Level I children (meth lab exposure) with no toxicological evidence of meth exposure



DEC Medical Evaluation Protocols

CHEM-L

CHildren Exposed to Methamphetamine Laboratories
Flowsheet Side 1

Version 4.0 January 20, 2004

The CHEM-L Protocol provides guidance for the following personnel to guide action before, during, and after a child is found in association with a clandestine methamphetamine laboratory in Nebraska.

L Law
Enforcement

P Protection
and Safety

E Emergency
Personnel

M Medical
Personnel

F Foster
Parents

- Long-Term Effects from Lab Exposures?
- Developmental delays?
- Organ damage?

