

STATEMENT OF
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BEFORE THE
UNITED STATES SENTENCING COMMISSION

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HEARING ON
METHAMPHETAMINE

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AUGUST 5, 2025
WASHINGTON, D.C.

Introduction

Judge Reeves and Commissioners, thank you for the opportunity to discuss the chemistry of methamphetamine, potency and purity, and testing procedures. In particular, I'll explain how the forms of methamphetamine differ and why the *d*-isomer is specifically sought after for abuse; the purity level of methamphetamine in seized drugs now routinely exceeds 95 percent; and how the DEA's standard testing procedures require that seized methamphetamine be tested for purity.

As DEA's Chief of Forensics, I oversee ten decentralized and six sub-regional laboratories with more than 560 employees that provide analytical, intelligence, scientific and other forensic and administrative support to law enforcement, prosecutors, legislators, and the public. I began my career with the Drug Enforcement Administration (DEA) as a forensic chemist testing seized drugs in 1990. In this capacity, I have participated in over 40 clandestine laboratory investigations involving the manufacture of methamphetamine and testified as an expert forensic science witness in over 125 different Federal/State court criminal cases. With over 35 years of Federal Service, I have progressively served in key leadership positions since 1999. In 2022, I became Chief of Forensics and now oversee DEA's Forensic Sciences Division.

Methamphetamine Chemistry

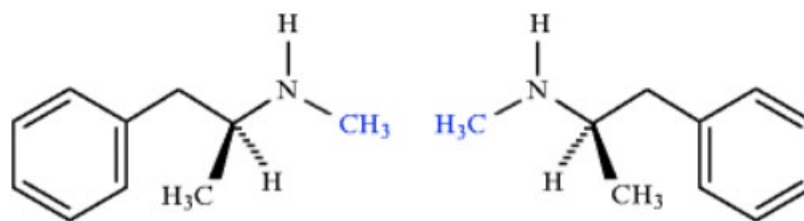


Figure 1. *d*-methamphetamine *l*-methamphetamine

Methamphetamine exists in two isomeric forms: *d*-methamphetamine and; *l*-methamphetamine (see Figure 1). The chemical formulas are exactly the same, but the arrangement of the atoms differ such that they are non-superimposable mirror images of each other, like how a left and right hand remain distinct appendages even when placed one on top of the other. All methamphetamine, regardless of the isomer, is a schedule II-controlled substance, which means it has a high abuse potential and is approved for very limited medicinal use. The *d*-form of methamphetamine has much stronger stimulant effects when compared to the *l*-form, which is why it is sought after isomer for abuse. Illicit methamphetamine is commonly found in crystalline/powder form, fake pills, or as a liquid.

Methamphetamine Synthesis

The DEA's Methamphetamine Profiling Program (MPP) has identified significant trends in methamphetamine production since its inception in the early 2000s. Two common methods for manufacturing methamphetamine are depicted in Figure 2 below. When illicit methamphetamine production became widespread in the 1980s, the preferred method of manufacturing was using phenyl-2-propanone (P2P), which led to a product that yielded a 50:50 mixture of both types of methamphetamine, commonly referred to as *d,l*-methamphetamine. At that time, the illicit drug manufacturers had no practical way to separate out the less stimulating *l*-methamphetamine from the desired *d*-methamphetamine. In the 1990s, illicit drug manufacturers started using pseudoephedrine as a precursor chemical to produce only the more potent *d*-isomer. With the passage of the Combat

Methamphetamine Epidemic Act of 2005, sale of pseudoephedrine products was restricted. These restrictions, coupled with enforcement efforts, prevented illicit manufacturers from readily obtaining the pseudoephedrine precursor. As a result, illicit manufacturers reverted back to chemicals like P2P that produce a 50:50 mixture of *d,l*-methamphetamine. However, the illicit manufacturers also discovered and deployed new chemical techniques to convert *d,l*-methamphetamine into the more potent *d*-methamphetamine form. This process of converting *d,l*- to *d*- isomer requires approximately 3-6 more manufacturing steps, but produces the desired isomer and results in the higher purity methamphetamine that is currently trafficked.

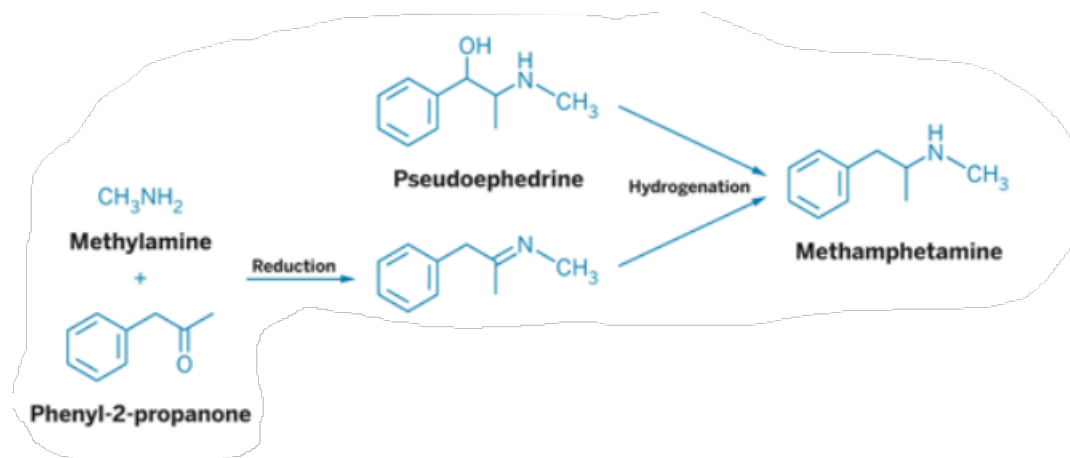


Figure 2. Two common methods for making methamphetamine start with P2P or pseudoephedrine. The pseudoephedrine method produces pure *d*-methamphetamine, whereas the P2P method produces a 50:50 mixture *d,l*-methamphetamine.

Methamphetamine Seizures

The term ‘purity’ is the amount or quantity of drug (actual methamphetamine) present relative to other substances, including impurities, contaminants, adulterants and other excipients. The term ‘potency,’ by contrast, refers to the amount of drug required to produce a biological response. The terms ‘purity’ and ‘potency’ are often mistakenly used interchangeably, though higher purity does correlate to higher potency. In the early 1990s, the average purity of a DEA seizure of crystalline methamphetamine (either or both *d*- and *l*-forms) was 37% “actual” methamphetamine. In today’s drug market, however, the average DEA crystalline seizure is 96% “actual” *d*-methamphetamine. To distinguish methamphetamine with very high purity, the term “ice” was created and defined as *d*-methamphetamine hydrochloride of at least 80% purity in response to a directive from Congress in the Crime Control Act of 1990. Most methamphetamine seized today is 96% “actual” and often, the base offense levels for “actual” and “ice” under the Sentencing Guidelines are equivalent.

Since October 2019, DEA has seized approximately 100,000 exhibits with a weight of nearly 200,000 kg of methamphetamine. On average, methamphetamine is seized in three primary forms: 91% of the time as crystalline/powder; 8% as pills; and 1% as methamphetamine contained within a liquid. More recently, drug cartels have been producing pills that visually mimic pharmaceutical drugs such as Adderall®; however, they do not contain amphetamine; instead, they contain methamphetamine and other drugs such as fentanyl. Of all the fake Adderall® pills DEA receives, 96% contain methamphetamine and contain an average of 14-17 mg of *d*-methamphetamine per pill.

Decline in Domestic Methamphetamine Production

According to the DEA's National Seizure System at El Paso Intelligence Center, U.S. methamphetamine clandestine laboratory seizures have declined significantly in recent years. In calendar year 2024, only 34 clandestine laboratories were seized, representing a 71% decrease from the 116 seizures reported in 2022. This decline reflects the regulation of precursor chemicals, enforcement efforts, and the dominance of Mexican transnational criminal organizations (TCOs) in methamphetamine production. These TCOs operate large-scale laboratories in Mexico capable of producing high-purity *d*-methamphetamine on an industrial scale. Domestic production has been unable to compete with the quantity and quality of methamphetamine trafficked into the United States by these organizations.

Methamphetamine Sentencing

In the late 1980s, to stem the spread of high purity methamphetamine across the nation, Congress established quantity thresholds for "actual" methamphetamine that require a purity test to determine the amount of pure methamphetamine seized. This varies from methamphetamine "mixture," which is a substance containing methamphetamine at any level. In 1990, the Sentencing Commission further refined the sentencing guidelines by adding the category of "ice," defined as a *d*-methamphetamine with a purity of at least 80%. This addition created three distinct categories (mixture, actual, and ice) for calculating and determining sentencing enhancements.

The current federal sentencing directives are based extensively on chemical nuances between high and low purity methamphetamine, a distinction that requires additional chemical analysis by laboratories. Laboratories have to determine the identity, weight, purity and isomer of methamphetamine seizures, whereas for other drugs such as fentanyl, cocaine or heroin, they only have to confirm the identity and weight. These additional tests require separate procedures, specific chemicals/supplies, and increased manpower and resources. Overall, the distinction between these categories have become less relevant as the average purity of crystalline methamphetamine seized today is consistently high – 96% according to DEA data. Laboratories spend significant resources analyzing purity and isomeric forms, which adds little value to inform sentencing outcomes given the uniformity of modern methamphetamine purity.

The majority of seized crystalline methamphetamine is of such high purity that the total "mixture" is nearly equal to the "actual" calculation. However, that is not the case for pills, where the average purity is approximately 5% (14-17 mg per pill). For example, 100 grams of tablets at 5% purity would be equivalent to 5 grams of "actual" methamphetamine, whereas 100 grams of crystalline form at 96% purity would be equivalent to 96 grams of "actual" methamphetamine. While pills can be lower purity than "actual" methamphetamine, these pills mimic the appearance of licit pharmaceuticals, including those taken by teens and young adults like Adderall®, where the end-user is likely unaware that they are consuming methamphetamine. Additionally, these seizures typically contain a large quantity of pills intended for distribution.

Methamphetamine Testing

DEA's current testing policy is to determine the weight, identity, purity and isomer (when required) of methamphetamine seizures (*see e.g.*, [SOP-METH-001: Standard Operating Procedure for the Analysis of Suspected Methamphetamine](#); [DEA's Laboratory Operation Manual Chapter 7500 – Analysis of Drug Evidence](#)). On average it takes 4 hours to identify the exhibit as methamphetamine and an additional 0.5

hours per analysis to determine the isomeric form and 0.5 hours to determine the purity. The DEA laboratory system analyzes approximately 16,000 methamphetamine samples per year. The estimated time required to perform both a purity and isomeric form analysis is one hour per exhibit. The additional identification requires DEA to spend approximately 16,000 additional labor hours per year (which is equivalent to testing an additional 5,000 drug exhibits per year).

The primary methodology used by the DEA laboratory system to determine the purity of methamphetamine is UV-Vis spectroscopy. Currently the laboratory system maintains 25 UV-Vis instruments at an average cost of \$17K per unit. DEA spent approximately \$425K to procure these instruments and maintains additional outyear plus replacement and maintenance costs.

As a conservative estimate, DEA spends approximately \$7.4M in a 10-year period to perform isomer and purity testing. Finally, many state and local laboratories do not have the methodology to determine purity and the isomeric form of methamphetamine and often resubmit those samples to DEA for testing.

Conclusion

DEA appreciates the opportunity to discuss the chemistry, potency, and purity of methamphetamine, and explain our testing procedures. DEA remains committed to using all tools to curb the significant threat of high purity methamphetamine being trafficked across our borders. We look forward to working with the Commission on this important issue.