



Amphetamine

Drug Checking at the Drug Information Center Zurich 2022

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1 Amphetamine evaluation 2022

Amphetamine is a synthetically produced stimulant that belongs to the phenethylamine group of substances.

In 2022, a total of 261 samples declared as amphetamine were handed in for analysis at the Drug Information Center (DIZ) Zurich and the mobile drug checkings. 204 of these samples were analyzed as part of the stationary drug checking at the DIZ, and 57 samples were analyzed as part of the eleven mobile drug checkings conducted in the city of Zurich in 2022. The results published here are not representative of the entire substance market in the city of Zurich.

1.1 Risk assessment

In addition to the known [side effects](#) and psychological dependence potential of amphetamine, the widely varying amphetamine content, synthetic impurities, toxic or other pharmacologically active extenders, and misdeclarations pose health risks.

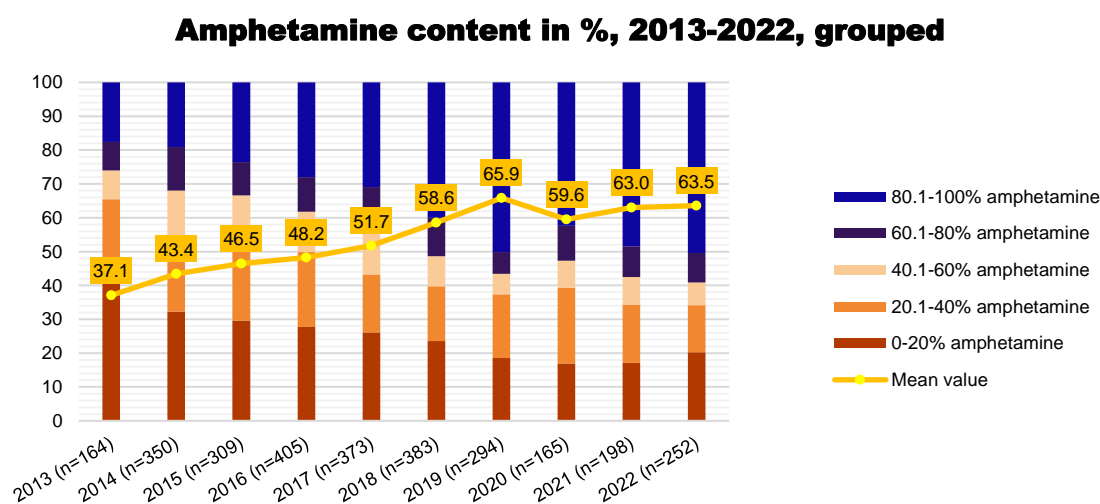
The highly variable and often high amphetamine content poses an overdose risk when consumed. High doses of amphetamine can cause an increase in body temperature, hallucinations, cardiovascular failure, cerebral hemorrhage or stroke, and even kidney and liver failure or respiratory paralysis. A dose of 50 mg/night (or consumption occasion) snorted or swallowed corresponds to the maximum recommended dose for healthy consumers.

The effects of the consumption of synthetic impurities have hardly been researched so far and thus represent an unknown risk. The consumption of amphetamine mixed with toxic solvents can attack the mucous membranes and thus, in the case of nasal consumption, cause considerable damage to the nasal mucosa in the long term.

Information and recommendations for low-risk consumption can be found at saferparty.ch under [Amphetamine Safer Use](#).

1.2 Amphetamine content

In 2022, the average amphetamine content¹ of the samples analyzed at the DIZ² was 63.5 %. Compared to the previous year, this content increased by 0.5 %³. The amphetamine content of the samples analyzed varied widely, ranging from 1.3 % to 100 %.



Graph1: Amphetamine content in %, 2013-2022, grouped

1.3 Unexpected pharmacologically active substances

The amphetamine samples handed in at the DIZ and mobile drug checkings were often a mixture of amphetamine and one or more extenders. Some of these extenders are not pharmacologically active (e.g., lactose, starch, cellulose). Extenders that have no additional effects on consumption are not reported by the laboratory and are not included in these statistics.

In 2022, 64.8% (-7.2%) of the amphetamine samples submitted contained at least one pharmacologically active extender, a synthetic impurity or contamination (smear contamination in minigrrips already used with other substances). Five samples (1.9%) were misdeclarations. In 2022, 24.9 % (-6.6 %) of all samples contained at least one synthetic impurity.

Synthetic impurities result from improper manufacturing and/or inadequate purification of the amphetamine in the manufacturing process.

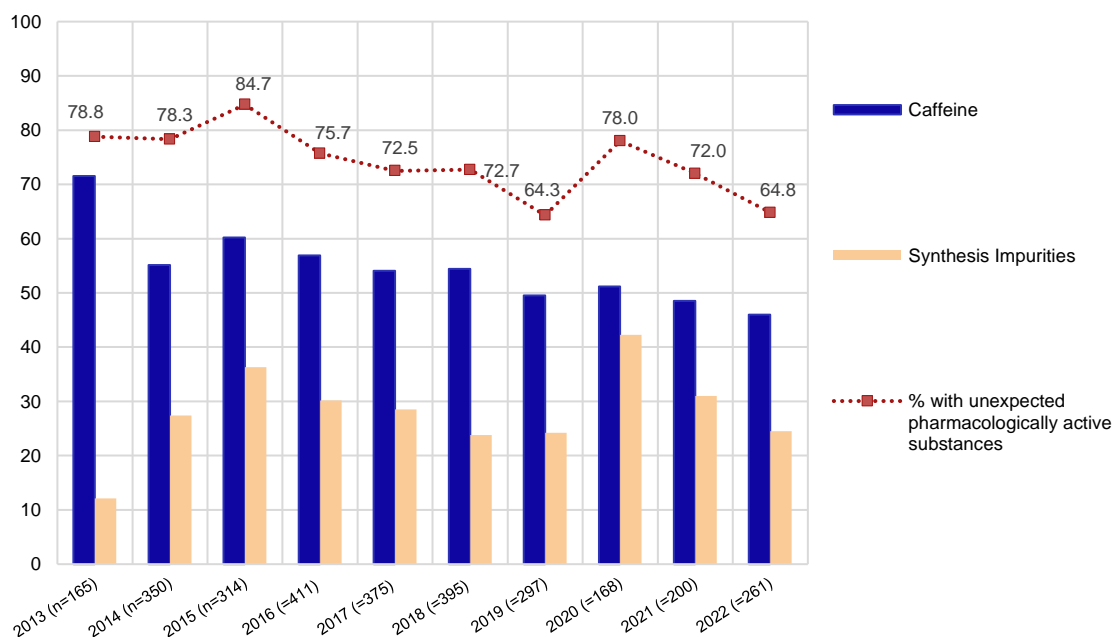
¹ The majority of amphetamine is traded as sulfate, which is why all values are reported as sulfate. Sulfate is a salt form.

² Nine samples were not included in the average amphetamine content: Three samples were pills containing amphetamine, one sample was a liquid amphetamine sample, and five samples turned out to be misdeclarations. These samples would distort the picture of the average content of powdered amphetamine due to other galenic forms and false declarations.

³ The differences compared with the previous year are shown in brackets below.

Whether and at which dosages synthetic impurities are effective and/or harmful to health is unknown. In principle, an additional unknown health risk must always be assumed. The most common pharmacologically active extender in amphetamine samples continues to be caffeine (46% of all samples).

Amphetamine samples with unexpected pharmacologically active substances in %, 2013-2022



Graph 2: Amphetamine samples with unexpected pharmacologically active substances in %, 2013-2022.⁴

The following sections list the additional substances detected in amphetamine samples in 2022, along with their effects and risks.

1.3.1 Caffeine

Caffeine makes you awake, accelerates the heartbeat, temporarily increases mental performance and has an appetite-suppressing effect. In higher doses, from 300 mg (equivalent to about 8 cups of coffee), it additionally produces euphoria. At high doses, the following side effects are possible: sweating, heart fluttering, urinary urgency, cardiac arrhythmias, perceptual disturbances, tremors, nervousness, and sleep disturbances. With regular use, there is a risk of dependence with physical symptoms. In combination with amphetamine, the effect of both substances intensifies. This leads to a higher load on the cardiovascular system.

Caffeine is added to amphetamine because of its stimulating effect and effect-enhancing potential, but also for profit maximization through stretching.

⁴ The difference in the number of samples between graph 1 and graph 2 (n=252 and n=261) is due to the fact that in graph 1, samples declared as amphetamine that did not contain amphetamine (e.g. false declarations) were not included in the evaluation. In chart 2, all declared amphetamine samples were included in the evaluation.

Caffeine was analyzed in 46.0% of amphetamine samples in 2022 (-2.5%); on average, 53.2% of caffeine was present in caffeine-strewn samples (-1.9%).

1.3.2 Synthesis Impurities

Synthetic impurities indicate improper production, which is mainly related to the fact that the substance is produced in illegal laboratories with very different quality standards and expertise. Since little information is available on the risks, side effects, and long-term consequences of the various synthetic impurities, people take an unknown additional health risk when they consume amphetamine containing synthetic impurities. It can be assumed that some of these synthetic impurities may well have neurotoxic and/or carcinogenic properties. Although synthesis impurities are visible during analysis, it is often not possible to determine exactly which substances they are and in what concentration. DPIA and Formetorex are two synthetic impurities that can be determined by laboratory analysis. DPIA exhibits a mild stimulant effect, but it is much less pronounced than that of amphetamine. The pharmacological and toxicological properties of DPIA are still unknown in humans due to a lack of scientific knowledge. The toxicity of DPIA is described as moderate based on a study in rodents.⁵ There is evidence that DPIA is partially metabolized to amphetamine in the body. In addition, DPIA may have an effect on the cardiovascular system and blood pressure as a side effect.

Formetorex is a stimulant that is half as potent as amphetamine. There is little reliable information available on the two substances concerning risks, toxicity, side effects and long-term consequences.

Synthetic impurities were detected in 24.9% of the amphetamine samples tested in 2022 (-6.6%).

Synthetic impurities were detected in 24.9 % of the amphetamine samples (-6.6 %). 19.2 % of the amphetamine samples contained one to two different synthetic impurities (+10.2 %). In 3.8 % of the amphetamine samples, three different synthetic impurities were analyzed (-2.2 %). In 1.9 % of the amphetamine samples even four to eight different synthetic impurities were analyzed (-14.6 %).

⁵ [Pharmacological characterization of 3,4-methylenedioxymphetamine \(MDA\) analogs and two amphetamine-based compounds: N,α-DEPEA and DPIA \(sciencedirectassets.com\)](#)

Proportion of analyzed synthetic impurities in amphetamine samples 2022, in % (n=261).

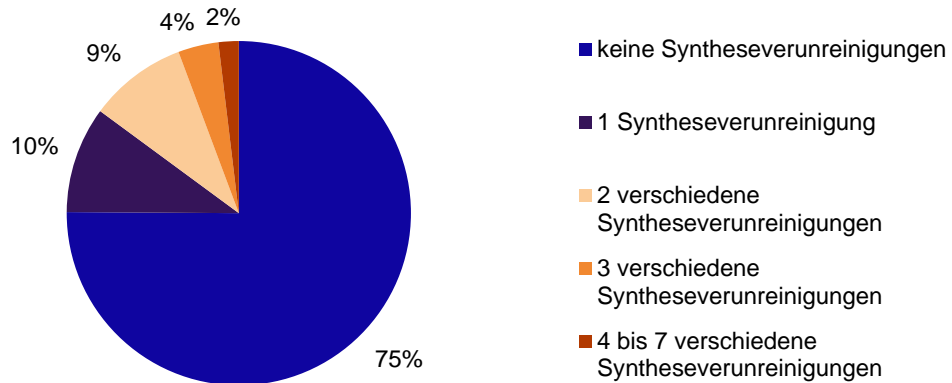


Figure 3: Proportion of analyzed synthetic impurities in amphetamine samples 2022, in % (n=261).

The impurities in the following graph are given in relation to the amphetamine content.

Proportion of synthetic impurities in relation to amphetamine content in amphetamine samples 2022, in % (n=65).

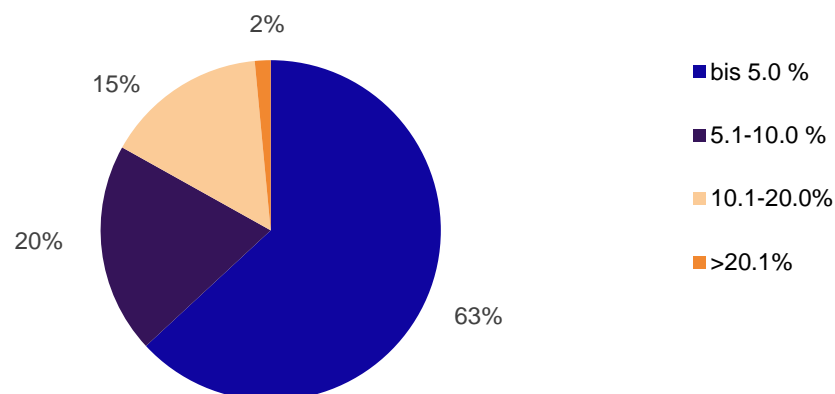


Figure 4: Proportion of synthetic impurities in relation to amphetamine content in amphetamine samples in 2022, in % (n=65)

Since there is hardly any information available on the risks, toxicity, side effects and long-term consequences of synthetic impurities, it is not possible to make a precise statement on the quantity and proportion of these impurities that are harmful to health. However, it can be assumed that larger quantity also means a greater risk. Nevertheless, it cannot be ruled out that even small quantities of certain synthetic impurities can be harmful to health.

1.3.3 Other pharmacologically active substances analyzed

In addition to the most common extenders described above, small amounts of ketamine (1 sample), cocaine (2 samples), methamphetamine (2 samples), phenethylamine (1 sample) and creatine (3 samples) were analyzed in individual amphetamine samples. This is presumably due to unintentional contamination (e.g., smear contamination in previously used minigrips). In addition, there were five misdeclarations in which amphetamine was not detected: Cocaine (2 samples), Ketamine (1 sample), one MDMA (1 sample) and one Methamphetamine (1 sample).

More information about most of these substances on saferparty.ch

1.3.4 Paste or powder

Amphetamine pastes were long considered to be particularly concentrated forms of amphetamine, as they were believed to be pure and to come directly from the manufacturing laboratory. However, these pastes are relatively impure chemically, since they are not purified or are insufficiently purified in the manufacturing laboratory.

Most samples sold as pastes consist of amphetamine salt-caffeine mixtures moistened with solvent and are rarely pastes⁶. They are moistened with, for example, phenylacetone or isopropyl alcohol to mimic a paste form (appearance of pastes and odor: phenylacetone or isopropyl alcohol are possible starting materials in amphetamine synthesis). Pastes are often liquid and sticky; in some cases, the moistening additive evaporates rapidly. Due to the toxicity of these solvents, amphetamine pastes should always be well dried before consumption.

⁶ Amphetamine base that has not been converted or has been incompletely converted to a salt such as hydrochloride or sulfate.

2 Conclusion

- The amphetamine content of the samples submitted to the DIZ has remained relatively constant between 58% and 65% since 2018. However, it is striking that around 50% of the samples submitted are extremely potent with an amphetamine content of over 80% to 100%. In parallel, 20% of the samples still have an active substance content of less than 20%. These extreme fluctuations can pose a considerable overdose risk for users.
- The most frequently detected psychoactive substances in amphetamine samples are still caffeine and synthetic impurities. It should be noted that many amphetamine users are accustomed to the rapid onset and strong effect of caffeine and often declare a caffeine-stretched sample to be "very strong". Thus, there is a risk that users overdose when using pure amphetamine due to the more subtle and later onset effect of these samples.
- In 2022, there was a slight decrease in synthetic impurities in amphetamine samples. Synthetic impurities were present in around a quarter of amphetamine samples purchased on the black market in 2022. It was particularly noticeable that significantly fewer samples with more than 4 synthetic impurities were analyzed in 2022. When synthetic impurities were detected, they were often one to two synthetic impurities.
- In the last year, amphetamine and caffeine have been increasingly detected in pills. These pills carry logos similar to those known from MDMA pills. In the case of such a false declaration, there is a risk of subsequent dosing, since no MDMA effect sets in after consumption of these pills, and thus a high dose of amphetamine is ingested unintentionally.
- Contrary to the widespread opinion among users, pastes do not indicate a particularly high quality of amphetamine.

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