EUDA
EUROPEAN UNION DRUGS AGENCY

INITIAL REPORTS

NEP

EUDA initial report on the new psychoactive substance 2-(ethylamino)-1-phenylpentan-1-one (*N*-ethylnorpentedrone, NEP)

In accordance with Article 9 of Regulation (EU) 2023/1322

Contents

Acknowledgements

The European Union Drugs Agency (EUDA) acknowledges the essential role of the Reitox national focal points and their national early warning systems in Member States for collecting and reporting national data and providing expertise. We also thank Europol and its National Units, the European Medicines Agency (EMA) and national medicinal product authorities, the European Chemicals Agency (ECHA), the European Centre for Disease Prevention and Control (ECDC), the European Food Safety Authority (EFSA), and the World Health Organization for their valuable contributions. Their input ensures that the report is truly multidisciplinary.

1. Introduction

2-(Ethylamino)-1-phenylpentan-1-one (*N*-Ethylnorpentedrone, NEP) is a synthetic cathinone stimulant. It is *N*-alkylated cathinone, which is structurally related to methcathinone ([1]) and pentedrone ([2]).

In Europe, NEP is monitored by the EUDA as a new psychoactive substance ([2]) through the EU Early Warning System (EWS) in accordance with Article 8 of Regulation (EU) 2023/1322 ([3]).

NEP was formally notified as a new psychoactive substance (EMCDDA, 2019a: 15-16, 2019b) by the EUDA on behalf of Austria on 6 March 2014. The notification was based on the identification of the substance in a police seizure of 22.2 grams of white powder made on 15 October 2013 in Styria.

Since the formal notification, information on NEP has been exchanged between the EUDA and the EU EWS Network (EUDA, Europol, Reitox national focal points and the Commission); the EMA has been kept duly informed.

Based on signals suggesting increased availability and harms related to NEP in some parts of Europe, on 14 October 2024, the EUDA added NEP to the list of new psychoactive substances under intensive monitoring (EMCDDA, 2019c) and requested that the Network expedite reporting of any event involving NEP to the EUDA until further notice.

The EUDA is currently monitoring 178 synthetic cathinones through the EU EWS that have been identified on the European drug market between 2004 and 2024.

After falling from a peak of 1.9 tonnes in 2016, the quantity of synthetic cathinones detected in Europe rose significantly between 2020 and 2024, increasing from 0.7 tonnes in 2020 to 8.5 tonnes in 2021, 26.5 tonnes in 2022, 36.7 tonnes in 2023, and preliminary data suggesting more than 43 tonnes in 2024 – representing more than a 6 000% increase in the quantity of material.

This dramatic increase is primarily due to European suppliers importing large quantities of synthetic cathinones from chemical companies in India since 2019, apparently principally through the Netherlands. Overall, such imports total at least 106.8 tonnes between 2020 and

([1]) Listed in Schedule I of the 1971 United Nations Convention on Psychotropic Substances.
([2]) As defined in point 4 of Article 1 of Council Framework Decision 2004/757/JHA of 25 October 2004 laying down minimum provisions on the constituent elements of criminal acts and penalties in the field of illicit drug trafficking (OJ L 335, 11.11.2004, p. 8).
([3]) Regulation (EU) 2023/1322 of the European Parliament and of the Council of 27 June 2023 on the European Union Drugs Agency (EUDA) and repealing Regulation (EC) No 1920/2006. https://eur-lex.europa.eu/eli/reg/2023/1322/oj/eng

2024, with 43.7 tonnes in 2024 alone. This has led to some cathinones previously sourced from companies in China and subsequently controlled there to re-emerge in apparently much greater quantities on the European drug market through this new supply route. These substances include 3-MMC and 3-CMC, which were subject to initial reports and later risk-assessed and controlled in the EU, and more recently 2-MMC and 4-BMC. In addition, other cathinones that were still on the market, such as NEP, have also been imported in large quantities leading to a significant increase in availability. This increased supply has been associated with a rise in cathinone-related harms, including acute poisonings and deaths in several European countries.

In 2024, approximately 4 000 seizures of three cathinones reported to the EU Early Warning System accounted for over 40.4 tonnes: 2-MMC (33.4 tonnes), NEP (6 tonnes) and 4-BMC (1 tonnes). For each of these substances, imports originating from India accounted for more than 99% of the total quantity seized in 2024. These three cathinones are currently the subjects of EUDA initial reports.

Article 9 of Regulation (EU) 2023/1322 requires that 'Where the Agency, the Commission or a majority of Member States considers that information on a new psychoactive substance collected in one or more Member States and shared with it or them gives rise to concerns that the new psychoactive substance might pose health or social risks at Union level, the Agency shall draw up an initial report on the new psychoactive substance.'

The initial report is submitted to the Commission and the Member States. The purpose of the initial report is to provide scientific evidence to the Commission to allow it to make an informed decision regarding whether or not there is a need to request a risk assessment on a new psychoactive substance as set out in Article 10 of Regulation (EU) 2023/1322.

Based on the information reported by the EU EWS Network, in February 2025, the EUDA assessed the existing information (EMCDDA, 2019a) ([4]) on NEP, based on the following criteria:

- reports of health problems,
- reports of social problems,
- reports of seized material,
- pharmacological and toxicological properties and analogy with better-studied substances,

([4]) This included information reported to the EUDA through the Early Warning System, including case reports and aggregated datasets.

- potential for further spread.

The EUDA concluded that the assessment gave rise to concerns that NEP may pose health or social risks at Union level, and, consequently, determined that an initial report should be produced.

2. Information collection process

In accordance with the requirements of Article 9 of the Regulation, on 28 February 2025, the EUDA launched a procedure for the collection of additional information on NEP in order to support the production of the initial report.

The EUDA collected information through:

- a structured reporting form sent to the Reitox national focal points in the Member States, Türkiye and Norway (Article 9(4)),
- routine monitoring of open source information,
- a search of open source information conducted specifically for the production of the initial report which included scientific and medical literature, official reports, grey literature, internet drug discussion forums and related websites (hereafter, 'user websites') and online vendors.

In addition, the EUDA also submitted requests to:

- the World Health Organization (WHO) in order to determine if NEP is under assessment or has been under assessment within the system established by the 1961 Single Convention on Narcotic Drugs, as amended by the 1972 Protocol, and the 1971 Convention on Psychotropic Substances ('United Nations system');
- the European Medicines Agency (EMA) in order to determine if NEP is used as an active substance in a medicinal product for human or veterinary use at Union or national level (Article 9(5)). Specifically, the EMA was asked if NEP is an active substance in:

    a. a medicinal product for human use or in a veterinary medicinal product that has obtained a marketing authorisation in accordance with Directive 2001/83/ EC

of the European Parliament and of the Council ([5]), Regulation (EC) No 726/2004 or Regulation (EU) 2019/6 of the European Parliament and of the Council ([6]);

b. a medicinal product for human use or in a veterinary medicinal product that is the subject of an application for a marketing authorisation;

c. a medicinal product for human use or in a veterinary medicinal product whose marketing authorisation has been suspended by the competent authority;

d. an unauthorised medicinal product for human use in accordance with Article 5 of Directive 2001/83/EC or in a veterinary medicinal product prepared extemporaneously in accordance with Article 112(1), point (c), of Regulation (EU) 2019/6;

e. an investigational medicinal product as defined in point (d) of Article 2 of Directive 2001/20/EC of the European Parliament and of the Council ([7]);

- Europol in order to provide information on the involvement of criminal groups in the manufacture, distribution, distribution methods and trafficking of NEP, and on any use of NEP (Article 9(6));
- the European Chemicals Agency (ECHA), the European Centre for Disease Prevention and Control (ECDC) and the European Food Safety Authority (EFSA) in order to provide the information and data at their disposal on NEP (Article 9(7)).

The information collection process was largely concluded on 14 March 2025. The EUDA received responses from all 27 Member States, Türkiye and Norway. In addition, the EUDA received responses from the WHO, EMA, Europol, ECHA, ECDC and EFSA.

3. Methodological note

NEP has been available on the drug market since 2013. Although NEP is screened for in many forensic and toxicology laboratories in Europe, it cannot be excluded that some cases of NEP are undetected or unreported, in particular in serious adverse events.

([5]) Directive 2001/83/EC of the European Parliament and of the Council of 6 November 2001 on the Community code relating to medicinal products for human use (OJ L 311, 28.11.2001, p. 67).
([6]) Regulation (EU) 2019/6 of the European Parliament and of the Council of 11 December 2018 on veterinary medicinal products and repealing Directive 2001/82/EC (OJ L 4, 7.1.2019, p. 43).
([7]) Directive 2001/20/EC of the European Parliament and of the Council of 4 April 2001 on the approximation of the laws, regulations and administrative provisions of the Member States relating to the implementation of good clinical practice in the conduct of clinical trials on medicinal products for human use (OJ L 121, 1.5.2001, p. 34).

Complementary data sources have been used in the preparation of the Initial Report.

- For the period comprised between 1 January 2013 and 31 December 2024, annual aggregated data which is systematically reported to the EUDA has been used. Data for 2024 is preliminary. In addition, event-based data reported through the European Database on New Drugs between 1 January 2013 and 14 March 2025 has also been used.
- It is important to note that the data on seizures and imports from aggregated data may potentially include some instances of double-counting. Specifically, substances that are initially recorded as legal imports may later be seized by law enforcement. In such cases, the same physical material could be counted twice: first as an import and subsequently as a seizure. While the exact extent of this overlap cannot be determined from the available data, this limitation should be considered when interpreting the total quantities reported.
- Only serious adverse events reported through event-based data are discussed in detail in Section 4.1.2.
- For the period comprised between 1 January and 14 March 2025, data reported through a targeted request for information (a structured reporting form sent to the Reitox national focal points and responses to ad hoc information requests) have been used. These data are not comparable to aggregated seizure data.
- Open source information identified through routine monitoring has also been used throughout the report, when confirmed by Reitox national focal points.

4. Information required by Article 9(2) of the Regulation

The order and titles of subsections 4.1 to 4.9 below are as they appear in Article 9(2) of Regulation (EU) 2023/1322; sections 4.1 to 4.4 are cross-referenced with the headings of Article 9(2a) to Article 9(2d) of the Regulation.

4.1 Nature, number and scale of incidents showing health and social problems in which the new psychoactive substance may potentially be involved, and the patterns of use of the new psychoactive substance (Article 9(2a))

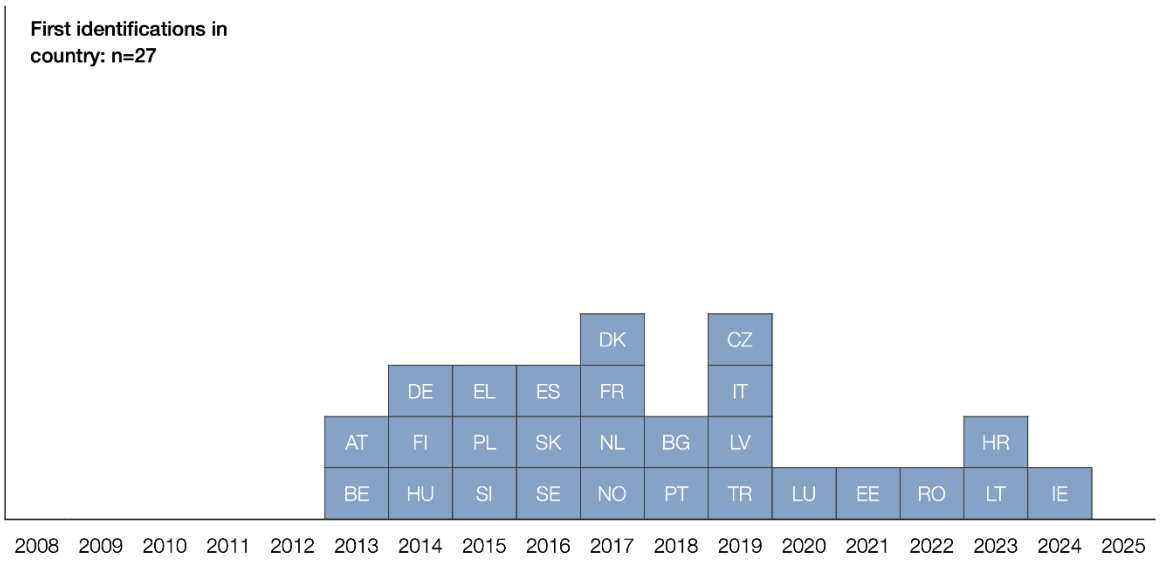
4.1.1 Information from seizures, collected samples and biological samples

First identifications in country

Between 1 January 2013 and 14 March 2025, a total of 25 Member States, Türkiye and Norway reported the identification of NEP for the first time (Figure 1). The Member States are Austria, Belgium, Bulgaria, Croatia, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, the Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain and Sweden.

Two Member States have not reported the identification of NEP in their country as of March 2025: Cyprus and Malta.

Figure 1: Countries reporting the first identification of NEP and year of identification, 2013-2025. Note: EU two-letter country codes are used to identify each country (e.g. AT=Austria, BE=Belgium)

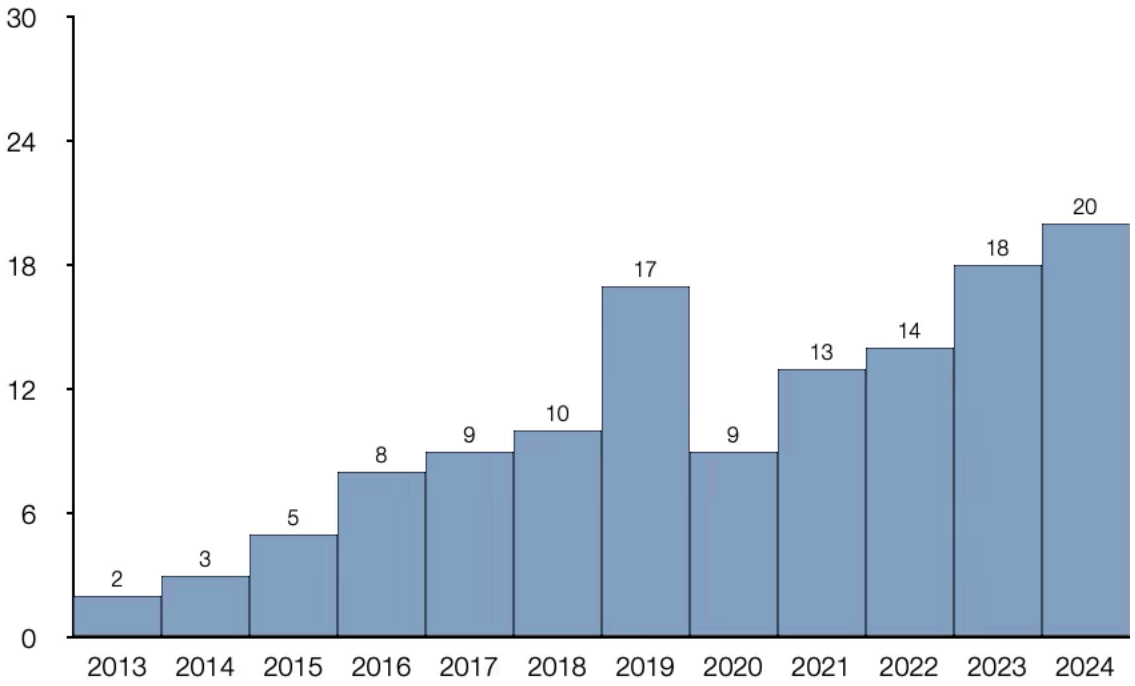


Information from seizures and imports

Between 1 January 2013 and 31 December 2024, a total of 6 714 seizures and imports (cases) containing NEP across all physical forms were reported by law enforcement in 25 Member States, Türkiye and Norway. The Member States are Austria, Belgium, Bulgaria, Croatia, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, the Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain and Sweden.

Powders constituted 6 473 (96.4%) of all cases. The remaining 241 cases (3.6%) comprised various other physical forms: 54 as plant material, 42 as liquid, 16 as tablets and capsules, three as paper, one as hash/resin, and 125 cases reported as other or unknown. The number of countries reporting cases per year is presented in Figure 2.

Figure 2: Number of countries with NEP seizures and imports reported by law enforcement by year, EU+2, 2013-2024



Given the predominance of cases involving powder, the subsequent analysis focuses on this physical form.

Of 6 473 powder cases, 6 224 (96.1%) reported quantities in weight (kilograms) and were included in the analysis. The remaining 249 cases (3.9%) lacked information on weight and were excluded.

A total of 6 224 cases amounting to 11 105.399 kg (11.1 tonnes) of NEP powder were reported between 2013 and 2024 (Figure 3 and Figure 4).

Since 2022, there has been a significant increase in NEP seizures and imports. A total of 4 076 cases (65.5% of all cases) amounting to 11 002.619 kg (99.0% of all NEP quantity) were reported during the three-year period between 2022 and 2024. Of these, the Netherlands reported 47 imports from India amounting to 10 818.045 kg (97.4% of total quantity), with 5 970 kg (53.7%) reported in 2024 alone.

Figure 3: Number of NEP powder seizures and imports reported by law enforcement in weight (kilograms), EU+2, 2011-2024

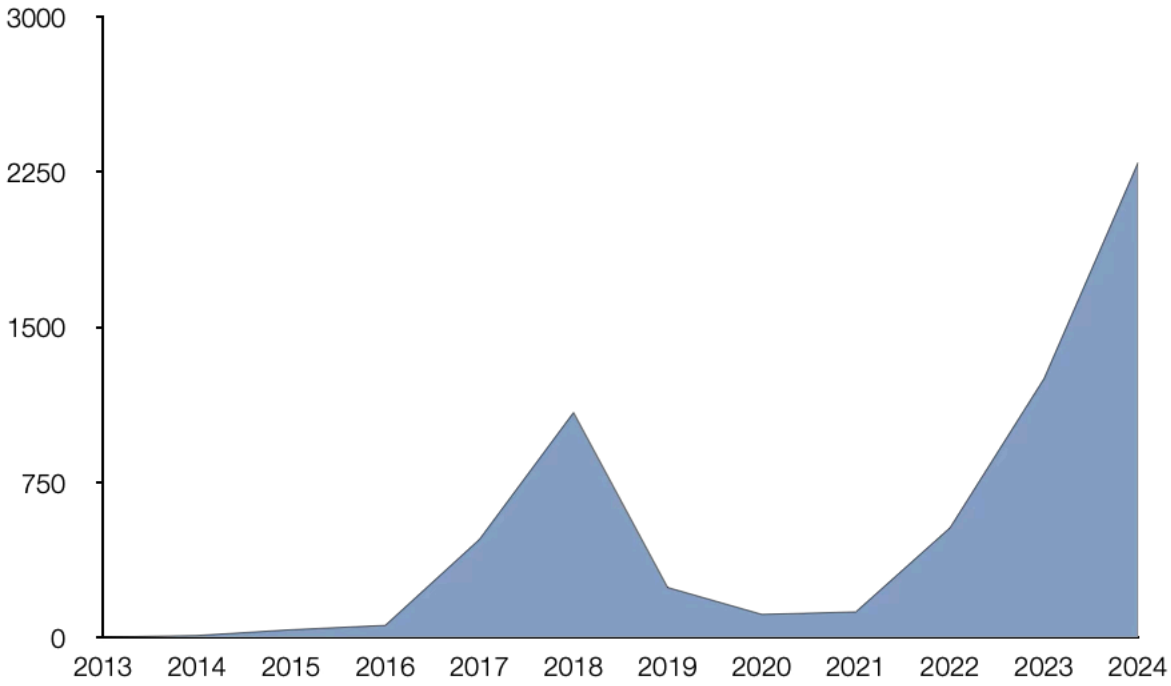
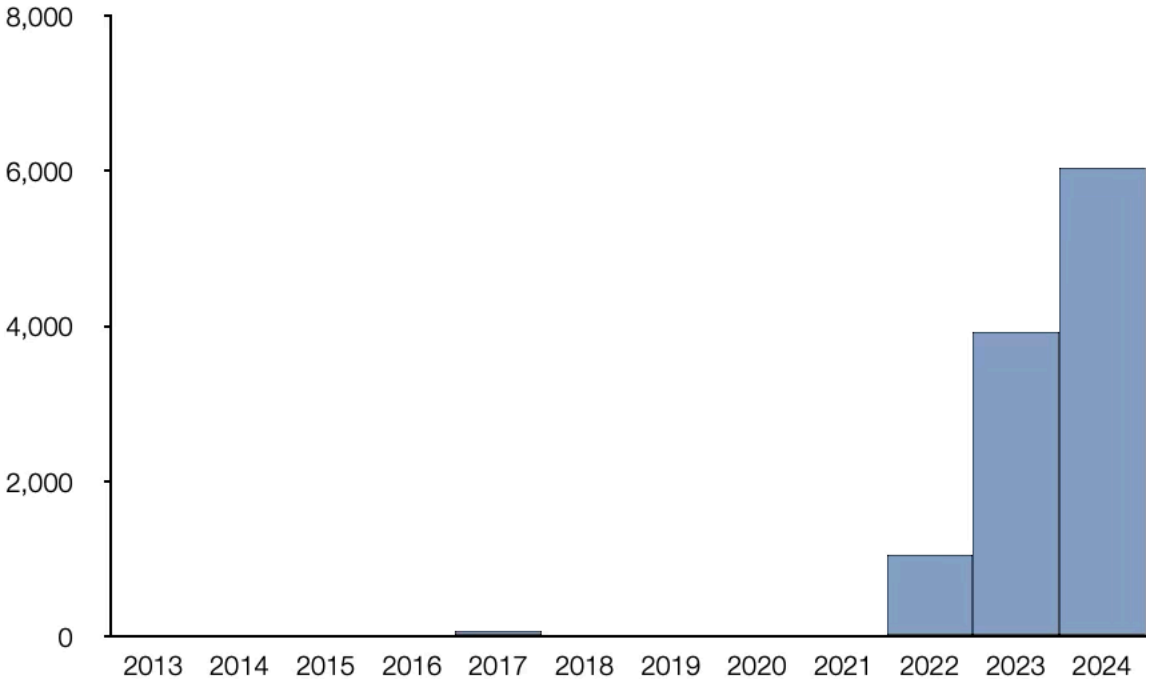


Figure 4: Quantities (kg) of NEP powder seizures and imports reported by law enforcement, EU+2, 2011-2024



Where reported, the powder was typically described as white, off-white or yellow. The purity of the powders was not reported.

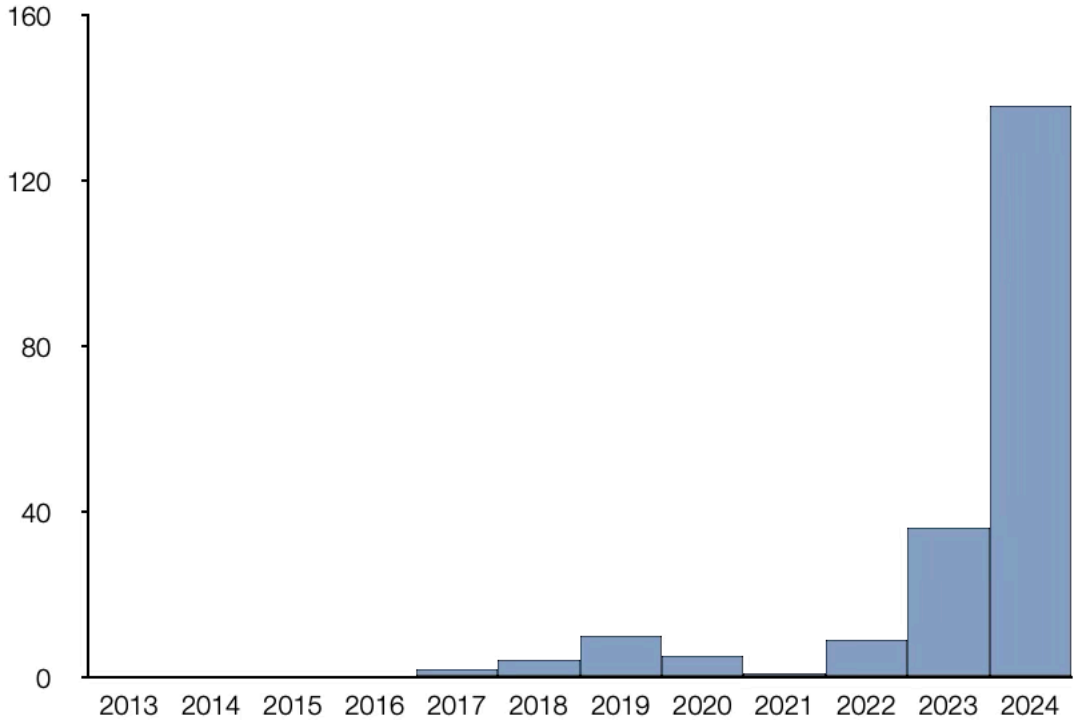
In 5 840 cases (93.8%), NEP was the only substance reported to be present. In 366 cases (5.9%), NEP was found in combination with one or more other substances, including other cathinones. In the remaining 18 cases (0.3%), the presence of other substances was reported as unknown or information was not available.

Separately, between 1 January and 14 March 2025, a total of 31 NEP cases were reported by five Member States: Finland, Greece, Lithuania, Spain and Sweden. Of these, nine cases (90%) were powders, amounting to 0.258 kg. In two cases, the powders were described as an off-white crystalline powder and a white powder, respectively. The purity of the powders was not reported.

Information from collected samples

Between 1 January 2013 and 31 December 2024, nine Member States reported a total of 205 collected samples containing NEP, with most coming from drug checking services: Austria, France, Italy, Luxembourg, the Netherlands, Poland, Portugal, Slovenia and Spain (Figure 5).

Figure 5: Number of NEP collected samples reported by year, EU+2, 2013-2024



Notably, 183 (89.2%) of the cases occurred between 2022 and 2024, and 138 (67.3%) in 2024 alone. At least in part, this likely mirrors the significant increase in availability of NEP as reflected in seizures and imports reported by law enforcement during the same time period. The analysis below is limited to samples collected between 2022 and 2024.

The Netherlands reported 112 (61.2%) of the cases during this time period, followed by France with 30 (16.4%), Austria with 23 (12.6%), Spain with 12 (6.6%), Slovenia with two (1.1%), Poland with two (1.1%), Italy with one (0.5%) and Luxembourg with one case (0.5%).

Powders constituted 176 (96.2%) of all cases. The remaining seven cases (3.8%) comprised various other physical forms: four cases of capsules and three cases reported as liquids.

Given the predominance of cases involving powder, the subsequent analysis focuses on this physical form.

In 157 (89.2%) of the cases, NEP was the only substance reported to be present. In 13 cases (7.4%), NEP was found in combination with other substances, including 2-MMC and other cathinones. In the remaining six cases (3.4%), the presence of other substances was reported as unknown or information was not available.

Information on purchase intent was reported in 108 cases that were all collected in 2024. In four cases (3.7%), NEP was purchased intentionally. In the remaining 104 cases (96.3%), NEP was mis-sold as other substances, primarily as 3-MMC (majority of 98 cases) with 'Flakka' in a smaller number of instances, and various other substances and names reported in the remaining six cases.

Separately, between 1 January and 14 March 2025, a total of six collected samples containing NEP were reported by one Member State: the Netherlands. All samples were reported as powders. In four cases, the samples were mis-sold as either 3-MMC, 4-MMC or MDMA.

Information from biological samples

A total of 7 391 detections where NEP was analytically confirmed in biological samples were reported in either aggregated data or event-based data by seven Member States: Belgium (22), Germany (1), Hungary (7 323), Italy (5), the Netherlands (8), Poland (11) and Sweden (21).

The biological samples were reported between 2014 and 2025 as follows:

- between 2014 and 2021: 53 samples, reported in 2014 (9), 2016 (4), 2017 (1), 2019 (14), 2020 (13) and 2021 (12);
- between 2022 and 2024: 7 333 samples, reported in 2022 (755), 2023 (2 731) and 2024 (3 847);
- in 2025: five samples.

Aggregated reporting

A total of 7 323 detections of NEP in biological samples were reported in aggregated datasets (8) by five Member States: Belgium (21), Hungary (7 274), the Netherlands (4), Poland (4) and Sweden (20). These samples related to drug abuse (consumption) (5 908), cases of driving under the influence of drugs (1 155, including 121 samples linked to traffic accidents), non-fatal poisonings (176), deaths (41), drug-facilitated sexual assault or violence (24), unspecified forensic case work (17) and petty drug offences (2).

([8]) These data were reported in aggregated datasets. It is important to note that the number of samples may not correspond directly to the number of cases, as multiple biological samples may be collected from a single case. It is therefore not possible to determine the exact number of unique cases represented.

Event-based data

A total of 68 biological samples were reported through event-based data. 68 serious adverse events with confirmed exposure to NEP from biological samples were reported as follows and are discussed in Section 4.1.2:

- five acute poisonings reported by Italy (4) and Belgium (1);
- 63 deaths reported by Germany (1), Hungary (49), Italy (1), the Netherlands (4), Poland (7) and Sweden (1).

4.1.2 Health problems

Acute poisonings

Confirmed exposure

Five cases of acute poisoning with confirmed exposure to NEP were reported by Italy (4) and Belgium (1). The cases occurred between 2021 and 2025 as follows: 2021 (1), 2022 (1), 2023 (1), 2024 (1) and 2025 (1). In all of the cases, other substances were identified, including central nervous system depressants (such as opioids and benzodiazepines) and central nervous system stimulants (such as amphetamine and other synthetic cathinones). One case was classified as life-threatening, requiring hospitalisation, while three were classified as non-life threatening but still required hospital treatment. The reported effects included seizures, tachycardia, hyperthermia, rhabdomyolysis, drowsiness and severe agitation.

Suspected exposure ([9])

A total of 32 cases of acute poisoning with suspected exposure to NEP were reported by the Netherlands (26), Slovakia (2) and Sweden (4). Where the date is known, the cases occurred between 2016 and 2025: in 2016 (1), 2019 (2), 2021 (1), 2023 (3), 2024 (19) and 2025 (4).

Where reported, 22 were male and nine were female. Where reported, the individuals were aged between 15 and 59 (mean: 34; median: 35). The reported effects included tachypnoea, hyperventilation, shortness of breath, hypertension, tachycardia, heart palpitations,

([9]) Suspected exposure means that the information on exposure to the substance is limited to the name of the substance that the case or someone else linked to the event believes that the case has consumed and/or from packages containing the drugs that the case is thought to have consumed.

hallucinations, psychosis, panic, agitation, anxiety, dizziness, restlessness, apathy and muscle weakness.

Deaths

A total of 63 deaths with confirmed exposure to NEP were reported by Germany (1), Hungary (49), Italy (1), the Netherlands (4), Poland (7) and Sweden (1). The cases occurred between 2017 and 2025 as follows: 2017 (1), 2022 (5), 2023 (17), 2024 (37) and 2025 (3).

Where reported, 43 were male and 10 were female. Age was reported in 33 of the cases. The individuals were aged between 0 and 59 (mean: 35; median: 35).

In the majority of the cases, other substances were identified, including central nervous system depressants (such as alcohol, opioids and benzodiazepines) and central nervous system stimulants (such as MDMA, amphetamine, methamphetamine, and other synthetic cathinones).

The cause of death was reported in 31 cases. In 12 cases, NEP was reported to be the cause of death or to have contributed to the death.

Information from other sources

Additional cases of acute poisonings, including deaths, linked to NEP have been reported in the scientific literature (Deville et al., 2022; Drevin et al., 2024; Pieprzyca et al., 2022).

ECDC reported that they do not have any information on NEP.

4.1.3 Social problems

While specific information on the social risks of NEP is limited, they may parallel those documented for similar synthetic cathinones, such as pentedrone, MDPV (3,4-methylenedioxypyrovalerone) or alpha-PVP (alpha-pyrrolidinopentiophenone), and stimulants generally. For related substances, these risks include negative impacts on socioeconomic status, family dynamics, academic/employment performance, and increased vulnerability depending on the user population (Brookman et al., 2016; de Jonge et al., 2021; Nijkamp et al., 2021).

Limited evidence suggests there is NEP use among vulnerable populations, including high-risk drug users and those engaging in chemsex (Drevin et al., 2024).

4.1.4 Patterns of use

The limited information suggests that NEP is sold both as a substance in its own right and mis-sold as other drugs, particularly 3-MMC or 'Flakka' (a common street name originally used for alpha-PVP but subsequently used for potent cathinone with more cocaine-like effects). Usage patterns of NEP likely resemble those of similar synthetic cathinones such alpha-PVP, but also 3-MMC (given that it is mis-sold as this substance). Similarly to such cathinones, NEP is typically administered by insufflation (snorting) and to a lesser degree vaporising (smoking), with some cases of oral administration or intravenous injection.

NEP appears to be used primarily by existing stimulant users, including those who use cathinones (including 'Flakka' users), amphetamines, cocaine and ecstasy, who either use it in addition to substances they already use or as a replacement. This appears to include both recreational use and, in some cases, high-risk behaviours such as injection which may be part of chemsex. Additionally, vulnerable groups, including young people, may be attracted to NEP because of its availability, legal status in some countries, and relatively low cost. NEP also appears to be frequently mis-sold as substances with established user bases, such as 3-MMC, potentially further contributing to its use among young people. NEP may be used in various settings including domestic environments, recreational venues and chemsex contexts.

4.2 Chemical and physical description of the new psychoactive substance and the methods and precursors used for its manufacture or extraction (Article 9 2(b))

4.2.1 Chemical description and names

N-ethylnorpentedrone (NEP) is a synthetic derivative of the naturally occurring substance cathinone which is internationally controlled ([10]) and one of the psychoactive principles in khat (*Catha edulis* Forsk). NEP was described in the scientific literature after its first detection on the drug market in Europe in October 2013, in a paper describing the identification of NEP in samples purchased on the Internet between January and August 2013 (Uchiyama et al., 2014).

([10]) Listed in Schedule I of the 1971 United Nations Convention on Psychotropic Substances.

As with many other synthetic cathinone derivatives monitored by the EUDA through the EU Early Warning System, NEP is an *N*-alkylated cathinone. Unlike many of the cathinone derivatives monitored by the EUDA, NEP is not substituted on the phenyl ring.

The common name NEP is derived from *N*-ethylnorpentedrone ([11]).

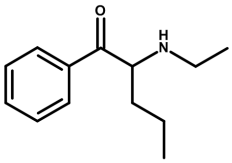
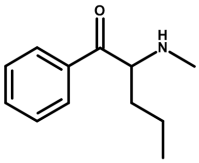
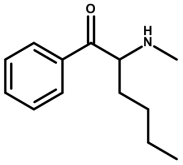
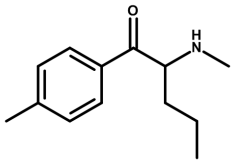
NEP is a higher homologue of pentedrone ([12]), which is internationally controlled. NEP is a structural isomer ([13]) of the following cathinones monitored by the EUDA: 2-methylethylbuphedrone (2-MEB) ([14]), 3-methyl-*N*-propyl-cathinone (3-PMC) ([15]), isohexedrone ([16]), 2,4-DMEC ([17]), 4-ethylethcathinone (4-EEC) ([18]), 4-methylpentedrone (4-MPD) ([19]), hexedrone (β-propylmethcathinone) ([20]), 3,4-dimethylethcathinone (3,4-DMEC) ([21]), 2,4,5-trimethylmethcathinone (2,4,5-TMMC) ([22]) and diethylcathinone ([23]).

NEP is also a structural isomer of the following cathinones not currently monitored by the EUDA: 4-methylethylbuphedrone (4-MEB) ([24]), butylcathinone (BAP) ([25]), tert-butylcathinone (t-BAP) ([26]), 4-ethyl-*N.N*-dimethylcathinone (EDMC) ([27]), *N*-ethyl-*N*-methylbuphedrone ([28]), 2-ethylethcathinone (2-EEC) ([29]), 3-ethylethcathinone (3-EEC) ([30]), 4-methyl-*N*-propylcathinone ([31]), 4-methyl-*N*-ethyl-*N*-methylcathinone ([32]), *N.N*-dimethylpentedrone ([33]), N,4-dimethyl-buphedrone ([34]) and *N*-propyl-norbuphedrone ([35]).

The molecular structure, molecular formula and molecular mass of NEP are provided in Figure 6.

([11]) The origin for the abbreviated common name is indicated by underlining the relevant letters in the common name.
([12]) 2-(Methylamino)-1-phenylpentan-1-one; listed in Schedule II of the 1971 United Nations Convention on Psychotropic Substances.
([13]) Structural isomers have the same molecular formula and molecular weight, differing only in the structural arrangement in space.
([14]) 2-(Ethylamino)-1-(2-methylphenyl)butan-1-one; formally notified by the EUDA in October 2020.
([15]) 2-(Propylamino)-1-(3-methylphenyl)-1-propan-1-one; formally notified by the EUDA in August 2021.
([16]) 4-Methyl-2-(methylamino)-1-phenylpentan-1-one; formally notified by the EUDA in April 2019.
([17]) 1-(2,4-Dimethylphenyl)-2-(ethylamino)propan-1-one; formally notified by the EUDA in September 2015.
([18]) 2-(Ethylamino)-1-(4-ethylphenyl)propan-1-one; formally notified by the EUDA in May 2015.
([19]) 2-(Methylamino)-1-(4-methylphenyl)pentan-1-one; formally notified by the EUDA in June 2014.
([20]) 2-(Methylamino)-1-phenyl-1-hexanone; formally notified by the EUDA in March 2014.
([21]) 1-(3,4-Dimethylphenyl)-2-(ethylamino)propan-1-one; formally notified by the EUDA in February 2014.
([22]) 2-(Methylamino)-1-(2,4,5-trimethylphenyl)propan-1-one; formally notified by the EUDA in May 2012.
([23]) 2-(Diethylamino)-1-phenylpropan-1-one; Schedule IV of the 1971 United Nations Convention on Psychotropic Substances.
([24]) 2-(Ethylamino)-1-(4-methylphenyl)butan-1-one
([25]) 2-(Butylamino)-1-phenylpropan-1-one
([26]) 2-(*tert*-Butylamino)-1-phenylpropan-1-one
([27]) 2-(Dimethylamino)-1-(4-ethylphenyl)propan-1-one
([28]) 2-[Ethyl(methyl)amino]-1-phenylbutan-1-one
([29]) 2-(Ethylamino)-1-(2-ethylphenyl)propan-1-one
([30]) 2-(Ethylamino)-1-(3-ethylphenyl)propan-1-one
([31]) 1-(4-Methylphenyl)-2-(propylamino)propan-1-one
([32]) 2-[Ethyl(methyl)amino]-1-(4-methylphenyl)propan-1-one
([33]) 2-(Dimethylamino)-1-phenylpentan-1-one
([34]) 2-(Dimethylamino)-1-(4-methylphenyl)butan-1-one
([35]) 1-Phenyl-2-(propylamino)butan-1-one

Figure 6: Molecular structure, molecular formula and molecular mass of NEP. Information on pentedrone, hexedrone and 4-methylpentedrone (4-MPD) is provided for comparison

				
	NEP (*N*-ethylnorpentedrone)	Pentedrone	Hexedrone	4-MPD (4-methylpentedrone)
Molecular formula	$C_{13}H_{19}NO$	$C_{12}H_{17}NO$	$C_{13}H_{19}NO$	$C_{13}H_{19}NO$
Molecular mass	205.30	191.27	205.30	205.30

Common name(s):

N-Ethylnorpentedrone

NEP

Systematic (IUPAC) name

2-(Ethylamino)-1-phenylpentan-1-one

(*RS*)- 2-(Ethylamino)-1-phenylpentan-1-one

Other chemical names:

2-(Ethylamino)-1-phenyl-pentan-1-one

2-(Ethylamino)-1-phenyl-1-pentanone

2-(Ethylamino)valerophenone

1-Phenyl-2-ethylaminopentanone

α-Ethylaminopentiophenone

Other names:

N-Ethylpentedrone

N-Ethyl pentedrone

Ethylpentedrone

Ethyl-pentedrone

α-EAPP

EAPP

N-Et pentedrone

NEPD

EUDA framework name (Pulver et al., 2024):

NE-valerophenone; NE-VP

Chemical Abstracts Service (CAS) registry numbers:

779974-89-9 (base)

18268-16-1 (hydrochloride salt)

2415172-10-8 (*R*-isomer)

2415172-11-9 (*S*-isomer)

IUPAC International Chemical Identifier Key (InChI Key):

QQAHEGDXEXIQPR-UHFFFAOYSA-N (base)

QIVGZMBSFAGAAC-UHFFFAOYSA-N (hydrochloride salt)

QQAHEGDXEXIQPR-GFCCVEGCSA-N (*R*-isomer)

QQAHEGDXEXIQPR-LBPRGKRZSA-N (*S*-isomer)

IUPAC International Chemical Identifier String (InChI string):

InChI=1S/C13H19NO/c1-3-8-12(14-4-2)13(15)11-9-6-5-7-10-11/h5-7,9-10,12,14H,3-4,8H2,1-2H3 (base)

InChI=1S/C13H19NO.ClH/c1-3-8-12(14-4-2)13(15)11-9-6-5-7-10-11;/h5-7,9-10,12,14H,3-4,8H2,1-2H3;1H (hydrochloride salt)

InChI=1S/C13H19NO/c1-3-8-12(14-4-2)13(15)11-9-6-5-7-10-11/h5-7,9-10,12,14H,3-4,8H2,1-2H3/t12-/m1/s1 (*R*-isomer)

nChI=1S/C13H19NO/c1-3-8-12(14-4-2)13(15)11-9-6-5-7-10-11/h5-7,9-10,12,14H,3-4,8H2,1-2H3/t12-/m0/s1 (*S*-isomer)

Simplified Molecular-Input Line-Entry System (SMILES):

CCCC(NCC)C(=O)c1ccccc1 (base)

Cl.CCCC(NCC)C(=O)c1ccccc1 (hydrochloride salt)

CCC[C@@H](NCC)C(=O)c1ccccc1 (*R*-isomer)

CCC[C@H](NCC)C(=O)c1ccccc1 (*S*-isomer)

4.2.2 Physical description

The hydrochloride salt of NEP is a crystalline solid, reported to be soluble in dimethylformamide (DMF) (20 mg/ml), dimethyl sulfoxide (DMSO) (10 mg/ml), ethanol (25 mg/ml) and phosphate-buffered saline (PBS) (pH 7.2) (10 mg/ml) (Cayman Chemical, 2024a). A λmax (ultraviolet wavelength of maximum absorbance) of 250 nm is reported (Cayman Chemical, 2024a).

To date, seizures and collected samples containing NEP and reported to the EUDA have been mostly in powder form and to a lesser extent in tablet, capsule, herbal/plant material and liquid form.

NEP has been identified in combination with other cathinones, including but not limited to *N*-ethylheptedrone ([36]) and iso-ethcathinone ([37]). NEP has also been identified in combination with internationally controlled substances such as 3-MMC ([38]), eutylone ([39]), *N*-ethylhexedrone ([40]), cocaine, amphetamine, methamphetamine and MDMA.

There is no information available on whether the free base form and/or the salt form of NEP was identified in detections within the European Union.

([36]) 2-(ethylamino)-1-phenylheptan-1-one
([37]) 1(-)(ethylamino)-1-phenylpropan-2-one
([38]) 2-(methylamino)-1-(3-methylphenyl)propan-1-one
([39]) 1-(1,3-benzodioxol-5-yl)-2-(ethylamino)butan-1-one
([40]) 2-(ethylamino)-1-phenylhexan-1-one

4.2.3 Methods and chemical precursors used for the manufacture or extraction

Limited information is available about the chemical precursors or manufacturing methods used to make the NEP which has been identified within Europe. General methods for the synthesis of cathinones, including NEP, are described below.

General methods for the synthesis of cathinones, including NEP

Cathinones may be prepared using several synthetic approaches. For *N*-alkylated cathinones, such as NEP, the simplest approach involves a 2-step bromination-amination procedure which is a relatively straightforward process, using equipment and knowledge similar to those required for the synthesis of other synthetic drugs such as MDMA and amphetamine (EMCDDA, 2011).

The first step of the process consists in the α-bromination of a suitable aryl ketone (commonly called a 'propiophenone'), to produce an α-bromoketone under acidic or basic conditions. The bromine for this step can be commercially obtained as a liquid or prepared from a bromide salt (e.g. KBr), an acid (e.g. H_2SO_4) and an oxidiser (e.g. H_2O_2). Importantly, bromine is toxic by inhalation, accelerates the burning of combustible material, is very corrosive to tissue and to metals and is dangerous for the environment. After the preparation of the α-bromoketone, the product is reacted with an amine.

Valerophenone ([41]) and 2-bromovalerophenone ([42]) can be used be used to synthesise pentedrone, using ethylamine instead of methylamine in the final step (Hyde et al.,1928). An analogous process can be used in the synthesis of NEP and other cathinones.

Synthesis of the hydrochloride salt of NEP (*compound 10*) has been previously documented in the literature using ethylamine hydrochloride in a suitable solvent (Gaspar et al, 2018). The bromoketone is converted to the cathinone in the hydrochloride salt form, which is then recrystallised. Unless steps are taken to resolve the reaction products, the synthesis produces racemic mixtures.

The synthesis of NEP has also been described by Nadal-Gratacós et al. through the reaction of benzonitrile with the corresponding Grignard reagent in anhydrous conditions, followed by acidic hydrolysis, to achieve the intermediate ketone. α-Halogenation was achieved by the addition of bromine (Br_2) to a solution of the intermediate ketone in dichloromethane (CH_2Cl_2), with catalytic amounts of glacial acetic acid (AcOH). Reaction with ethylamine

([41]) 1-Phenylpentan-1-one
([42]) 2-Bromo-1-phenyl-pentan-1-one

($EtNH_2$) gave the synthetic cathinone, which was crystallised as a hydrochloride salt (Nadal-Gratacós et al., 2023).

'Designer' precursors

Other than standard organic synthesis methods using known precursors, cathinones can be prepared using so-called 'designer precursors'. These are 'purpose-made, close chemical relatives of controlled precursors and can easily be converted into a controlled precursor and usually have no legitimate use' (CND, 2020). They can be, for example, stable chemical intermediates, masked derivatives of controlled precursors, or masked derivatives of controlled drugs (CND, 2020). Amine compounds, including cathinones, are especially suited for the latter approach, in that 'masking' or 'protecting' groups (such as acetyl protecting groups, 'Boc' groups, CBZ groups and/or 'Tosyl' groups) can be easily introduced into the molecule (making it a different chemical entity) and then easily cleaved off, often in quantitative yields to produce the controlled amine of choice.

Illicit production of NEP

Information on the synthetic pathways used to produce the NEP seized in Europe can come from impurity profiling of seized or collected samples, from seizures of cathinone precursors and from law enforcement intelligence collected in seizures of illicit cathinone production sites. No information exists on the synthetic impurities present in NEP samples (synthetic impurity profiling). The Netherlands reported detections of 120 litres of valerophenone in 2021 and 0.5 litres of valerophenone in 2023 to the European Commission through the European Union's Drug Precursors Database (EDPD). Czechia reported two incidents involving valerophenone through the Precursors Incident Communication System (PICS) managed by the International Narcotics Control Board (INCB), with 25 kilograms detected in 2017, and 50 kilograms detected in 2018. Although in most of the reported cases valerophenone was used primarily to produce alpha-PVP ([43]), it can also be used to synthesise NEP, pentedrone and other cathinones.

Two NEP production sites were reported through the European Reporting on Illicit Synthetic Substance Production Sites (ERISSP) database. One NEP production site was reported by Hungary in 2014. Pentedrone was also produced on the same site, and other substances found included alpha-PVP (1.5 kg of powder), JWH-018 quinolinecarboxylate analogue (PB-22) ([44]) (0.16 kg of powder), methoxetamine ([45]) (0.086 kg of powder) and 4-methylethcathinone (4-MEC) ([46]) (0.5 kg of powder). One NEP production site was reported

([43]) 1-Phenyl-2-(pyrrolidin-1-yl)pentan-1-one
([44]) Quinolin-8-yl 1-pentyl-1H-indole-3-carboxylate
([45]) 2-(Ethylamino)-2-(3-methoxyphenyl)cyclohexanone
([46]) 2-(Ethylamino)-1-(4-methylphenyl)propan-1-one

by Slovakia in 2021. Other substances and chemicals found on site included *N*-ethylhexedrone ([47]) (5 479.209 grams), hydrochloric acid, ethylamine, dichloromethane, acetone, toluene, ethanol and boric acid.

4.2.4 Detection and analysis

The identification of NEP in physical samples can be carried out according to the methods described in the literature, such as ultra-performance liquid chromatography-electrospray ionisation-mass spectrometry (UPLC-ESI-MS) (Uchiyama et al., 2014), gas-chromatography-mass spectrometry (GC-MS) (Uchiyama et al., 2014; Gaspar et al., 2018), high-resolution electrospray ionisation-mass spectrometry (HRESI-MS) (Gaspar et al., 2018) and nuclear magnetic resonance spectroscopy (NMR) (Uchiyama et al., 2014; Gaspar et al., 2018).

Quantification of NEP in physical samples can be carried out according to the general procedure described by the United Nations Office on Drugs and Crime (UNODC, 2020). Mesihää et al. developed and tentatively validated a method of nitrogen chemiluminescence detection combined with gas-chromatography nitrogen chemiluminescence detection coupled with atmospheric pressure chemical ionisation quadrupole time-of-flight mass spectrometry (GC-NCD-APCI-QTOFMS) for the quantitative estimation of stimulant-type new psychoactive substances (NPS), including NEP, applied to seized material, using secondary reference standards (Mesihää et al, 2020). The authors noted however that the method should serve predominantly as a rapid test and might find use as a tool for instant purity assessment in forensic laboratories (Mesihää et al, 2020).

Identification of NEP in biological samples by GC-MS and liquid chromatography coupled with quadrupole time-of-flight mass spectrometry (LC-QTOF-MS) can be carried out according to the methods described in the literature (Krotulski and Logan, 2020).

Quantification of NEP in biological samples can be carried out according to methods described in the literature (Concheiro et al., 2015; Nuñez-Montero et al., 2023). Concheiro et al. developed a validated method for the simultaneous quantification of 40 NPS in urine, using liquid chromatography-high resolution mass spectrometry (LC-HRMS) and library matching (Concheiro et al., 2015). Nuñez-Montero et al. presented a validated gas chromatography tandem mass spectrometry (GC-MS/MS) method for the detection and quantification of synthetic cathinones in oral fluid and sweat samples (Nuñez-Montero et al., 2023). A high performance ultra-high-pressure liquid-chromatography quadrupole time-of-flight high-resolution mass spectrometry (UHPLC-QTOF-HRMS) method for identification of

([47]) 2-(ethylamino)-1-phenylhexan-1-one

several phase-I and glucuronide-phase-II metabolites and semi-quantification of NEP in urine was developed by Massano et al. (Massano et al., 2024).

Bade et al. described the detection of NEP in wastewater using liquid chromatography tandem mass spectrometry (LC-MS/MS) (Bade et al., 2023).

Discrimination of NEP from its structural isomers

NEP has more than 20 known cathinone structural isomers (detailed in section 4.2.1). Reference standards of the hydrochloride salt of NEP (Cayman Chemical, 2024a) and of the hydrochloride salts of at least some of the isomers (Cayman Chemical, 2023a, 2023b, 2023c, 2024b, 2024c, 2025a, 2025b, 2025c, 2025d, 2025e) are available. Structural isomers have the same molecular formula and molecular mass, therefore the discrimination of these isomers of NEP may pose analytical challenges, as techniques solely relying on mass may not allow an unequivocal identification. The discrimination of these isomers can be achieved through the use of analytical reference standards, and/or analytical methods in addition to GC-MS, such as Fourier transform infrared spectroscopy (FTIR) or NMR. The discrimination of these isomers is described in further detail below.

Concheiro et al. demonstrated the capability to chromatographically resolve the isomers diethylcathinone and NEP in urine using LC-HRMS (Concheiro, et al. 2015). Kohyama et al. reported the differentiation of NEP and *N*,*N*-dimethylpentedrone by analysis of product ion spectra from the iminium and acylium ions using a combination product ion spectrometry by gas chromatography with electron ionization and tandem mass spectrometry (GC-EI-MS-MS) and UV spectra obtained by liquid chromatography-photodiode array (LC-PDA) (Kohyama et al., 2016).

Differentiation of enantiomers

Cathinones such as NEP contain a stereogenic centre thus allowing for the existence of a pair of enantiomers, (*R*)- and (*S*)-NEP. There is no information on the enantiomeric composition of the samples of NEP detected within the European Union, which in part may reflect the fact that stereochemical analysis is not routinely undertaken in forensic laboratories.

Differentiation of enantiomers is possible using the following techniques: chiral chromatography, vibrational circular dichroism (VCD) spectroscopy and/or electronic circular dichroism (ECD) spectroscopy. Hägele et al. reported the use of an isocratic HPLC method with specific chiral stationary phases (CSP) to successfully separate enantiomers of a range of synthetic cathinones (Hägele et al., 2020).

4.3 Pharmacological and toxicological description of the new psychoactive substance (Article 9 2(c))

NEP is a substituted synthetic cathinone. Similar to closely related cathinones such as pentedrone, NEP has been shown to interact with the monoamine transporter system in a number of *in vitro* studies, which suggest that NEP acts as a psychostimulant. For example, NEP was reported to inhibit the reuptake of dopamine (DA) and serotonin (5-HT) at their respective transporters DAT and SERT in human transporter stably transfected in human embryonic kidney (HEK) 293 cells (Nadal-Gratacós et al., 2021; Nadal-Gratacós et al., 2023). NEP was found to more potently inhibit DAT compared to SERT with a DAT/SERT ratio of >1 000 (Nadal-Gratacós et al., 2021; Nadal-Gratacós et al., 2023). Typically, substances with a high DAT/SERT ratio (> 10) are associated with distinct psychostimulant effects with a high abuse potential similar to methamphetamine (Luethi and Liechti, 2020). In the transporter binding affinities study, NEP exhibited higher binding affinity for hDAT and substantially lower affinity to hSERT (Duart-Castell et al., 2021; Nadal-Gratacós et al., 2023).

Consistent with a locomotor stimulant profile, NEP was observed to increase horizontal locomotor activity in mice (Nadal-Gratacós et al., 2021; Nadal-Gratacós et al., 2023). In the conditioned place preference test in mice, NEP was demonstrated to produce rewarding effects (Nadal-Gratacós et al., 2021; Nadal-Gratacós et al., 2023). Acute NEP administration in mice resulted in anxiolytic effects and reduced social exploration. However, following repeated administration and withdrawal, the anxiolytic effects were attenuated, while the decrease in social exploration persisted and was accompanied by an increase in aggressive behaviour (Espinosa-Velasco et al., 2022). Taken together, these results suggest that NEP is likely to act as a stimulant in humans and might also show abuse liability.

The acute effects of NEP are likely to share some similarities with related synthetic cathinones like pentedrone, alpha-PVP and MDPV. This includes general stimulation and increased energy, elevated mood and euphoria, and increased sociability (Abdulrahim and Bowden-Jones, 2015; Soares et al., 2021).

Poisoning from synthetic cathinones, reflecting a sympathomimetic toxidrome, includes hyperactivity, mydriasis (dilated pupils), anxiety, agitation, hallucinations, hyperthermia, cardiovascular toxicity (tachycardia, hypertension, chest pain, cardiac arrest), respiratory effects and seizures. In addition, psychotic episodes may occur (Baumann et al., 2018).

Synthetic cathinones have abuse liability and dependence potential (Bajaj et al., 2010; Batisse et al., 2014; Dolengevich-Segal et al., 2016). While information specifically on NEP is limited, the chronic health risks may include dependence, similar to other synthetic cathinones.

The concomitant use of NEP with other central nervous system stimulants or other psychoactive substances (polysubstance use) may increase the risk of poisoning.

4.4 Involvement of criminal groups in the manufacture or distribution of the new psychoactive substance (Article 9 2(d))

Europol received replies from 12 Member States: Austria, Croatia, Cyprus, Denmark, Estonia, France, Greece, Italy, Lithuania, Luxembourg, Slovakia and Slovenia.

Replies were also received from Iceland ([48]), Switzerland ([49]), Ukraine ([50]) and the United Kingdom (UK) ([51]).

Involvement of criminal groups in the manufacture or distribution of NEP

No information on the involvement of criminal groups in the manufacture or distribution of NEP was reported to Europol.

Information on seizures of NEP

Generally, seizures of NEP, reported to Europol by Austria, Croatia, Estonia, France, Italy, Lithuania and Slovakia, occurred between 2017 and 2025.

Cyprus, Greece, Luxembourg and Slovenia reported that no information was available. Denmark did not report specific information on seizures of NEP.

([48]) Iceland reported that they had no information on NEP.
([49]) Switzerland reported that they had no information on the involvement of criminal groups in the manufacture, distribution and trafficking of NEP. Based on information gathered from forensic laboratories, Switzerland reported eight identifications of NEP in 2023. Additionally, in 2024, two identifications of NEP were reported, with individual weights of 50 grams and 2 grams. In 2023, a drug checking service have reported one pill containing NEP that was sold as 3-MMC.
([50]) Ukraine reported that no control measures are established for NEP.
([51]) The UK reported that detections of synthetic cathinones are low and there is limited known use of these substances.

4.5 Information on the human and veterinary medical use of the new psychoactive substance, including as an active substance in a medicinal product for human use or in a veterinary medicinal product

According to Article 9(5) of the Regulation (EU) 2023/1322, the EMA requested that the national competent authorities responsible for human and veterinary medicinal products in the Member States, Norway and Iceland provide information on whether NEP is an active substance in:

a. a medicinal product for human use or in a veterinary medicinal product that has obtained a marketing authorisation in accordance with Directive 2001/83/EC of the European Parliament and of the Council (20), Regulation (EC) No 726/2004 or Regulation (EU) 2019/6 of the European Parliament and of the Council (21);

b. a medicinal product for human use or in a veterinary medicinal product that is the subject of an application for a marketing authorisation;

c. a medicinal product for human use or in a veterinary medicinal product whose marketing authorisation has been suspended by the competent authority;

d. an unauthorised medicinal product for human use as referred to in Article 5(1) and (2) of Directive 2001/83/EC or in a veterinary medicinal product prepared extemporaneously in accordance with Article 112(1), point (c), of Regulation (EU) 2019/6;

e. an investigational medicinal product as defined in Article 2, point (d), of Directive 2001/20/EC of the European Parliament and of the Council (22).

The following information was received:

- twelve Member States ([52]) as well as Norway and Iceland reported that NEP is not an active substance in medicinal products for human use;
- twenty-one Member States ([53]) as well as Norway and Iceland reported that NEP is not an active substance in medicinal products for veterinary use ([54]);

([52]) Austria, Croatia, Cyprus, Czechia, Denmark, France, Germany, Ireland, the Netherlands, Portugal, Spain and Sweden.
([53]) Austria, Belgium, Croatia, Cyprus, Czechia, Denmark, Estonia, Finland, Germany, Ireland, Italy, Latvia, Luxembourg, the Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain and Sweden.
([54]) Regarding extemporaneous veterinary products Croatia, Denmark, Germany and Slovenia reported that they have no information available.

- the EMA reported that NEP is not an active substance in a centrally authorised human or veterinary medicinal product.

Based on the available information, it appears that NEP is not an active substance in any medicinal product for human use or in any veterinary medicinal product in Europe. However, the information for both human and veterinary medicines at national level is incomplete, particularly regarding human medicines. In addition, the use of NEP as an active substance in medicinal products prepared extemporaneously or in investigational medicinal products cannot be excluded in some Member States due to a lack of information.

4.6 Information on the commercial and industrial use of the new psychoactive substance, the extent of such use, as well as its use for scientific research and development purposes

NEP is available as analytical reference material for use in clinical and forensic case work and scientific research. There is currently no information that suggests NEP is used for other legitimate purposes.

The ECHA, ECDC and EFSA reported that they do not hold any relevant data or information on NEP.

4.7 Information on whether the new psychoactive substance is subject to any restrictive measures in the Member States

Twenty-one Member States, Türkiye and Norway reported that NEP is subject to restrictive measures at national level, as detailed below.

Six Member States (Bulgaria, Luxembourg, the Netherlands, Portugal, Romania and Spain) reported that NEP is not subject to restrictive measures at national level. The Netherlands reported that NEP will be covered by a generic definition of cathinones as of 1 July 2025.

When reporting whether NEP is subjected to restrictive measures, 10 Member States (Austria, Belgium, Denmark, Estonia, Germany, Greece, Hungary, Latvia, Lithuania and Malta) and Türkiye mentioned that this substance is covered by the generic definition of

cathinones ([55]). Malta reported that NEP is controlled as a derivative of pentedrone. Greece reported that NEP is controlled as an isomer of amfepramone.

Drug control legislation

Fifteen Member States (Belgium, Croatia, Cyprus, Czechia, France, Greece, Ireland, Italy, Latvia, Lithuania, Malta, Poland, Slovakia, Slovenia, Sweden) and Norway reported that NEP is controlled under drug control legislation:

- Belgium reported that NEP is covered by the generic definition of cathinones as of 26 September 2017;
- Croatia reported that NEP is controlled since 23 December 2024;
- Cyprus reported that NEP is controlled since 14 November 2011;
- Czechia reported that NEP is controlled since 25 October 2018 by Government Regulation No. 463/2013;
- France reported that NEP is controlled under drug control legislation since 2 August 2012;
- Greece reported that NEP is classified in Table D of Law 4139/2013 as an isomer of amfepramone;
- Ireland reported that NEP is classed as a Schedule 1 controlled drug under the Misuse of Drugs Regulations 2017 since 4 May 2017;
- Italy reported that NEP is controlled by Presidential Decree n. 309 of October 9, 1990, entitled 'Consolidation of the laws governing drugs and psychotropic substances, the prevention, treatment and rehabilitation of drug addicts' since 2 December 2021;
- Latvia reported that NEP is covered by the generic definition of cathinones in the legislation On the Procedures for the Coming into Force and Application of the Criminal Law since 2013;
- Lithuania reported that NEP is regulated as a derivative of cathinone since 10 March 2015;

[55] Two Member States (Denmark and Estonia) reported that NEP is controlled by 'generic classification', with no additional indication of dates or type of legislation.

- Malta reported that NEP is considered a derivative of pentedrone, and covered by the Medical and Kindred Professions Ordinance;
- Poland reported that NEP is controlled by Regulation of the Minister of Health of 17 August 2018 on the list of psychotropic substances, narcotic drugs and new psychoactive substances since 21 August 2018;
- Sweden reported that NEP is regulated as a narcotic since 9 August 2022;
- Slovakia reported that NEP is listed as a psychotropic substance in Annex No. 1 to Act. No. 139/1998 Coll. since 1 December 2022;
- Slovenia reported that NEP is regulated by a decree on the categorisation of illicit drugs since 25 March 2016;
- Norway reported that NEP is classified as a narcotic drug.

New psychoactive substance legislation

Four Member States (Austria, Germany, Finland and Hungary) and Türkiye reported that NEP is controlled under new psychoactive substance legislation:

- Austria reported that NEP is covered under the generic definition of cathinones;
- Germany reported that NEP is covered by the generic definition of cathinones in the New Psychoactive Substances Act (NpSG) since 26 November 2016;
- Finland reported that NEP is regulated as a substance banned from the consumer by Government decree 1130/2014 since 2 February 2015;
- Hungary reported that NEP is covered by the definition of cathinones in Annex III of Decree no. 78/2022 of the Ministry of Interior since 3 April 2012;
- Türkiye reported that NEP is covered by the generic definition of cathinones since 2015.

Other countries

The available information suggests NEP is not controlled in China and India.

4.8 Information on whether the new psychoactive substance is currently or has been under assessment within the United Nations system

The World Health Organization is the specialised United Nations agency designated for the evaluation of the medical, scientific and public health aspects of psychoactive substances under the Single Convention on Narcotic Drugs, 1961, and the Convention on Psychotropic Substances, 1971.

On 20 March 2025, the World Health Organization informed the EUDA that NEP is not currently under assessment nor has it been under assessment by the United Nations system.

5. Analysis and assessment

2-(Ethylamino)-1-phenylpentan-1-one (*N*-ethylnorpentedrone, NEP) is a synthetic cathinone with stimulant effects that is monitored as a new psychoactive substance by the EUDA in accordance with Regulation (EU) 2023/1322.

The substance is an *N*-alkylated cathinone and contains a chiral centre so two enantiomers may exist: (*R*)-NEP and (*S*)-NEP. It is a derivative of cathinone, the naturally occurring stimulant and main psychoactive substance in the khat plant *Catha edulis*. NEP is also closely related to and likely shares similar stimulant effects with methcathinone and pentedrone. Cathinone, methcathinone and pentedrone are controlled under the 1971 United Nations Convention on Psychotropic Substances because of the public health and social risks that they pose.

NEP was first identified in Europe in 2013 based on a police seizure made in Austria. As of 31 March 2025, the substance has been identified in 25 Member States, as well as Türkiye and Norway.

Since 2022, European suppliers began importing large quantities of NEP from chemical companies in India, apparently primarily through the Netherlands.

This new supply route has led to a significant increase in the availability of NEP on the European drug market, with law enforcement reporting significant increases in seizures and imports. Of the 6 224 cases reported between 2013 and 2024:

- 4 076 (65.5% of all cases) occurred between 2022 and 2024;
- these recent cases amounted to 11 tonnes (99% of total quantity);
- these include 47 imports from India totalling 10.8 tonnes, with 6 tonnes (53.7% of total quantity) reported in 2024 alone.

In addition, drug checking services from nine Member States reported 205 samples containing NEP collected from users, with 89.2% of samples collected since 2022. Analysis revealed that NEP was primarily mis-sold as 3-MMC.

The limited information suggests that NEP is sold both as a substance in its own right and mis-sold as other drugs, particularly 3-MMC. Usage patterns of NEP likely resemble those of other similar synthetic cathinones, such as pentedrone. They may also resemble those of 3-MMC given that NEP appears to be frequently mis-sold as this substance. Similar to other

cathinones, NEP is typically administered by insufflation (snorting), with some reported cases of oral use, smoking and intravenous injection.

NEP appears to be used primarily by existing stimulant users, including those who use cathinones, amphetamines, cocaine and ecstasy — either as an addition to substances they already use or as a replacement. This may include both recreational use and, in some cases, high-risk behaviours such as injection as part of chemsex.

Additionally, vulnerable groups, including young people, may use NEP because of its increased availability, legal status in some countries, and relatively low cost. NEP also appears to be frequently mis-sold as substances with established user bases, such as 3-MMC, potentially further contributing to its use among young people. NEP may be used in various settings including domestic environments, recreational venues and chemsex contexts.

Since 2022, an increasing number of harms associated with NEP have been reported. This includes acute poisonings and deaths, specifically:

- a total of 30 acute poisonings with confirmed (four cases) or suspected (26) exposure to NEP have been reported by three Member States: Belgium, Italy and the Netherlands;
- a total of 62 deaths with confirmed exposure to NEP have been reported by five Member States: Hungary, Italy, the Netherlands, Poland and Sweden. In the majority of the cases, other substances were identified, including central nervous system depressants and stimulants. In 12 cases, NEP was reported to be the cause of death or to have contributed to the death.

Currently, there is limited information on the involvement of criminal groups in the manufacture, trafficking and distribution of NEP within Europe. However, based on information reported to the EUDA, there is evidence of criminal acts, such as trafficking and supply offences, involving NEP.

Based on the available information, it appears that NEP is not an active substance in any medicinal product for human use or in any veterinary medicinal product in Europe. However, the information for both human and veterinary medicines from national level is incomplete, particularly regarding human medicines. In addition, the use of NEP as an active substance in medicinal products prepared extemporaneously or in investigational medicinal products cannot be excluded in some Member States due to a lack of information. Aside from limited use as an analytical reference standard and in scientific research, there is currently no information that suggests that NEP is used for other legitimate purposes.

NEP is subject to restrictive measures in 21 Member States, Türkiye and Norway, sometimes covered by a generic definition of cathinones. However, it is not subject to restrictive measures in six Member States. Available information suggests NEP is not controlled in either China or India.

NEP has not been subject to assessment nor is it currently under assessment by the United Nations system.

The EUDA will continue to intensively monitor NEP to ensure that new information is provided to the Member States, Europol, the Commission and the EMA through the EU Early Warning System in a timely manner. This monitoring will enhance awareness and inform effective preparedness and response measures at both national and EU levels to protect public health.

The analysis of available data reveals that NEP availability and reported harms have significantly increased in the European Union in recent years. The EUDA considers that these findings indicate potential health and social risks at Union level. We conclude that the potential health and social risks posed by the use, manufacture, distribution and involvement of criminal groups could be comprehensively assessed through a risk assessment procedure as specified in Article 10 of Regulation (EU) 2023/1322.

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The European Union Drugs Agency (EUDA) is the leading authority on illicit drugs in Europe. Based in Lisbon, Portugal, we provide independent scientific evidence and analysis on all aspects of this constantly changing threat to individual lives and wider society. Our work contributes to EU and national policies to protect Europe's citizens from drug-related harms. We are an agency of the European Union.

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- EUDA Early Warning System on NPS
- EUDA New psychoactive substances webpage

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