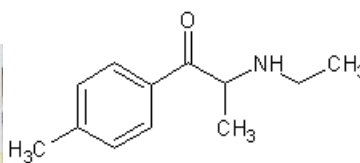


Technical folder 4-methylethcathinone



This technical folder provides information about the 4-MEC. The information is based on a numerous existing data sources and also works undertaken in the I-Trend project.

Three main tools have been used to fill this folder:

- A monitoring of the online conversation on the French speaking forums of psychoactive drug users,
- A monitoring of the supplies on the online popular web-shops in French language,
- The chemical analysis results of the substances purchased on the same web-shops.

1. Substance name(s)

1.1. Chemical name:

2-Ethylamino-1-(4-methylphenyl)-1-propanone

1.1. Other names (e.g. popular/street/slang name(s)):

1.1.1. Classification confirmed by chemical analysis

Cathinones

1.1.2. Classification used by drug users on the forums

Cathinones

1.1.3. Classification used by online shop

Cathinones, Stimulants

1.2. Summary of the effects by classification

Drug users	Online shop	Pharmacological studies
		Dopaminergic, adrenergic and serotonergic stimulant

1.3. Names

1.3.1. Chemical name

1.3.2. Other name(s) (e.g. popular/street/slangname(s))

4-MEC, 4-methylethcathinone

1.3.3.Branded name(s)

4-MEC

1.4.Potential risks

1.4.1.Risks reviewed in scientific literature and national case studies

- Behaviour side effects
 - agitation for more than 50 % of the users
 - insomnia, anxiety
 - confusion, panic attack, hallucinations
 - violence
 - suicidal ideation, self-harm
- Physical signs of intoxication
 - mydriase, blurred vision
 - tachycardia, palpitations, arrhythmia, blood pressure increased
 - cold and blueish fingertips
 - bruxism, loss of appetite, nausea, vomiting
 - chest pain, headache, convulsions
 - hyperthermia, diaphoresis, dehydration
- Acute toxic effects
 - hyponatremia, acidosis, hypo/hyperkaliaemia
 - rhabdomyolysis
 - cardiopulmonary collapse, infarctus du myocarde
 - disseminated intravascular coagulation
 - cerebral edema, renal failure, multiple organ failure

A 36-year-old male was found lying on the grass in a park, showing no signs of life. An ambulance was called for; resuscitation was initiated, which proved to be unsuccessful; and death was pronounced. His case history indicated he was a HIV and HCV carrier. For 10 years he had been on methadone drug replacement therapy. He found maintaining abstinence difficult, was in search of various alternative therapy forms, took medications, and experimented with designer drugs. A foil bag containing white powder was found by his body; subsequent analysis showed the powder to be 4-methylethcathinone (4-MEC).

Drug Test Anal. 2014 Jul-Aug;6(7-8):770-7.

1.4.2.Potential risks with substances of the same chemical group

Idem and

- Deaths

Deaths related to consumption of mephedrone, methylone, MDPV, PVP have been reported.

1.5.Legal status in France

Classified

1.6. List of national focal points of REITOX that identified and reported the substance to the EMCDDA

Country	Date
United-Kingdom	July 2010
Finland	October 2010
Denmark	December 2010
Czech Republic	January 2011
France	February 2011
Bulgaria	February 2011
Hungary	March 2011
Germany	May 2011
Croatia	June 2011
Italia	September 2011
Slovaquia	August 2011
Belgium	August 2011
Malta	December 2011
Slovenia	March 2012
Greece	September 2012
Spain	November 2012
Turkey	December 2012
Austria	December 2012
Norway	January 2013
Lituania	August 2013

1.7. Substance pictures

1.7.1. Photography of the substance purchased and analyzed in the laboratory

Not purchased because the substance is classified in France

1.7.2. Photography or screen capture of the product as it is sold on the online shop

Not sold in online shop in French because the substance is classified in France

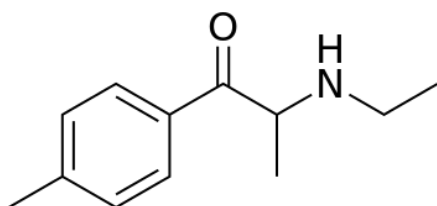
2. Chemistry

2.1. CAS number

1225617-18-4

2.2. Chemical information

2.2.1. Structure

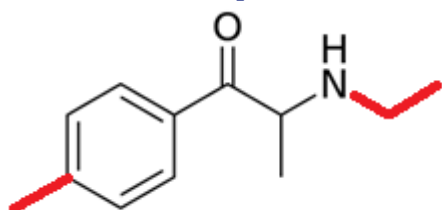


C₁₂H₁₇NO

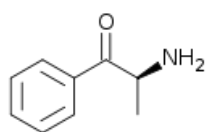
2.2.2.Molar mass

191,27 g.mol⁻¹

2.2.3.Structural comparison with the analogous substance or limited



2.2.4.Structural image of similar substance



cathinone (from khat)

3. Chemical composition: results of the analyzes conducted on products purchased online

3.1.Marketing details

Not sold on the online shop because the cathinone are classified in France

3.2.Results of chemical analyzis

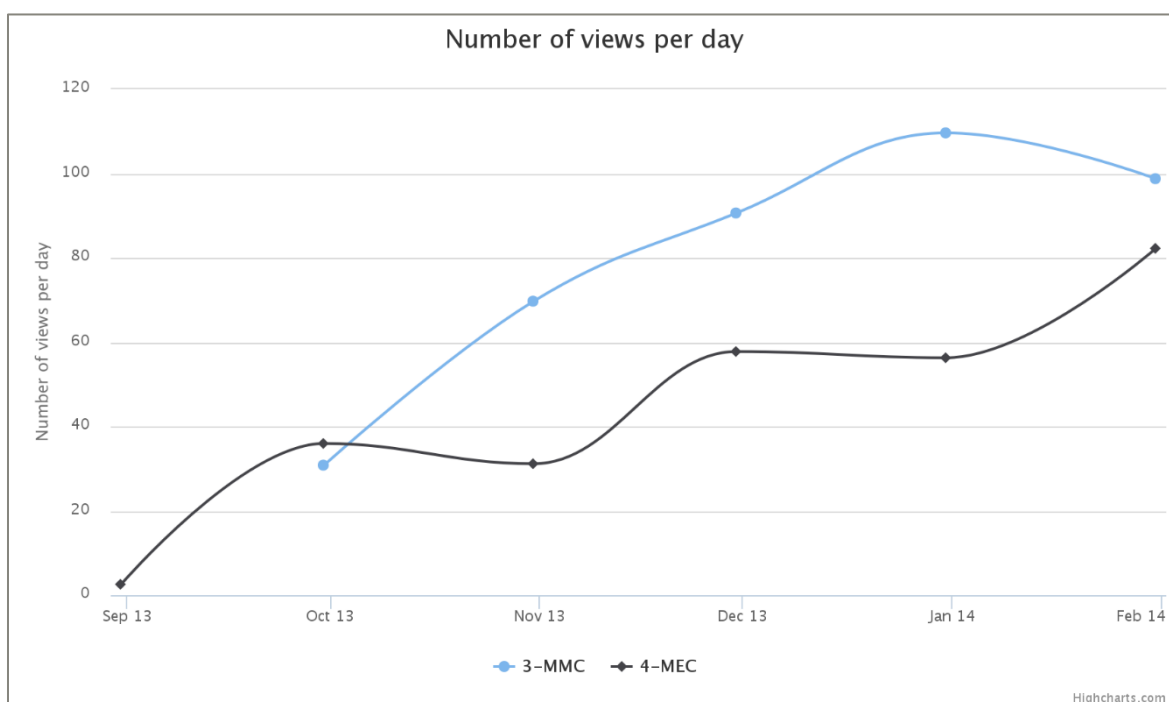
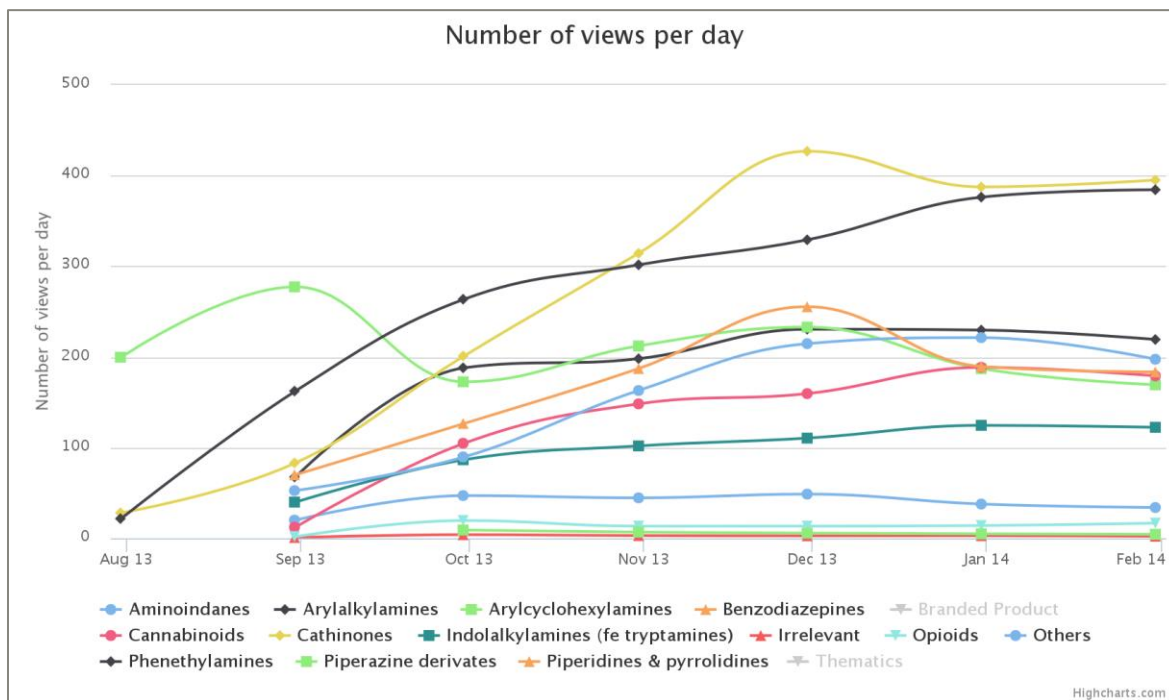
Not purchased because the cathinone are classified in France

3.3.Analytical method

4. Data collected on the forums

4-MEC has appeared on the French forums during the summer of 2010, shortly after the ban of the mephedrone. Among 700 discussion threads followed quantitatively, 10 had 4-MEC as main subject. On January 2014, 4 discussion threads were declining while 3 had an increasing popularity. For the whole period from June 2013 to February 2014 the popularity of the thread was declining. The qualitative analysis focused on six threads, selected according to the positive value of the growth rate or their recentness. Totally, 67 people participated 205 times. Among them, 23 people represent 70% of the procedures.

4.1.1. Evolution of popularity of 4-MEC, 3-MMC and all cathinone on 3 francophone forums between August 2013 and January 2014



5. Evolution of 4-MEC popularity on Google

The tool "Trend" of Google shows the months of May and June 2010 (official announcement of the cathinone ban) as the beginning of a period when the term 4-MEC is often used. After peaking in July 2010, interest in this molecule creates a regular rhythm of queries, which ends in April 2014 with a slight increase of the interest.

Summary

But this element should not be interpreted as an increase of 4-MEC consumption. In one hand, this is not in agreement with the quantitative and qualitative analysis, conducted on user forums, which is made below. Actually, 4-MEC was the subject of particular interest because it was presented by online shops as the alternative to the mephedrone. But users have preferred 3-MMC which was appeared slightly later on the market. On the other hand, the media coverage of this molecule (e.g. Le Monde, 11/06/13) have contributed to increase the interest of the professionals (physicians, toxicologists, educators...) for this molecule, increasing the number of queries on the research engines.

Great disappointment for the users because there is not additional effects if they consume once again. They also notify the absence of coming-down.

These are the reasons why consumers consider this substance as a "starter" for an early evening or a drug for work. The difficulties to obtain stimulating and empathogene effects and implies that it is sometimes seen as "hollow", "flat", and thus it presents low interest.

6. Dosages given by the forums' user (42 items)

23 people mentioned doses by 42 times

6.1.Initial dosage (14 items)

Three users gave dosages ranging from 30 to 50 mg, four mentioned dosages between 60 and 80 mg and three other users indicated dosages between 100 and 150mg.

The first indicated dosages were from users who had relatively recent experience of NPS, but, besides, who were addicted to opiates. The mean and higher dosages were used from people with expert profiles who had a more ancient practice of NPS.

When the product is smoked, a single 20 mg dose is mentioned. By oral consumption, the dosages are higher. Four dosages were declared, 95mg, 120mg then 200 to 250mg and 300 to 400mg. These two latter dosages could correspond to a single dose or the sum of several doses during the same session of consumption. The difference is important with the aforementioned doses which are considered as high dosages (see High qualified dosage).

6.2.Dosages during one session of consumption (9 items)

There are 5 persons who report doses in milligrams (5 items). The different doses increased by steps from 10 to 30 to 80mg, essentially by snorting. Two other persons indicate more doses in a second time without specifying the amounts. These 7 people resume that taking 4-MEC again does not increase the effects (See Effects and Duration).

Only one person is satisfied with the effects obtained by a taking several doses during the same session. It slightly increases the initial taking. The users who have recent experience with NPS but who are already stimulant users, are used to take a second dose of 4-MEC 45 minutes after the first one. It is supposed to increase the effects. But most of the time, it doesn't that's why 4-MEC is not well considered by the users compared to other cathinones.

6.3.Light dosage (0 item)

The 30 to 50 mg dosages for snorting consumption are used by people who have a short experience with NPS. They are not mentioned specifically as light dosage but the effects linked to these dosages are. The 50 to 80 mg dosages are used by confirmed users, those who have potentially a higher tolerance threshold. They describe this range as a minimum threshold. By snorting, they considered 100-130 mg as the threshold above which appears the feelings that they expect (see Time).

6.4.High dosages (3 items)

Three dosage ranges are considered high. Range from 200 to 250 mg, then 300 to 400mg and finally 500mg to 1 gram or more. The last two dosages are notified by consumers whose profiles are not clearly identified (see User profile). 300 to 400 mg is mentioned without specified the way of consumption. Range of 200 to 250 mg is declared with oral consumption. It is not possible to say whether the importance of these doses is in line with the consumer path and the existence of tolerance. The difference between these assays and those mentioned initial engagement and second counts, these assays also are considered very high. The latest range from 500 mg to about 1 g refers to the total amount taken during a session.

Increasing the dosage of 4-MEC influenced very little effects achieved (See Effects and Time).

7. Effects (91 items)

7.1.Physical effects (21 items).

The main effects described by the users are:

- stimulation
- tachycardia
- mydriasis
- heat sensation without sudation

Then:

- visual hallucinations
- serotonergic syndrome (7 persons)
- disorder in long-term consumption (1 person)
- erectile property (3 person)

7.2.Psychological effects (18 items).

- Intellectual more than physical stimulation
- Empathy

7.3.Desired effects (4 items).

- High stimulant as mephedrone substitute
- Empathy sensation
- No influence on the MDMA or x-APB tolerance

7.4.Positive effects for the users (35 items).

- mydriasis (3 items)
- stimulation (7 items)

- empathy (5)
- low strain during coming-down (7 items).

However, the lack of coming-down itself gives rise to different judgments (See Duration). Empathy and physical stimulation work together. Both are described mixed with a light heat, facilities to communicate and to dance. Mydriasis is described to be almost inexistent.

The craving is given to be almost inexistent (9 items mentioning his absence).

7.5. Adverse effects for the users (58 items).

Classification in three groups depending on the dosages and the profiles:

- Low users: adverse effects appears since 70 mg (insomnia, painful coming-down...)
- Regular users: no adverse effects below 150 mg
- Biggest users (500mg or more during a session of consumption): strong insomnia even with benzodiazepines consumption (see Polyconsummation).

Muscular tensions and tachycardia are poorly mentioned. Those effects are very rare with 4-MEC compared with methylone.

A specific adverse effect on the blood vessels during injection is mentioned as well as burns and bleedings by snorting or irritations and diarrhea by intrarectal administration (see Routes of administration).

8. Routes of administration (57 items)

32 persons talked about routes of administration.

The route affects the length and the intensity of the effects. 4-MEC is essentially consumed by oral route, snorting, intrarectal administration and, to a lesser extent, by injection or inhalation. Inhalation and snorting are often quoted to improve compulsion.

8.1. Ingestion (19 items)

14 persons talked about ingestion.

Ingestion is mentioned as a way to reduce the effects that can be outstanding by non-consumers, as mydriasis (see Effects). This route of administration is appreciated for using in a public scene. The most often cited dosages are ranging from 150 to 300mg. The ingestion is preferred by users to improve the feeling of the rise (see Time). It is also cited as a way to decrease the craving sensation.

8.2. Nasal route (27 items)

19 persons talked about nasal route.

The regular and experimented users constituted the majority and talked more often about the nasal route. Like ingestion, this route is described to regulate the physical stimulation intensity but also to enable the leveling of the effects (see Duration). 4-MEC is not considered as a substance adapted to this route of administration leading to nasal injury (burns, irritations, bleedings...) (see Appearance and Preparation).

8.3. Inhalation (3 items)

One person talked about bong and crack pipe.

4-MEC effects are « stronger », thus this route of administration are compared to crack (see Polyconsumption). By using this route of administration, craving is considered as more acute than using nasal or oral route.

8.4. Intrarectal administration (13 items)

This route of administration is more discussed considering 4-MEC than other NPS, such as synthetic cannabinoids, for example. It is more mentioned for the adverse effects than any advantages (not possible in public, different effects...). 4-MEC is cited as the other stimulant to lead to itching, dilatation and diarrhea when it is consumed by this route. As for the nasal route, these feelings are not shared by all the users who talked about intrarectal route. Nearly half of them declared that the side effects appeared when the product is too concentrated or the preparation badly made. Those users also find that after repeated consumption, mucous membranes are less sensitive.

8.5. Injection (15 items)

11 persons talked about injection.

A regular user observed burns and abscesses after cathinone injections. Another user makes the assumption that injection of ketones can alter the pH of the blood.

8.6. Other routes of administration (3 items)

- nasal spray
 - o Rarely mentioned in the French forums contrary to the English forums and shops. It is an attractive device because it seems that nasal injuries are reduced compared with snorting and it is easy to use in public. But, the preparation requires a certain knowledge which can limited the uses (see Appearance and preparation).

9. Duration (54 items)

9.1. To get high (10 items)

Described as occurring quickly after initial intake (10-15 minutes), powerful and short (35-40 minutes). Compared to other NPS, experimented users could consider this substance as unattractive.

9.2. Plateau (7 items)

It is described as short. Between 1 and 2 hours when the substance is consumed by nasal route. By oral route, the duration can be up to 3 hours. The euphoria and the empathy are the two feelings which disappear first.

9.3. Coming down (24 items)

Described as inexistent or very short. Less important than with other cathinones as methyline but more important than with 3-MMC.

Three persons observe that they have no difficulty to fall asleep shortly after intake. But some users with less experience using dosages of 80 mg or more have difficulties to fall asleep.

9.4. The next days (7 items)

In the next days after intake, adverse effects can be felt but they are considered lower than with other cathinones as mephedrone. When less than 1 gram is consumed in one session, these adverse effects are described as easy to overcome (exclusively tiredness). But when more than 1 gram is consumed or for the unexperienced users, physical tiredness and craving are present. Psychologically, adverse effects are generally a lack of motivation and a discomfort. They can occur up to 3 to 4 days after intake.

10. Appearance and Preparation (23 items).

10.1. Appearance

Colors may vary from transparency to beige and caramel. The odor is very similar to 4-MMC.

It is possible to find 4-MEC as powder or crystal. This latter form is seen in numerous online shop, particularly one shop on the deep web. This form is considered as better quality and more powerful. It is possible that it was true during a period but the appearance of a substance is not linked to his purity.

The powder form at the time of writing discussions seemed to be particularly voluminous. Users called this form "aerated". The volume has an impact on the consumption. For the nasal route, it implies that the inhaled quantity is important, which is not appreciated by users. Dosages mentioned for initial intake of 4-MEC by nasal route are more important than with many other NPS. Moreover, the intake of a large amount increases the adverse effects.

10.2. Preparation

For rectal use, it is mentioned that the product may be consumed with a syringe (without a needle) or with capsules.

The crystal form used for nasal route has to be crushed until becoming a powder. The bleeding which have been found can also arise from the use of the crystal form.

According to a user, a nasal spray application requires to be aware of the concentration of the liquid and the doses release for each pressure.

11. Consumption frequency (18 items).

There is two groups:

- Users with high level consumption during one session or with very short period between sessions (less than one week). It is the smallest group but who talked more about this topic.
- Users who take time between two sessions without precision (more than one week, sometimes more than one month). But they try to « take care of their brain ». They change the substances consumed, they wait for consuming again. They try to not develop a tolerance.

12. Tolerance (5 items)

It seems impossible to increase or extend the intensity of the effects by taking again. Consequently, few people do it that reduces risks of craving or tolerance.

13. Polyusage (58 items).

13.1. Other substances taking in combination (16 items)

- methylone (5),
- alcohol (5),
- mephedrone (3),
- cannabis (2),
- 4-BMC (2),
- methoxetamine (2),
- 3-MMC (1),
- MDPV (1).

13.2. Other substances used to compare (40 items)

- mephedrone (16),
- methylone (10),
- MDMA (10)
- 3-MMC (8)

Mephedrone and 3-MMC are used as reference to assess the intensity or the duration of the effects.

13.3. Other substances used for coming-down (8 items)

- cannabis
- alcohol
- benzodiazepines

14. User profiles

Substances such as 4-MEC, stimulants and empathogenic attract a potentially wider audience than the other categories of substances (e.g. psychedelic like tryptamines or 25x-NBOMe). Synthetic cannabinoids are also present in numerous francophone forums, but NPS such as 4-MEC create a remarkable difference between the forums used according to consumption. The injection is more discussed on a specific forum with this substances than the other substances, on the other forums. In the same way, nasal, oral and rectal route consumptions are differently reported on the different forums.

Forum	People	Injection	Nasal route	Ingestion	Rectal route
1	23	8	13	12	6
2	9	5	5	4	0
3	2	0	2	0	0
Total	34	13	20	16	6

The experimented users have quickly not considered 4-MEC as a good alternative to mephedrone. Moreover, they prefer psychedelic effects and don't seek only stimulant substances. They used to snort or ingest instead of inject.

People who use to inject opiates can make more use of injection, but this is not a systematic behavior.

We observed a majority of experimented users among them very few people have injection practices in a sexual context. The others start their consumptions.

15. Consumption context (20 items)

The most often cited context is public place or nights (13 people). In the evening term, it is understood to be an evening in a private context (apartment) or in commercial places (bars...). He also referred to use in a professional context (2 persons). The quotation from public places such consumer environment is very often connected to some mydriasis aroused 4-MEC (see Effects).

16. Harm reduction (15 items)

- Decrease dosages
- Spacing the catches of 4-MEC (several weeks)
- Typical messages about injection for injecting users

17. Online shops relations (37 items)

- Purity varies by site. Users try to link shapes of the substance with quality (see Appearance and preparation).
- Marketing strategies are mentioned via the "free samples" method and some phone relations with the sellers.
- Worries about the risk that NPS classification leads to the online shops closures and consequently the need to order on non EU shops.

18. Sources (13 items).

- UK forums
- Personal knowledge about practices or even pharmacology
- One TV documentary is mentioned
- One scientific publication is mentioned