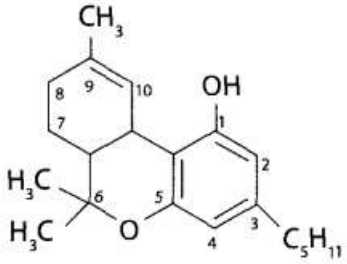
Detection and identification of individual drugs and narcotic substances. Cannabinoids

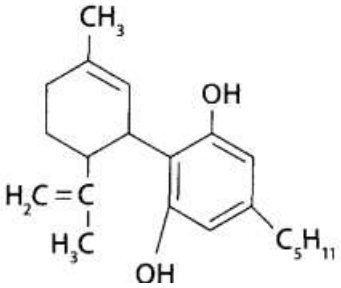
Properties and toxicological significance

This group includes substances found in various parts of hemp (Cannabis sativa). More than 30 different cannabinoids have been identified in hemp. Drug addicts use cannabis preparations most often in the form of marijuana and hashish. The effect of hashish on the body is 5 times stronger than the effect of marijuana.

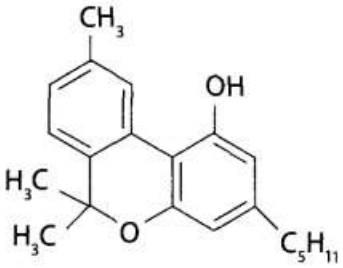
The main cannabinoids are 5 compounds:



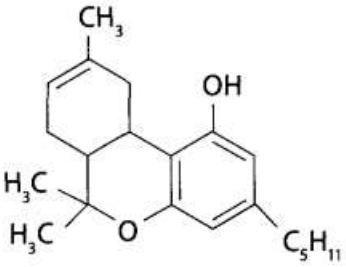
D9-Tetrahydrocannabinol (THC)



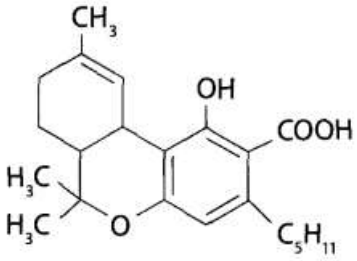
Cannabidiol (CBD)



Cannabinol (CB)



D8-tetrahydrocannabinol (D8-THC)



D9-tetrahydrocannabinol-2-carboxylic acid (D9-THC acid)

Currently, cannabis, its preparations and all THC isomers are included in the list No. 1 of the Standing Committee for Drug Control of the Russian Federation, which prohibits their use for any purpose, including medical purposes.

In the 20th century (1960-1970s), the use of marijuana by young people in the USA and other countries has reached large proportions. It is smoked, mixed with tobacco, taken orally, chew, add to sweets and drinks. Many studies have found that marijuana gradually causes drug

addiction, contributes to the transition young people to other “hard” drugs: heroin, cocaine, opium. In this regard, the attitude of society towards the problem of free use of marijuana is fundamentally has changed.

The most common forms of cannabis-derived drugs on the illegal commercial market are:

Marijuana is the dried and crushed upper part of the plant with leaves and flowers. The content of psychoactive substances in marijuana reaches 13-15%.

Hashish is a resin produced by cannabis (Cannabis sativa) during a certain period of plant development. Has green, dark brown or black color. The THC content is 2-10%.

Hashish oil is an extract of cannabis plant material or resin obtained by extraction with organic solvents. It is a dark, liquid, viscous mass. THC content ranges from 10 to 60%.

Depending on the manufacturing method, the resulting narcotic drugs from hemp on the black market received the names: “anasha”, “kharas”, “chirus”, “marijuana”, “grass”, “plan”, “kief”, “dagga”, “mahanga”, etc.

Methods of using cannabis drugs:

- ***Smoking (smoke inhalation)***. Cigarettes containing hashish are used for this purpose or hashish oil. The narcotic effect appears within a few minutes.
- ***Oral consumption***. Most often, chewing, brewing, drinks, candies with added marijuana, etc. The narcotic effect appears after 0.5-1 hour.

The effect of one dose lasts 3-5 hours, sometimes 12 hours or more. When using marijuana the physiological effect on the body resembles the action opium. Euphoria develops, which is accompanied by motor and speech excitement (there is a need to quickly walk, jump, run, dance), bright colorful hallucinations, a feeling of carelessness and fun. Any actions of others cause uncontrollable laughter, attention is distracted, associations arise easily and quickly.

Hypertrophy of one’s own “Me” occurs (the subject considers himself the highest human being), split personality. There is a feeling of horror in front of any noise (obsessive sensation of a clock ticking, a mosquito buzzing). The performance is disrupted about time and space. There is an exacerbation emotional experiences. Then comes general weakness, lethargy, tearfulness and long, deep sleep with a slow pulse and a decrease in body temperature. The nature of the action of hashish depends on the characteristics body, the dose taken and the activity of the drug.

Long-term use of cannabis drugs reduces a person’s mental abilities. Cannabinoids affect the lungs and heart, reduce testosterone levels (in men), accumulate in the female reproductive organs, cause toxic effects on fetal development, severe childbirth and early death of infants.

In case of fatal hashish poisoning (in animal experiments), severe destructive disorders are detected in the brain (venous stagnation, various destruction ganglion cells until their death). In the heart muscle, focal dystrophy and hemorrhages were noted, in the lungs - plethora, massive hemorrhages, emphysema, acute toxic pneumonia, severe degeneration in the liver.

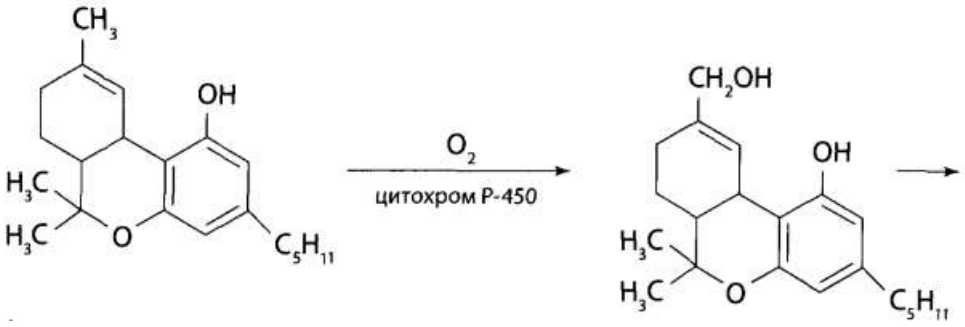
Metabolism

When smoked, cannabinoids are quickly absorbed into the blood. Due to the decomposition of substances, the amount of physiologically active compounds CB and D9-THC increases.

The concentration of THC in the blood reaches a maximum after 5-30 minutes.

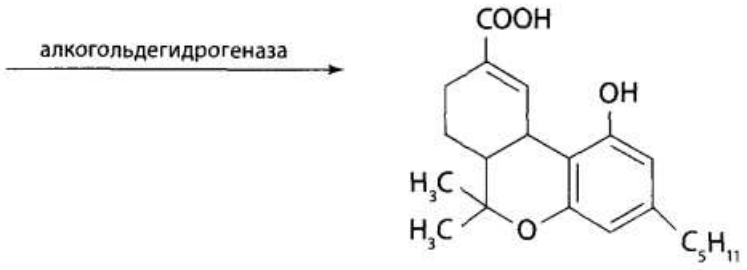
Metabolic processes are active. When cannabinoids are administered orally, due to poor solubility, the concentration in the blood increases slowly and reaches a maximum depending on the form reception after 1-3 hours.

I phase – oxidation



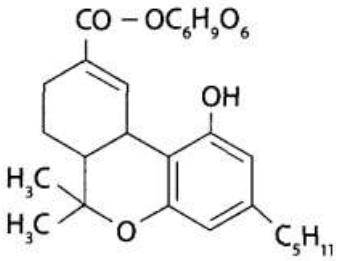
D9-tetrahydrocannabinol
D9-TGK

11-hydroxy-D9-tetrahydrocannabinol
(11-hydroxy-THC, active metabolite)



D9-tetrahydrocannabinolic acid
(THC acid, inactive metabolite)

II phase - conjugation with glucuronic acid



THC-COOH-glucuronide

Cannabinoids accumulate and undergo various metabolic processes in the liver. The main metabolite of cannabinoids is THC acid, which is 80% excreted in the form of conjugates with glucuronic and sulfuric acids. With feces, D9-THC and THC-acid conjugated with bile and fatty acids are excreted.

Physical properties

D9-THC and D9-THC-acid are highly soluble in ethyl alcohol and acetone, almost insoluble in water. D9-THC acid is poorly soluble in chloroform and diethyl ether and insoluble in benzene, petroleum ether.

Objects of analysis for cannabinoids and their preparation for research (drug treatment) Isolation method:

Wash from lips, palms, fingers. To take samples from the lips, palms, and fingers, wipe them with a gauze or cotton swab moistened with alcohol. From tampons tested the compounds are extracted with an organic solvent (hexane, ethyl acetate or petroleum ether). The extracts are evaporated to a volume of 0.2-0.4 ml and analyzed.

Saliva and mouth rinses. Take 10 ml of saliva or rinse your mouth with 50 ml 70% ethanol, to which sodium chloride is added until saturation (to eliminate possibility of ingestion). Cannabinoids are re-extracted with ethyl acetate. The resulting extracts are evaporated to a volume of several drops and analyzed.

Plasma. 5 ml of plasma is extracted with a mixture of petroleum ether containing 1.5% pentanol by volume. The extract is evaporated to a few drops and examined.

Urine. 50 ml of urine is subjected to alkaline hydrolysis and the resulting D9-THC acid, after acidification, is extracted with an organic solvent, evaporated, converted into methyl ether and analyzed by GLC and GC-MS.

Hair is collected and prepared for examination this method: to remove external contaminants, hair is washed with 2 M solution of hydrochloric acid and methanol (or ethanol), then dried at room temperature and a sample of 30-40 mg was taken for analysis. Chromatography-mass spectrometry is used for analysis.

Samples of narcotic drugs (hashish, marijuana, hashish oil). Weighed the sample is taken in an amount of 0.5-1 g and extracted for 1 hour with a tenfold amount of 96% ethyl alcohol, filtered, evaporated to a small volume and acidified.

Hashish oil is mixed with 96% ethyl alcohol in a ratio of 1:10 and analyzed.

Detection of cannabinoid`s compounds

PRELIMINARY REACTION

- Chemical method (coloring reaction):
  1. An extract from the object in a volume of several drops is applied to filter paper, dried and treated with a 0.5% solution of strong (fast) blue B in a 10% solution sodium bicarbonate. Cannabinoids show up on paper as a purple-red stain.
  2. To part of the extract add acetaldehyde, a solution of vanillin in 96% ethyl alcohol, concentrated hydrochloric acid and 1 ml of chloroform. When shaken the chloroform layer turns purple.

Reactions are given forensic chemical significance when a negative result is obtained.

CONFIRMATORY Chromatography in a thin layer of sorbent

- Immunoenzyme method (in chronic users of cannabinoids, after the last use, they can be detected by this method within 77 days, and in occasional users - within 29 days)
- Gas-liquid chromatography
- High performance liquid chromatography (HPLC)
- Gas chromatographic analysis coupled with mass spectrometry (GC/MS)

Quantitative determination

Gas chromatography method

High performance liquid chromatography