

CHARACTERISTICS AND CHEMICAL COMPOSITION OF EPHEDRINE ALKALOIDS ISOLATED FROM PLANTS OF THE EPHEDRA GENUS DETERMINATION.

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Abbosova Dinora Zokirjonovna

Fergana State University

Карабаева Раъно Ботировна

Киме фанлари буйича фалсафа доктори PhD



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Abstract: this article describes the properties of ephedrine alkaloids isolated from plants of the ephedra family. In addition, this article examines products derived from ephedra alkaloid and provides brief information about the ephedra family.

Keywords: Ephedra herb, Ephedra, molecular formula, crystal, Ma`huan`g, Ephedra sinica, E. equisetina

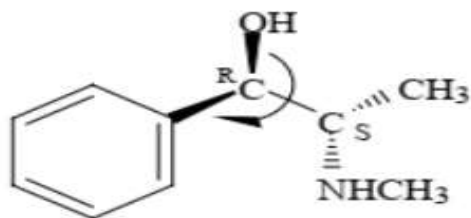
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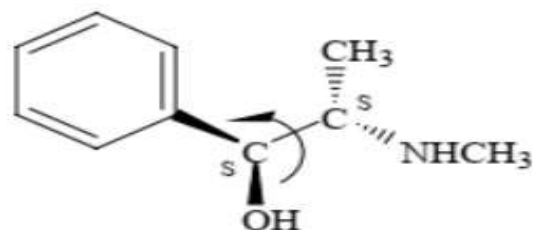
Ephedra is translated from Greek as "ioy". This name was given due to the appearance of the plant and the lack of foliage. It is very easy to recognize a plant, the deep spread of branches up to 1.5 meters long on the bushes gives it a ball-like shape. The remaining tip is the heaviest part of the gray bush. Sections are smooth, thin, transparent and long- up to 2 cm, there are only two leaves on the plant, they are triangular in shape, covered with small scales, opposite each other grows from the root. Many annual plants start with one inflorescence and a male trichet. Ephedra blooms from May to June, after which small yellow or red fruits appear. These cones are fleshy and sweet. The plant body is composed of water and organic matter, and the dry matter consists of organic and mineral compounds. The amount of water and dry matter in the organs and tissues of plants varies. The growing vegetative organs of plants contain 70 to 95 percent water, and the storage tissues of seeds contain 5 to 15 percent water in the cells of mechanical tissues. As the plant ages, the total and relative amount of water in its tissues, especially in the reproductive organs, decreases. The functions of water in plants are related to its physical and chemical properties. Due to the high specific heat capacity of water and its ability to evaporate at any temperature, it protects plants from overheating. Water is a good solvent for many compounds, such compounds dissociate electrolytically in an aqueous environment, and these ions are absorbed by plants as essential mineral elements. Due to the high tension of water, it plays a role in various adsorption processes and in the movement of mineral and organic compounds from one place to another. Ephedra herb preparation Ephedra sinica, E

intermedia or *E. equisetina* is a crude drug consisting of the stem above hoe Ephedra herb is often used to treat headaches, bronchial asthma, nasal inflammation, and the flu. The effects of ephedra herb are believed to be due to ephedrine alkaloids. However, ephedrine alkaloids can cause palpitations, hypertension, insomnia and dysuria are the main adverse effects therefore, the use of Ephedra herb and traditional formulas containing Ephedra plants is strictly prohibited herb and traditional formulas containing Ephedra plants is strictly prohibited for patients with cardiovascular diseases. Ongoing research suggests that ephedrine alkaloids are not involved in some of the pharmacological effects of the herb Ephedra. Ephedra alkaloid-free Ephedra Herb Extract demonstrates the possibility of making a new and potentially safer natural medicine without the adverse effects associated with ephedrine alkaloids. Ephedrine is a sympathomimetic alkaloid with molecular formula $C_{10}H_{15}NO$, molecular mass 165.2, and structural name (1R, 2S)-2-methylamino 1-phenylpropan-1-ol. Ephedrine is completely soluble in bitter colorless or white crystalline water, alcohol, chloroform, ether and glycerol. Ephedrine is also obtained by chemical synthesis and produced using the microbial biotransformation method. Ephedrine has a similar structure to methamphetamines, and its stimulating effect is produced by the adrenal glands with released adrenaline compared, it increases heart rate and blood vessel constriction in high stress situations. Medical use of ephedrine dates back to 3000 BC from Ma'huang'g by the Chinese, but was first isolated in 1855 and its pharmaceutical use began 1930. Studies on the molecular structure of ephedrine show that two asymmetric carbon atoms are involved in the molecular skeleton of ephedrine, so four optically active stereoisomers are naturally formed: (R, 2S)-(-)-ephedrine, (1S, 2R)-(+)-ephedrine (Fig.2.1), (1R,2R)-(-)-pseudoephedrine, (1S,2S)-(+)-pseudoephedrine (Fig.2.2).

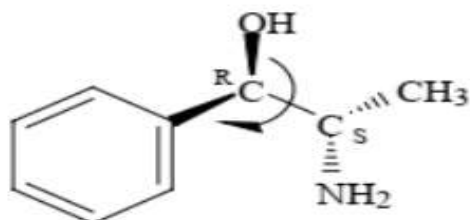
It is worth noting that pseudoephedrine is a diastereomer of ephedrine, and significantly racemic ephedrine (d-ephedrine) is not found naturally, but it is prepared synthetically and is not used commercially. Other naturally occurring compounds in ephedra plants are norephedrine and methylephedrine (Table 2.3). Four stereoisomers are also possible for each of these alkaloids. Theoretically, the three ephedra alkaloids exist as a total of 12 stereoisomers possible. Ephedrine and pseudoephedrine are completely stable compounds at varying temperatures, but they are highly unstable when exposed to sunlight or in the presence of oxygen pressure. The unique molecular structure of ephedrine makes its various stereoisomers valuable for pharmaceutical applications as nasal system stimulants. Ephedrine is a sympathomimetic substance, and the main mechanism of action of ephedrine is its effect on postsynaptic α - and β -receptors stimulation of insulin secretion, platelet aggregation and nerve reduces the release of norepinephrine from its terminals and causes contraction of vascular smooth muscles.



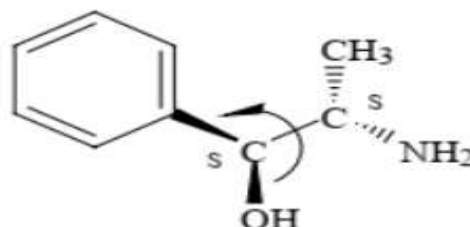
(-)-Efedrin



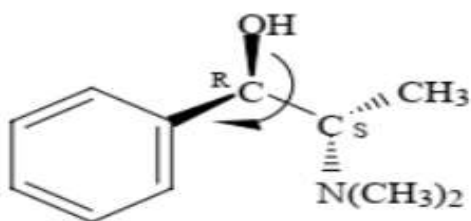
(+) -Psevdoefedrin



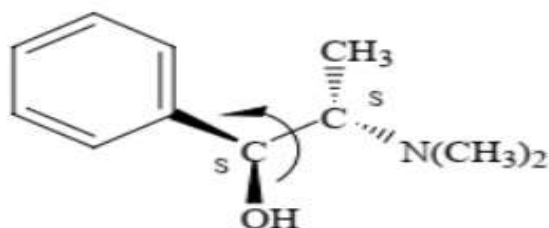
(-)-Norefedrin



(+) -Norpsevdoefedrin



(-)-N-Metilpsevdoefedrin



(+) -N-Metilpsevdoefedrin

In addition ephedrine has the ability to metabolize to norephedrine, which may be responsible for its central nervous system stimulant effects that cause weight loss. Unfortunately, ephedrine has been associated with toxic psychosis, and based on this finding, there is a growing demand for pseudoephedrine, the diastereomer of ephedrine, which has fewer side effects than ephedrine and it also has a weak, long-lasting effect on the heart system.

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