

Dimethyl Sulfoxide (DMSO)

What is DMSO?

Dimethyl sulfoxide (DMSO) is an organosulfur compound with the chemical formula $(\text{CH}_3)_2\text{SO}$. It is a colorless liquid known for its ability to penetrate biological membranes and dissolve both polar and nonpolar substances. Due to its unique properties, DMSO has been studied extensively for its use as a pharmaceutical solvent, drug-delivery agent, and therapeutic compound. DMSO exhibits anti-inflammatory, analgesic, and antioxidant properties. Unlike nutrients such as vitamins, DMSO is a synthetic compound primarily used in medical and industrial applications.

Mechanisms of Actions

1. Anti-inflammatory: Inhibits prostaglandin synthesis
2. Analgesic: Reduces peripheral nerve conduction
3. Antioxidant: Scavenges free radicals
4. Membrane penetration: Enhances drug delivery across the skin

Pharmacokinetics

Every drug or supplement has its own pharmacokinetic profile, commonly described by ADME, which stands for absorption, distribution, metabolism, and excretion. DMSO is unique in that it is readily absorbed through both the skin and mucous membranes, allowing it to enter systemic circulation without the need for oral or intravenous administration. Once absorbed, DMSO is widely distributed throughout the body, penetrating various tissues and biological membranes.

DMSO has a relatively long half-life of approximately 9-16 hours, which contributes to its sustained presence in the body. It is primarily metabolized in the liver into metabolites such as dimethyl sulfide and dimethyl sulfone. These metabolites, along with unchanged DMSO, are then eliminated through multiple routes, including the kidneys in urine and the lungs via exhalation, which is often responsible for the characteristic garlic-like odor associated with its use.

Patient Education

DMSO should only be used under the supervision of a healthcare provider and applied to clean skin to reduce the risk of contamination or irritation. Patients should monitor for symptoms such as rash or dizziness and report them promptly, and they should use caution when combining DMSO with other topical products, as it can increase the absorption of substances through the skin.

Adverse/Side Effects

- Garlic-like breath
- Skin irritation/burning sensation
- Headache, dizziness, nausea
- Rare: allergic reactions and vision changes

Formulation/Uses

Form	Use
Topical solution/gel	Arthritis, Pain, inflammation (off-label)
Intravesical solution	Interstitial cystitis (FDA-approved)
Cryoprotectant	Cell/tissue preservation
Solvent	Drug delivery/research

*Intravesical formulation is provider-administered

Conclusion

Therefore, DMSO is a very powerful compound with unique membrane-penetrating properties. Although it has great medical uses, it is very important to be careful and properly educated when using products containing DMSO. Contact your medical provider if you are interested in exploring DMSO options!

References

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