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Product Information

RETINOL ALL TRANS Sigma Prod. No. R7632

CAS NUMBER: 68-26-8

SYNONYMS: Vitamin A; Vitamin A₁; Vitamin A Alcohol;
Anti-Infective Vitamin; Axerophthol¹

PHYSICAL DESCRIPTION:

Appearance: Yellow to orange with a brown cast powder

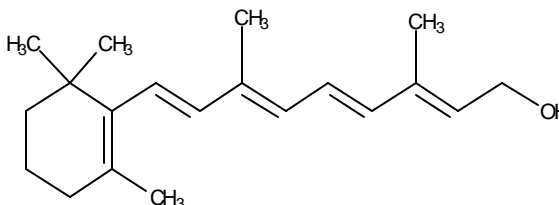
Molecular weight: 286.5

Formula: C₂₀H₃₀O

Melting point: 62-64°C (solvent free)⁴

E^M(325nm) = 52,480 (ethanol)³

E^{1%}(324-325nm) = 1835 (ethanol)⁴



RE exhibits fluorescence properties with maximum absorbance and emission at 325 nm and 520 nm (cyclohexane), respectively.⁵

METHOD OF PREPARATION:

Retinol all trans (RE) is synthetically prepared by Sigma. Many procedures have been reported for methods of synthesis which include synthesis from retinal⁸ and total synthesis from various starting compounds.^{4,9} Methods of purification and various assays for purity determination have been described.^{4,10}

STABILITY / STORAGE AS SUPPLIED:

RE is expected to be stable for about one year if unopened in the sealed amber glass vial (packaged under argon atmosphere), stored at -20°C.²

SOLUBILITY / SOLUTION STABILITY:

RE is practically insoluble in water or glycerol. It is soluble in absolute ethanol, methanol, chloroform, ether, fats and oils.⁷ RE has been dissolved at 50 mg/ml in chloroform; a clear yellow to orange solution results.² Stock solutions of RE (1 mg/ml) were prepared in ethanol, diluted in DMSO under low light conditions and stored at -50°C under nitrogen in brown glass vials.¹¹ RE solutions (50 µM) were sterile filtered before use.¹¹ RE both as a solid and in solution is readily oxidized in air and inactivated by UV light.

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SOLUBILITY / SOLUTION STABILITY: (continued)

To reduce photodestruction of RE, manipulations of RE solutions can be performed under yellow or red light.^{12,13} Solutions may be stabilized by dissolving in oil, by the addition of anti-oxidant compounds including α -tocopherol or hydroquinone or by conversion to the palmitate and acetate esters.³ It is recommended to prepare solutions fresh for optimal quality. However, if absolutely necessary, store solutions in the dark under an inert atmosphere at least at -20°C preferably at -70°C. Solvents preferred for storage are peroxide-free ethyl ether, acid-free acetone or ethyl acetate. For short term storage, ethanol is suitable as a solvent for spectroscopic analysis.⁴

USAGE / APPLICATIONS:

The isolation of retinol from human plasma has been described.¹⁴ RE is an effective antioxidant displaying lipoperoxy radical scavenging activity.¹⁵ The interactions between RE and Vitamin E (α -tocopherol) in suppressing lipid peroxidation were observed in bovine retinal membrane preparations.¹³ RE may influence the production of transition vesicles by stimulating the activity of a protein disulfide isomerase-like activity involved in vesicle formation.¹² RE may be involved in immune system mechanisms; an RE deficiency will depress the immune response producing a negative effect on both humoral and cellular immunity.¹⁶ RE (10 μ M) and other retinoid compounds effectively induced sanguinarine and chelerythrine (benzophenanthridine alkaloids) accumulation in suspension-cell cultures of *Sanguinaria canadensis* in a way similar to fungal elicitation.¹¹ RE (10 μ M) stimulated DNA synthesis and possibly repair mechanisms in Sertoli cells of rat.¹⁷

GENERAL NOTES:

The USP unit of vitamin A (same as the International Unit⁶) is equal to 0.3 μ g of the pure all-trans isomer of retinol which is equivalent to 0.344 μ g of all-trans retinyl acetate.⁷

RE and its metabolites, including retinoic acid, are part of the retinoid class of compounds, involved in vision, normal embryo morphogenesis and in the regulation of proliferation and differentiation of a number of cell types. Current information and hypotheses on the absorption, transport, storage and metabolism of this fat soluble Vitamin A (retinol) have been reviewed.¹⁸ Studies on RE metabolism including its mobilization and transport in plasma and in tissues via serum and cytosolic retinol-binding proteins have been described.¹⁹

REFERENCES:

1. Sigma Material Safety Data Sheet
2. Sigma Quality Control Data
3. Dawson, R.M.C. et al., eds. *Data for Biochem. Res.* 3rd edition, Clarendon Press, Oxford, 136, 1987.

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REFERENCES: (continued)

4. Specifications and Criteria for Biochemical Compounds, 3rd edition, *National Academy of Sciences*, 78, (1984).
5. Radda, G.K. and Smith, D.S., *FEBS Letters*, 9, 287, (1970).
6. *Martindale, The Extra Pharmacopoeia*, 30th ed., 1051, (1993).
7. *The Merck Index*, 12th edition, #10150, p. 1709.
8. Wendler, N.L. et al., *J. Am. Chem. Soc.* 72, 234, (1950).
9. Mukaiyama, T. and Ishida, A., *Chem. Letters*. 1201, (1975).
10. Kofler, M. and Rubin, S.H., *Vitamins, Hormones* 18, 315, (1960).
11. Mahady, G.B. and Beecher, C.W.W., *Natural Product Letters*, 8, 173, (1996).
12. Jacobs, E. et al., *Life Sciences*, 59, 273, (1996).
13. Tesoriere, L. et al., *Biochem. Mol. Biol. Int.* 37, 1, (1995).
14. Dueker, S.R. et al., *Anal. Chem.* 66, 4177, 1994.
15. Livrea, M.A. and Tesoriere, L., *Methods in Enzymology*, 234, 7401, (1994).
16. Chytil, F.J., *Nutr. Immunol.*, 4, 35, (1995).
17. Moreira, J.C.F. et al., *Med. Sci. Res.* 24, 383, (1996).
18. Blomhoff, R. et al., *Science*, 250, 399, (1990).
19. Goodman, D.S., *Federation Proc.*, 39, 2716, (1980).

Additional References:

Sebrell, W.H. and Harris, R.S. (eds) *The Vitamins*, Vol. 1, Academic Press, NY, 2nd ed., 1967 - descriptive information on the chemistry, physicochemical properties and physiology of Vitamin A.

Morre, D.M. "Intracellular Actions of Vitamin A" *Intl. Rev. Cyt.* 135, 1, 1992.