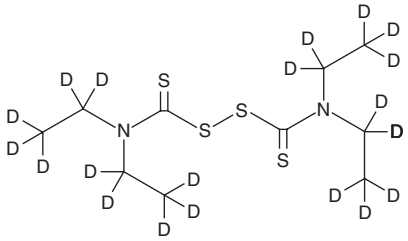
PRODUCT INFORMATION

Disulfiram-d_{20}

Item No. 28536

CAS Registry No.: 1216403-88-1
Formal Name: *bis*(1,1,2,2,2-pentadeuterioethyl) carbamothioylsulfanyl N,N-*bis*(1,1,2,2,2-pentadeuterioethyl)carbamodithioate
Synonym: Tetraethylthiuram disulfide-d_{20}
MF: $C_{10}D_{20}N_2S_4$
FW: 316.7
Chemical Purity: ≥98% (Disulfiram)
Deuterium Incorporation: ≥99% deuterated forms (d_1-d_{20}); ≤1% d_0
Supplied as: A solid
Storage: -20°C
Stability: ≥4 years



Information represents the product specifications. Batch specific analytical results are provided on each certificate of analysis.

Laboratory Procedures

Disulfiram-d_{20} is intended for use as an internal standard for the quantification of disulfiram (Item No. 15303) by GC- or LC-MS. The accuracy of the sample weight in this vial is between 5% over and 2% under the amount shown on the vial. If better precision is required, the deuterated standard should be quantitated against a more precisely weighed unlabeled standard by constructing a standard curve of peak intensity ratios (deuterated *versus* unlabeled).

Disulfiram-d_{20} is supplied as a solid. A stock solution may be made by dissolving the disulfiram-d_{20} in the solvent of choice, which should be purged with an inert gas. Disulfiram-d_{20} is soluble in methanol, DMSO, and dimethyl formamide.

Description

Disulfiram is a copper and zinc chelator and an irreversible inhibitor of aldehyde dehydrogenase (IC_{50} = 0.1 mM).[1] It also inhibits the copper-dependent enzyme dopamine β-hydroxylase, which prevents the breakdown of dopamine.[2] When in complex with copper, disulfiram has been shown to inhibit purified 20S proteasome (IC_{50} = 7.5 µM) and 26S proteasome (IC_{50} = 20 µM) from MDA-MB-0231 breast cancer cells.[3,4] Disulfiram (at 250 nM) induces reactive oxygen species, activates JNK and p38 pathways, and inhibits NF-κB activity, which suppresses self-renewal in cancer stem cells.[5,6]

References

1. Kraemer, R.J. and Deitrich, R.A. Isolation and characterization of human liver aldehyde dehydrogenase. *J. Biol Chem.* **243(24)**, 6402-6408 (1968).
2. Haile, C.N., De La Garza, R., II, Mahoney, J.J., III, *et al.* The impact of disulfiram treatment on the reinforcing effects of cocaine: A randomized clinical trial. *PLoS One* **7(11)**, e47702 (2012).
3. Chen, D., Cui, Q.C., Yang, H., *et al.* Disulfiram, a clinically used anti-alcoholism drug and copper-binding agent, induces apoptotic cell death in breast cancer cultures and xenografts via inhibition of the proteasome activity. *Cancer Res.* **66(21)**, 10425-10433 (2006).
4. Schmitt, S.M., Frezza, M., and Dou, Q.P. New applications of old metal-binding drugs in the treatment of human cancer. *Front. Biosci. (Schol. Ed.)* **4**, 375-391 (2012).
5. Liu, P., Brown, S., Goktug, T., *et al.* Cytotoxic effect of disulfiram/copper on human glioblastoma cell lines and ALDH-positive cancer-stem-like cells. *Br. J. Cancer* **107(9)**, 1488-1497 (2012).
6. Chiba, T., Suzuki, E., Yuki, K., *et al.* Disulfiram eradicates tumor-initiating hepatocellular carcinoma cells in ROS-p38 MAPK pathway-dependent and -independent manners. *PLoS One* **9(1)**, e84807 (2014).

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