

LP-GAS ODORIZATION INFORMATION

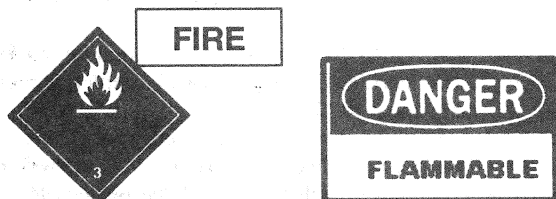
THIS INFORMATION MAY SAVE A LIFE

TO: ALL LP-GAS Producers, Suppliers, Marketers and Consumers.

Propane (C_3H_8)

Trade Names: Liquefied Petroleum Gas, LP-Gas, LPG, HD-5, Propane

LP-Gas (Propane) at normal atmospheric conditions is a colorless, odorless, and flammable gas. It is transported and stored in liquid form under pressure in specially designed, constructed, and treated containers.



KNOW THE ODOR:

In order to detect its presence and prevent an explosion from a buildup of propane gas, odorant (almost always ethyl mercaptan) is added to liquid LP-Gas. Ethyl mercaptan has a distinctive odor and has a high odor impact. To familiarize yourself with this type of odor you can request "Scratch and Sniff" leaflets from the Propane Education & Research Council, (866) 905-1075, www.propanemarc.com; your local propane supplier or from Chevron Phillips Chemical Company LP, 10001 Six Pines Drive, The Woodlands, TX 77380 (ATTN: Specialty Chemicals).

Propane is occasionally odorized with something other than ethyl mercaptan and it may smell different. Users should acquaint themselves with the odor of the odorized propane that they are using and should frequently make sniff tests to confirm the presence of odor in their LP-Gas. If there is ever any suspicion as to the adequate presence of the expected odor, the user should immediately evacuate the area, shut off the propane tank supply valve, if possible, and call their LP-Gas dealer, or supplier, from a place of safety. If there is a suspected leak, the user should follow this same procedure and also call the fire department from a place of safety.

WARNING:

Everyone handling or using LP-Gas should realize that the odorant used to give propane a distinctive smell may not be detected by all people under all circumstances. The strongest odor may be near the floor, and consumers should be aware of possible floor-to-ceiling concentration differences. Conditions such as sinus congestion, allergies, head colds, smoking, or recent use of alcohol or drugs (including certain medications) also may affect the ability to detect odor at any particular time. Certain individuals (especially the elderly) can have an impaired sense of smell. Environmental conditions also may exist that diminish odor detection. For example: 1. the odorized gas may be masked or covered up by other odors such as musty basements, cooking odors, and certain foods, or 2. high concentrations of odor can shock or diminish the sense of smell, which can also occur from prolonged exposure to the odor of LP-Gas.

Under rare conditions, ethyl mercaptan odorant in LP-Gas can "fade" or diminish in intensity. A leak could exist and a person may not detect an odor from the gas. Ethyl mercaptan can fade because of absorption (sticking) of the odorant to the inside surface of metal storage containers or oxidation of the odorant. Odorant can be absorbed from the vapor space of periodically used (static) propane storage containers. Odorant can also be absorbed by such things as soil, on the inside walls of gas piping, by building materials such as untreated masonry or rough wall surfaces, and on furniture, fabrics, and drapes.

Special precautions should be taken when putting a container into service, especially if the container is new or has been out of service and open to the atmosphere for any extended period of time. Special care should be taken to ensure that containers are free of active internal rust. Refer to PERC or refer to NPGA bulletins for container preparation methods.

The National Fire Protection Association and federal and state agencies responsible for regulating propane safety acknowledge that odorants added to propane do not provide 100% effective leak detection: on rare occasions a leak may not be detected by smell. Gas detectors, listed by the Underwriters Laboratories (UL) and others, can be used as

an extra measure of safety for detecting leaks. Detectors that sound a loud alarm are now on the market at a reasonable price.

Everyone producing, distributing, marketing, or consuming LP-Gas should accept the responsibility of becoming knowledgeable about the handling and use of LP-Gas. All family members should be informed. People who own rental property that uses propane should inform their new leases of the characteristics and properties of LP-Gas.

If an LP-Gas incident occurs, involving personal injury, death, or property damage, contact the LP-Gas supplier immediately.

Any time there is a question about the presence of propane gas, immediately evacuate the premises, shut off the propane tank supply valve, if possible, and call the fire department and LP-Gas dealer from a place of safety.

It is customary for the owner or operator of production, distribution, or bulk storage facilities in the U.S. to inject a minimum of 1.0 pounds (generally 1.5 lbs) of ethyl mercaptan per 10,000 gallons of liquid LP-Gas. NFPA 58, which has been adopted administratively as law in most states:

"All LP-Gases shall be odorized prior to delivery to a bulk plant by the addition of a warning agent of such character that the gases are detectable, by a distinct odor, to a concentration in air of not over one-fifth the lower limit of flammability."

"Exception: Odorization, however, shall not be required if harmful in the use of further processing of the LP-Gas or if such odorization will serve no useful purpose as a warning agent in such further use of processing (sec. 1-3.1)."

The owner or operator of production, storage or bulk distribution facilities handling odorized propane should verify by a sniff test the presence of an odorant at each change of LP-Gas custody. Good industry practice involves preparing the proper documentation of odorization on the bill of lading for tank cars and transports. At a minimum such documentation should certify that the gas has been odorized, the type of odorant, and the amount used. The receiving plant should review the bill of lading (to confirm the certification), perform its own chemical analysis or sniff test, and make a record of the results of such tests.

THE FOREGOING INFORMATION IS INTENDED TO ENHANCE THE SAFE USE OF PROPANE. CHEVRON PHILLIPS CHEMICAL COMPANY LP HAS USED ALL POSSIBLE CARE TO ENSURE THE ACCURACY OF THE INFORMATION CONTAINED IN THIS INFORMATION SHEET BUT ASSUMES NO LIABILITY FOR ANY ERRORS, OMISSIONS, OR DEFECTS WHATSOEVER IN THE CONTENT OR FOR ANY

DAMAGE OR INJURY RESULTING FROM ITS INFORMATION.

Standards, Codes, Regulations, Papers

More detailed information is available from the following sources:

1. Federal, state and local laws, regulations and codes.
2. Department of Transportation Regulations.
3. NFPA 58, Liquefied Petroleum Gas Code
4. NPGA Bulletins"
5. Johnson, Sung-I J., "Ethyl Mercaptan Odorant Stability in Stored Propane Gas." Presented at the Institute of Gas Technology Symposium on Odorization, May 1989.
6. Cain, William S. and Amos Turk, "Smell of Danger: An Analysis of LP-Gas Odorization," American Industrial Hygiene Association Journal, March 1985
7. Amoores, J. E., "Properties of Olfactory System." Presented at the Institute of Gas Technology Symposium on Odorization, July 1976.
8. Whisman, M.L. et. al., "A New Look at Odorization Levels for Propane Gas," Bartlesville Energy Research Center Report BERC/RI 77/1, September 1977.
9. Matson, A.R. and R.E. Dufour, "Persistency of Odor of Accidentally Released Liquefied Petroleum Gas," Underwriters Laboratory Bulletin of Research Number 37, December 1946.
10. Proceedings, Symposium on LP-Gas Odorization Technology, April 18, 1989.
11. Proceedings, Symposium on LP-Gas Odorization Technology, October 11, 1990.
12. Material Safety Data Sheet for Scentinel® A Gas Odorant, US 025580.
13. Title 49 CFR 173-315 Transportation, Compressed gases in cargo tanks and portable tanks, Department of Transportation.
14. Gas Engineer's Handbook, Fuel Gas Engineering Practices, Chapter 11, by J.S. Powell and F.E. Vandaveer, The Industrial Press, 1965.
15. Technical Information Bulletin, "LP-Gas Odorant Properties", Revision 11, Chevron Phillips Chemical Company, October, 2011.
16. Title 29 CFR 1910.11(b)(1) Basic Rules - Odorizing Gases.
17. Propane Education & Research Council www.usepropane.com