SIGMA

ProductInformation

DIETHYL PYROCARBONATE
Product Number **D5758**
Storage Temperature 2-8°C

CAS #: 1609-47-8
Synonyms: DEPC, DEP, Pyrocarbonic Acid Diethyl ester, Diethyl Oxydiformate, dicarbonic acid diethyl ester[6]

Product Description
Appearance: Clear colorless liquid
Molecular formula: $C_6H_{10}O_5$
Formula weight: 162.1
Density: 1.12 g/mL
Molarity: 6.9 M
Refractive Index: 1.398 at 20°C

Diethyl Pyrocarbonate (DEPC) is sensitive to moisture and to pH; it decomposes to ethanol and carbon dioxide in aqueous solution. It decomposes at 155°C. DEPC is also sensitive to ammonia, which causes decomposition to urethane, a possible carcinogen.

DEPC is effective as a nuclease inhibitor.[2,3,4] (It reacts with many enzymes containing -NH, -SH or -OH groups in their active sites.[8] Typically a 0.1% solution is used to inactive RNase (one milliliter of DEPC is added to 1 liter of water). The DEPC will not immediately dissolve, as evidenced by the appearance of globules. The mixture should be stirred until the globules disappear. The DEPC hydrolyzes over time to form ethanol and carbon dioxide. At this time the solution may be autoclaved to destroy the DEPC.

DEPC has been used as a gentle esterifying agent and preservative.[6] DEPC acts as a condensing agent between lysine ε-amine groups and the carboxyl groups of aspartic or glutamic acid. It modifies purine residues in RNA by carboxyethylation of histidyl residues.[4]

It is considered sufficient to autoclave 0.1% DEPC solutions for 15 minutes per liter.

A method to assay for DEPC uses 5-thio-2-nitrobenzoate.[4]

For general information and background, see references.

Notes:
1. DEPC will dissolve some plastic pipets; therefore, glass should be used. It has been reported that it is incompatible with polycarbonate containers; it may react to form an insoluble solid.
2. If one does not wish to autoclave, the DEPC-treated water may be boiled (100°C for 15 minutes).
3. Glassware is incubated with a DEPC solution for about 30 minutes and subsequently autoclaved to degrade the DEPC

Preparation Instructions
DEPC is tested for miscility in 95% ethanol; 1.6 mL in 4 mL ethanol gives a clear, colorless solution. It is soluble in alcohols, esters, ketones and other hydrocarbons, but only soluble in water to about 0.1%.[5] DEPC hydrolyzes in aqueous solution. In phosphate buffer at 25°C, its half-life is 4 minutes at pH6, 9 minutes at pH 7. Hydrolysis is accelerated by TRIS buffer; at 25°C, its half-life was reported to be 1.25 minutes at pH 7.5, 0.37 minutes at pH 8.2.[6]

Storage/Stability
Diethyl pyrocarbonate is very sensitive to moisture, and as such, is packaged under argon to help reduce exposure to moisture. This product has a shelf-life of 2 years.

If the product is exposed to even traces of moisture, it does hydrolyze somewhat. The carbon dioxide which is formed is more soluble in DEPC at 0-4°C than at room temperature, and as the product is brought to room temperature before opening, the DEPC at 0-4°C can become supersaturated with respect to any dissolved gas. It is advised that the user be familiar with the hazardous nature of DEPC, as described on the Material Safety Data Sheet (MSDS).

After opening the bottle for the first time and each time thereafter, layer nitrogen or argon gas over the DEPC and store the closed bottle at 2-8°C for optimal stability. It may be helpful to store the bottle inside a sealed plastic bag with desiccant, but with the bottle cap slightly loose. If the bag inflates at all, this is an indication of some degree of decomposition with possible pressure build-up. Once opened, the bottle should not be kept for more than 9 months.

References

1. Suppler data.
2. Williamson, R. et al., Biochemistry 10, 3014 (1971).

3. Solymosy, F. et al., Eur. J. Biochem. 5, 520 (1968).
4. Sambrook, J., Fritsch, E.F., & Maniatis, T., Molecular Cloning: A Laboratory Manual, 2nd Ed. (1989) p. 7.3-7.4.
5. Berger, S.L. Analytical Biochem., 67, 428 (1975).
6. Merck Index, 12th Ed., p. 1375, #8182 (1996).
7. Data For Biochemical Research, 3rd Ed., Dawson, R.M.C et al, ed., Oxford Press, 1984, p. 389.
8. Sigma Molecular Biology Department.
9. Ehrenberg, L. et al, Prog. Nucleic Acid Res. & Molec. Biol. 16, 189-263 (1976). "Diethyl Pyrocarbonate in Nucleic Acid Research.

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