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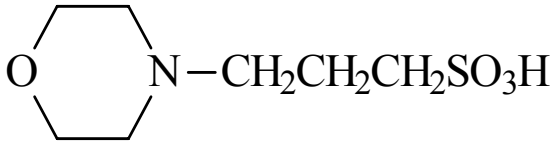
ProductInformation

MOPS FREE ACID
Sigma Prod. Nos. M1254, M5162, M6270, and M8899

CAS NUMBER: 1132-61-2
SYNONYM: 3-(N-morpholino)propanesulfonic acid



PHYSICAL DESCRIPTION:

Appearance: white powder (crystalline)
Molecular formula: $C_7H_{15}NO_4S$
Molecular weight: 209.3
Melting point: decomposes at approx. 277°C[1]
pK_a = 7.2 at 25°C
Effective buffering range: pH 6.5-7.9
$\Delta pK/\Delta T$ = -0.015[2,3]

STABILITY / STORAGE AS SOLD:

The solid is stable at room temperature for years. On standing, bulk material tends to compact and becomes quite hard, but chemically is still fine. MOPS Free Acid should be re-evaluated every year for suitability in user application.

SOLUBILITY / SOLUTION STABILITY:

MOPS Free Acid is very soluble in water, at least to 33% (w/w), giving a clear colorless solution. The pH of a 0.1 M solution is generally 3.3-4.1 (temperature-dependent). The specifications for M5162, the SigmaUltra product, set limits for a 1 M solution.

Solutions should be stable at 2-8°C for at least six months. Sterilization should be done by filtration through 0.2 μm filters. Autoclaving is not recommended for any sulfonic acid buffers. If buffers must be nuclease-free, it is best to treat the water, then add the buffer solids after autoclaving. When MOPS solutions have been autoclaved, they turn yellow (although pH does not change measurably). The identity of the yellow breakdown product is unknown.[1]

GENERAL REMARKS:

MOPS is a morpholino *propanesulfonic* acid, a structural analog to MES, the *ethanesulfonic* acid (first introduced by Good et al.)[4] Both series of buffers were developed to meet the following criteria: midrange pK_a, maximum water solubility and minimum solubility in all other solvents, minimal salt effects, minimal change in pK_a with temperature, chemically and enzymatically stable, minimal absorption in visible or UV spectral range and reasonably easily synthesized.[4]

GENERAL REMARKS: (continued)

Because its pK_a is closer to physiological pH 7.4 than that of MES, MOPS may be more suitable as a buffer. Its use in mammalian cell culture was examined; usage above 20 mM is not recommended for such purposes.[5] Its use in a discontinuous buffer system in polyacrylamide gel electrophoresis was tested and recommended.[6]

Sigma offers several MOPS buffers for special applications. M1254 is the standard reagent grade. M5162, SigmaUltra, is tested for trace metals. M6270 is tested for suitability in cell culture work. M8899 is tested for suitability in molecular biology applications.

A buffer using MOPS free acid can be prepared by titrating the free acid with sodium hydroxide to the desired pH ($pK_a \pm 1$). Alternatively, volumes of equimolar MOPS free acid and sodium MOPS can be mixed to attain the desired pH. Sigma offers M0289, a hemi-sodium MOPS, which produces a buffer ready to use without titration.

REFERENCES:

1. Sigma Material Safety Data Sheet
2. Sigma quality control.
3. Ellis, K.J. and Morrison, J.F., *Methods in Enzymology*, 87, 405-426 (1982). "Buffers of constant ionic strength for studying pH-dependent processes." Note that a review article in *Methods in Enzymology*, 182, table p. 27 (1990) has the $\Delta pK/\Delta T$ misprinted.
4. Good, N.E. et al., *Biochemistry*, 5, 467-477 (1966).
5. Eagle, H., *Science*, 174, 500-503 (1971).
6. Thomas, J.M. and Hodes, M.E., *Analytical Biochemistry*, 118, 194-196 (1981).