ProductInformation

MOPS SODIUM
Sigma Prod. Nos. M0289, M9381 and M5789

CAS NUMBER: 71119-22-7
SYNONYM: 3-(N-morpholino)propanesulfonic acid

PHYSICAL DESCRIPTION:

Appearance: white powder
Molecular formula: $C_7H_{14}NO_4SNa$
Molecular weight: 231.2
pK_a= 7.2 at 25°C, Effective buffering range 6.5-7.9
$\Delta pK_a/\Delta T$ = -0.015[1,2]

STABILITY / STORAGE AS SUPPLIED:

The solid is stable at room temperature, but over time may develop a trace of yellow color.[3] Suitability for user application should be re-evaluated every two years.

SOLUBILITY / SOLUTION STABILITY:

MOPS Sodium 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 10-12 (temperature-dependent). The specifications for M5789, 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.[3]

GENERAL REMARKS:

MOPS is a morpholino *propanesulfonic* acid, a structural analog to MES, the *ethanesulfonic* acid (first introduce 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]

A buffer using MOPS free acid can be prepared by titrating the free acid with sodium hydroxide to the desired pH ($pK_a \pm 1$), using about a half-equivalent of NaOH. Alternatively, volumes of equimolar MOPS free acid and MOPS sodium can be mixed to attain a buffer of the desired pH. Titration of a solution of MOPS sodium with HCl results in a solution that will contain NaCl, so the ionic strength will be higher than appropriate for some applications.

Sigma offers several MOPS buffer products: M9381 is the reagent grade; M5789, SigmaUltra, is tested for trace metals. M0289, a hemi-sodium MOPS, produces a buffer ready to use without titration.

REFERENCES:

1. Sigma quality control.
2. 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 $\Delta pK_a/\Delta T$ misprinted.
3. Sigma production department.
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).