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BIOTECHNOLOGY

Edited by C. F. PHELPS and P. H. CLARKE

The fourteen contributions forming this volume were presented at a London meeting of the Biochemical Society including the Society's Forty-Eighth Symposium 'Biotechnology', in December 1982. With today's increasing pressures to develop latest laboratory findings into practical industrial processes as quickly as possible the chosen theme of this Symposium was a timely one. The papers represent up-to-date reports from international biochemists whose work is of direct relevance to the wide areas of interests concerned with biotechnology, together with glimpses of the early development of its techniques and a look at its exciting future.

List of contents and authors:

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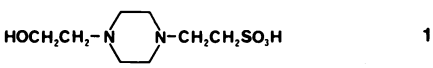
Biological Buffers

Buffers make an important contribution to the study of biological reactions by maintaining a low but constant concentration of hydrogen ions (10^{-6}-10^{-10}*M*). The buffers most suited to biological systems have the following properties:[1,2]

1) high water solubility, but limited solubility in organic solvents
2) make minimal contribution to the number of ions in the medium
3) pKa is little influenced by the medium
4) form complexes with biologically significant cations which are water-soluble with well characterized binding constants
5) do not interfere with spectrophotometry at wavelengths greater than about 230nm
6) nonreactive with the medium.

N.E. Good *et al.*[1,2] designed a wide variety of buffers using these criteria. In general the 'Good' buffers are water-soluble, zwitterionic species with buffering ranges between pH 6 and 10. We produce a complete line of biological buffers including the 'Good' buffers[1-3] which consist of substituted ammonium ethanesulfonates, propanesulfonates and hydroxypropanesulfonates. In addition, we offer a wide range of TRIS [tris(hydroxymethyl)-aminomethane]- and glycine-derived buffers.

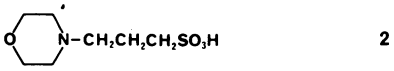
Ethanesulfonates



1

HEPES [**1**, 4-(2-hydroxyethyl)-1-piperazineethanesulfonic acid][1,2] is the preferred buffer for many biological purposes. This compound and other zwitterionic ethanesulfonates have been used for pH control in biological media[4,5] and in mixed-solvent applications[6] (DMSO-H_2O). Aldrich also offers the ethanesulfonate derivatives of morpholine (MES), tris (TES), diethanolamine (BES), cyclohexylamine (CHES), piperazine (PIPES) and glycinamide (ACES).

Propanesulfonates

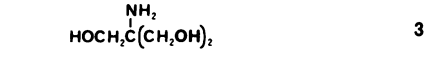


2

MOPS (**2**, 4-morpholinepropanesulfonic acid)[1,2] is the most popular of the propanesulfonate buffers. As with HEPES, it has found widespread use in pH control in biological systems[7] and mixed solvents.[5,8] It has been suggested as a secondary standard in isotonic sodium chloride solution.[7]

Other propanesulfonate derivatives available include *N*-(2-hydroxyethyl)piperazine (EPPS), tris (TAPS), cyclohexylamine (CAPS), β-hydroxy-4-morpholine (MOPSO) and 3-cholamidopropyldimethylammonio (CHAPS).

TRIS



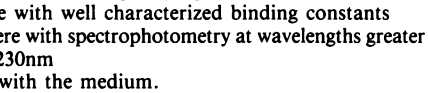
3

TRIS (**3**) and its salts have been useful as buffers in a wide variety of biological systems.[5,9,10] In addition, TRIS has found use as a seawater buffering agent.[11]

TRIS has been used as a starting material for polymers, oxazolines (with carboxylic acids) and oxazolidines (with aldehydes).[12]

Other 'TRIS'-type buffers we offer are 'bis-tris' [2,2-bis(hydroxymethyl)-2,2′,2″-nitrilotriethanol] and 'bis-tris' propane {1,3-bis[tris(hydroxymethyl)methylamino]propane}.

Glycine derivatives



4

Glycine derivatives such as tricine {**4**, *N*-[tris(hydroxymethyl)-methyl]glycine}[1,2,5] are also often used to advantage in biological systems. This buffer can replace TRIS in many applications,[2] although it is not as widely used as HEPES. Other glycine derivatives available include bicine[1,2] [*N*,*N*-bis(2-hydroxyethyl)glycine] and ADA [*N*-(2-acetamido)iminodiacetic acid].

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