



P09E

## ■ Buffering agents and Buffers

This document includes:

### ● Solvents

[Water](#) | [DMSO, DMF \[solubilisation\]](#)      [More Solvents](#)

### ● Buffering agents, and their formulated buffers

[Borate](#) | [Carbonate](#) | [Citrate](#) | [Glycine](#) | [Tris](#) | [Phosphate](#) | ... [More classic buffering agents](#) (mineral and organic buffers)

[Hepes](#) | [ACES](#) | [CAPSO](#) | [MES](#) | [MOPS](#), ...

[More Good's buffers](#) and [other biological buffers](#)

### ● Additives for buffer solutions preparation

### ● Formulated buffers by techniques

[electrophoresis/blotting, affinity chromatography, cell culture and assay, immunodetection, ...]

Interchim provides high quality biochemicals for use in Biotech, Purification, Molecular Biology, and Cell Culture.

See [General use Biochemicals](#) <sup>(PH)</sup>

(alphabetic list, and other biochemical types: buffers, salts, detergents, antibiotics, protease inhibitors, ...)

See also [on line search](#) [all Interchim supply]

## Introduction to buffers (solvents, buffering, additives)

Most applications in biotechnologies and biochemistry of proteins operate in aqueous solutions. Other more or less polar solvents are however useful, and apolar organic solvents are used to solubilize reagents in typically in biochemistry.

**Water** is determinant to interactions of biological systems, dissociating in H<sup>+</sup> and OH<sup>-</sup> ions thus interfering with ions and charged biomolecules, but also interacting by Van de Waal binding to solvate biomolecules and by hydrophobic interactions to form micelles or precipitates. **Organic solvents** may be helpful to solubilize hydrophobic compounds prior mixing to aqueous buffers.

To that point, **buffers** are aqueous solutions containing partly neutralized weak acids or bases that show little change in pH [H<sup>+</sup> concentration] whatever ions are added. Requirements should be considered for the choice of the buffer, and it's use in each application. I.e. the pH should be determined at the final temperature, in presence of salts [i.e. phosphate pH change with salts concentration] near the pK<sub>a</sub> of the buffering compound. The buffering compound should not absorb at wavelengths [i.e. at 240-270nm for mass spectrometry]...

Classic used buffering agents are **mineral buffers** [[Phosphate](#), [Tris](#), [Borate](#), [Citrate](#), [Glycine](#)...], but also several **organic buffers** [[Glycine](#), [DEA](#),...]. Many requirements should be met [buffering range, solubility, compatibility with spectrometric or immunometric or cell assays, ...] and several other points considered such as habits, availability and price. As a result, standard buffer, and even any chosen buffer are often not ideal at one point or the other, and one might take benefits from more specific and new buffers.

**Biological buffers** differ from classic mineral ones to several points: they have pK<sub>a</sub> values closer to physiological pH [between 6 and 8]. These buffers are not toxic to cells, and are not absorbed through cell membranes. The concentration, temperature, and ionic composition of the medium has minimal effect on the buffering capacity. They are resistant to enzymatic and non-enzymatic degradation, furthermore they are essentially transparent to visible and ultraviolet light.

For solubilizing, many reagents require a more polar [i.e. Ethanol] or apolar solvent [DMSO, DMF]. In biochemistry and chromatography applications, organic solvents are used to create more or less or gradient of polarity [Acetonitrile, Propanol,...] while acidic or alkaline substances are required to create desired pH [Citric acid, TFA,...]. As several most are **nocive** and **even toxic**, requiring often *specific operating conditions*, one should consider [Green Substitutes or Alternatives](#) <sup>[1]</sup>. Examples include limonene, (xylene->) histochoice, ...

In each applications, many substances can be needed for various purposes: **additives** include

- preservatives, i.g. Antibiotics, Bacteriostatics, Protease or phosphatase inhibitors,
- compounds to block undesired reactions, i.g. detergents, saturating agents, chelatants, stabilisants, reducers, ...

Our buffers are offered in a variety of [technical quality grades](#)

## Solvents

### \*Water and polar solvents

Water Nuclease free, Sterile, RNase-Free Solution 457420, 500 ml .  
Ethanol EO7550,

### \*Organic solvents

DMSO, ACS grade 36765A, 500ml .  
DMF 12137K, 1L

See [Green Substitutes and Alternatives](#)<sup>0</sup>

See also solvents for chromatography, purification,... [i.e. TEA, TFA,...]

#### Technical tip – Solvents types

One distinguishes 2 major types of solvents base on the polarity/hydrophilicity, because this affect greatly the solubility of compounds and the molecular interactions.

**Polar solvents** are typically water and other hydrophilic molecules "**aqueous solvents**", mineral such as , or organic such as ethanol. They are used in large areas, because water and water-soluble compounds are ubiquitous in biosciences, as organisms, tissues, cells, biomolecule and notably proteins need a polar environment to maintain their structure.

**Apolar solvents** are typically components of petrol (obtained by fractionated condensation), having more or less long carbonated saturated chains, hence commonly called "**organic solvents**" (even organic solvent can be polar! This denomination is somewhat also paradoxal regarding low compatibility with organic systems-see below). Solvents with short chains and small MW are very **volatile**, and mostly used in chemistry to dissolve chemicals, often apolar, or to achieve high concentrations, but also in biochemistry, and even at low concentration in biotechnology (above a certain concentration, biomolecules **denaturate** –often irreversibly-. I.e. protein tolerate 0.1-20% depending on their nature).

For similar reasons, organic solvents are also often nocive, because they dissolve in lipidic biological structures, desorganizing them. Even very low concentrations (ppm) can concentrate in cell membranes. As a result, most organic solvents are toxic, with major targets such as neural cells (neurological disorders). Their a rising need of less or **not toxic alternatives to organic solvents**, notably in industry and chemistry.

## Buffers (salts, solutions, and formulated buffers)

See also buffers by applications: **Immunodetection:** [Buffers](#)<sup>1</sup>, [Saturating agents](#)<sup>1</sup>, [Enzymatic substrates](#)<sup>1</sup>

**Biochemistry:** [Buffers for electrophoresis](#)<sup>1</sup>, ...

**Cell Culture:** Cell culture media components

Buffer descriptions are by alphabetic order of buffering agents [list of powder, salts, formulated buffers, solution, concentrates,...]:

### Borate

pK<sub>a1</sub>[25°C]=9.24 | pH range 8.5-10.2

Borate buffered saline should not be used in gel electrophoresis in the presence of polyols, including carbohydrates and their derivatives with which they make chelate complexes and give a bent zone with lateral spreading<sup>f</sup>. Borate buffers also have a high bacteriocidal effect.

Boric Acid UP070440, 1 kg

MW:61.83 pKa1 - 9.24, pKa2 - 12.74, pKa3 - 13.80, pH range: 8.5-10.2

Boric Acid Proteomics Grade 10853A, 500 g 10853B 1 Kg

### Carbonate

[\[all\]](#)

[Tech Sheet](#)

Ammonium Carbonate

N1237A, 500 g

MW: 96.09; CAS : 506-87-6

-

Calcium Carbonate MW: -; CAS : 471-34-1	629245, 100 g    629246, 500g	-
Sodium Carbonate, Anhydrous, ACS grade MW: 105.99; CAS : 497-19-8	141321, 1 Kg    141322, 2.5kg	( <a href="#">141321</a> )
Sodium Carbonate, Anhydrous, Reagent Grade MW: ; CAS :	08499A, 1 Kg	-

### Carbonate Buffered solution

0.1M Sodium Bicarbonate-Sodium Carbonate Buffer, pH 9.0 Applications: coating protein on microplates	UPR16490, 250 ml	-
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### Citrate

[\[all\]](#)
[Tech Sheet](#)

pKa1=3.13<sup>[pH range:2.2-6.5]</sup>, pKa2=4.76<sup>[pH range:3.0-6.2]</sup>, pKa3=6.40<sup>[pH range:5.5-7.2]</sup> | working global pH range 3-6.2  
Citrate is used notably for elution in affinity chromatography, but also for cell media.

Citric Acid MW:192.1	UP168781, 1 Kg	
Citric Acid ACS grade/ Biotech grade MW:192.1	673410, 500 g	
Citric Acid, Trisodium Dihydrate MW:294.1	218830, 1 Kg	218831, 2.5 Kg
Citric Acid, Trisodium Dihydrate Proteomics Grade MW:294.1	10853A, 500 g	10853B, 1 Kg
Citric Acid, Ammonium Salt, Dibasic, UltraPure MW:226.2	N12630, 500 g	N12631, 1 Kg

### Glycine

[\[all\]](#)
[Tech Sheet](#)

pKa1 - 2.35<sup>[pH range: 2.2-3.6]</sup>, pKa2 - 9.78<sup>[pH range: 8.2-10.6]</sup> | pH range: 8.2-10.6

Glycine is used in buffers notably for elution in affinity chromatography, in electrophoresis buffers, but also as quenching agent biochemistry.

Glycine MW:75.07; CAS: 56-40-6	UP018225, 1Kg
TG buffer (Tris/Glycine)	see <a href="#">Tris buffers</a>
TG-SDS buffer (Tris/Glycine/SDS)	see <a href="#">Tris buffers</a>

### Phosphate buffer, and formulated Phosphate buffers

Phosphate Buffered solutions, and notably saline ones [PBS] are widely used, to dilute and incubate or wash reagents in immunodetection techniques, for cells in cell culture et cell assays, in Biochemistry notably with proteins...

Phosphate buffer should not be used in assays where competition for phosphate groups, or complex formation with a metal ion is essential for the enzyme activation. Phosphate ions will inhibit carboxypeptidase, carboxylase, urease, muscle diamine, formase and phosphoglucomutase.

Classic used additives, depending on applications requirements, include

- protease inhibitors, antibiotics,... to prevent biomolecules degradation (in biochemistry, purification, storage)
- detergents and saturating agents to prevent non specific binding,... (in Immunodetections)
- Other inorganic ions are added for cell culture applications (see below Balanced salt solution/Dulbecco)

### Phosphate salts

[\[all\]](#)
[Tech Sheet](#)

Ammonium Phosphate Dibasic	52195B, 1 Kg	-
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MW: 132.06; CAS : 7783-28-0

Potassium Phosphate Dibasic, Anhydrous

687960, 500 g

687962, 2.5Kg

-

MW: 132.06; CAS :

Potassium Phosphate Monobasic

684481, 500 g

684482, 1kg

684483, 2.5Kg

[\(684481\)](#)

MW: 174.18; CAS : 7758-11-4

Potassium Phosphate Tribasic

QR5464, 500 g

-

MW: 212.28; CAS : 7778-53-2

Sodium Phosphate Dibasic, Heptahydrate

836655, 50 g

836657, 1 Kg

-

MW: 136.98; CAS : 7782-85-6

## Phosphate Buffered solution (PBS)

Phosphate Buffered solution (PBS) is 137mM Sodium Chloride, 10mM phosphate, 2.7mM Potassium Chloride; pH is 7.4.

It is a Phosphate Balanced Saline solution used in many buffers and media, in biochemistry, proteomics and genomics, cell culture. Modified PBS formulation may vary Potassium or add other as in DPBS or other BSS buffers.

*Rem:* PBS (modified) without Potassium (e.g. NaCl 100mM, HPO<sub>4</sub> 20mM, pH 7.4) is rarely used, but for washing buffers.

PBS is very close to basic Dulbecco's PBS but the latter usually contains additional salt(s), starting with Mg, and even antibiotics or nutrients as outlined in next section 'Balanced salt solutions/Dulbecco's Media'.

DPBS without MgCl<sub>2</sub> nor CaCl<sub>2</sub> ..., is usually identical to PBS.

When Phosphate is undesired (in some immune- and enzyme-assays), one can look at [Borate buffers](#), or [Hepes and othe Good's buffers](#), or at ather more alkaline buffers like [Carbonate buffers](#) and [Tris-based buffers](#), or acidic buffers like [citrate buffers](#).

PBS Ultrapure, powder packs	UP68723A, 1pack [10 L]	68723B, 10x1L pack	<a href="#">Tech sheet</a>
1 vial (9.88g), when dissolved with distilled water, makes 1L of 10X PBS, or 10L of 1X PBS			
PBS Ultrapure, powder vial	687236		
1 vial (9.88g), when dissolved with distilled water, makes 1L of 10X PBS, or 10L of 1X PBS			
PBS 1X Solution	1A6570		
PBS Concentrate 10X	N14012, 1L		<a href="#">Tech sheet</a>
PBS Concentrate 20X	N1376A, 500ml		<a href="#">Tech sheet</a>
PBS Sterile [0.2µm filtered, autoclaved]	N13522, 500ml	N13524, 1L	<a href="#">(GS3574)</a>
PBS Sterile [0.2µm filtered, Ultrapure, Sterile]	1M4860, 10L		<a href="#">(GS3574)</a>
PBS Ultrapure, ready-to-use tabs	UP307157, 100 tabs [100ml]		<a href="#">(AWJGB0)</a>
1 tablet, when dissolved with distilled water, will give 100 ml of PBS			
PBS with Tween 20, pH 7.5	#N13810, 500 ml	N13811, 1 L	
PBS pH7.4, Proteomics grade	GS4250		
> PBS for saturation in immunodetection techniques (BSA or Tween or Milk PBS blends)			
PBS with Tween® 0.05%, pH 7.5 , powder packs	#GS4250, 5 pk [10.4 g/1 L]	(BB8210) (687230)	
PBS 20X with Tween® 0.05%, pH 7.5 , powder packs	#MJ244A, 500ml		
PBS 10X with Tween® 0.05%, pH 7.5 , powder packs	#AYO873, 500ml		
PBS 20X with Tween® 1%, pH 7.5 , powder packs	#GS3681, 500ml		
PBS with Non-Fat Powdered Milk 3%, pH 7.5 , powder packs	#GS4180, 5 pk [39.8 g/1 L]		
PBS with BSA 1%, pH 7.5 , powder packs	#GS4190, 5 pk [19.8 g/1 L]		
PBS with Bioblock agent	/749.E671		

> PBS with magnesium, Calcium, and other salts:

See 'Balanced Saline Solutions and Media'

e.g. Dulbecco's PBS (DPBS, D-PBS) and Media (TBSS, DPBS, DME, DMEM) are similar to PBS, with magnesium and others salts or additives or nutrients. i.e. D-PBS 20X [#RJ226A](#)

## Tris, and formulated Tris buffers

Syn.: TRIS; Tromethane; Tromethamine, 2-Amino-2-hydroxymethyl-1,3-propanediol, Tris(hydroxymethyl) aminomethane

pK<sub>a</sub>[25°C]=8.30 ; Useful | pH range 7.2-9.0

**Tris** buffers are preferable over phosphate buffers to avoid complex formation with ionic species such as calcium and magnesium in blood. It generally does not suit biochemistry applications because it contains primary amine [interferes with amine reactive agents] and it's appreciable solubility in organic solvents.

### Tris powder and solutions

[\[all\]](#)

[Tech Sheet](#)

Tris [base]	UP031658 500 g	UP031657, 1Kg	UP031657, 5Kg	<a href="#">(031657)</a>
MW: 121.14; CAS: 77-86-1				
Tris HCl	UP09154D 500 g	UP09154E, 1 kg	UP09154F, 5x1 kg	<a href="#">(091154E)</a>
MW: 151.6; CAS: 1185-53-1				
Tris buffer 0.1M solution pH 7.4 nuclease free biotechnology grade		587550, 500 ml		587551, 100 ml
Tris buffer 0.5M solution pH 6.8 biotechnology grade		725200, 500 ml		
Tris buffer 0.5M solution pH 6.8 proteomics grade		725201, 500 ml		
Tris buffer 1.0M solution pH 7.5 sterile ultra pure grade		N13710, 100 ml		
Tris buffer 1.0M solution pH 8 sterile biotechnology grade		586780, 100 ml		586781, 500 ml
Tris buffer 1.0M solution pH 9 sterile ultra pure grade		N13720, 250 ml		
Tris buffer 1.0M solution pH 10 sterile ultra pure grade		N13740, 250 ml		N13740, 250 ml
Tris buffer 2.0M solution pH 7.5		N14620, 1 L		
Tris buffer 2.0M solution pH 7.8		N14610, 500 ml		

### Tris Buffered Saline solutions (PBS)

[\[all\]](#)

[Tech Sheet](#)

Tris Buffered Saline [TBS], 20X Liquid Concentrate	N14580 4 L		
Tris Buffered Saline [TBS], 20X Powder Pack	<b>74004A</b> , 1pack	74004B, 10packs	<a href="#">(74004A)</a>
Tris Buffered Saline [TBS], 20X Ready-Pack™	740040, 2 packs		
TBS with Non-Fat Powdered Milk 3%, pH 7.5	GS4160, 5 pk [42 g/1 L]		
TBS with BSA 1%, pH 7.5	GS4170, 5 pk [22 g/1 L]		
TBS with Tween® 0.05%, pH 7.5	MJ244A, 500ml	MJ244B, 1L	
TBS with Tween® 1%, pH 7.5	GS3681, 500ml	GS3682, 1L	
TAE Powder	892580, 1 u [40 L]		
TAE Ready-pack	665100, 2 packs [50 L]		
TAE Solution 25X Concentrate	UP892574, 1.6 L		
TBE Powder	892533, 1 u [40 L]		
TBE Ready-pack	892535, 2 packs [20 L]		
TBE Solution 5X Concentrate	N14790, 1 L	N14791 4 L	
TBE Solution 10X Concentrate	UP86510A, 5 L	UP86510C 4 x 5 L	
TBE disodium Ready-pack	473840 ,2 packs [20 L]		
TTE Solution 10X concentrate	R59980, 1 L	R59981 5 L	
TTE Ready-pack	R59982, 1 Pack [10 L]		

## Others

Mineral acids and alkali are listed in the biochemicals catalog.

PBS (Phosphate Buffered Saline buffer): see [Phosphate / PBS](#)

TBS (Tris Buffered Saline buffer): see [Phosphate / PBS](#)



## Balanced Saline Solutions and Media (by name)

### Balanced salt solutions (BSS) – Dulbecco's(DPBS, DME, DMEM), Tyrode (TBSS), ...

The use of **balanced salt solutions (BSS)** is generally attributed to early workers in the field of cell and tissue culture. In 1885, Sydney Ringer developed a solution of inorganic salts designed to maintain contractility of mammalian heart tissue. A less specific salt solution was designed by Tyrode for use in work with primary mammalian cells. **Tyrode's salt solution** became the accepted fluid for diluting protein components of media of natural origin. Since that time, many other balanced salt solutions have been developed for use in cell and tissue culture.

The current role of balanced salt solution in cell culture rely on 4 principle functions:

- Provide a buffering system to maintain the medium within the physiological pH range (7.2-7.6);
- Maintain intra- and extra-cellular osmotic balance;
- Provide an irrigating, transporting and diluting fluid in and between tissues;
- Provides cells with water and certain bulk inorganic ions essential for normal cell metabolism;
- Provides cells with organics, nutrients and eventually an energy source for cell metabolism, typically vitamins and a carbohydrate, such as glucose.

Most popular balanced salt solutions are Dulbecco's BSS, Hank's BSS, and Tyrode BSS.

### • Dulbecco's Phosphate saline Buffer [DPBS, D-PBS], that is PBS with Magnesium (MgCl<sub>2</sub>).

D-PBS is a general use, isotonic saline solution for washing cells and tissues.

Typical complete DPBS is 137mM Sodium Chloride, 10mM phosphate, 2.7mM Potassium Chloride; and Magnesium. pH is 7.4. This prepare<sup>[1]</sup> with 0.133g/L CaCl<sub>2</sub>•2H<sub>2</sub>O, 0.1g/L MgCl<sub>2</sub>•6H<sub>2</sub>O, 0.2g/L KCl, 0.2g/L KH<sub>2</sub>PO<sub>4</sub>, 8.0g/L NaCl, 0.05g/L NaH<sub>2</sub>PO<sub>4</sub>(anhydrous). This differs from PBS by the addition of *magnesium*.

Note: DPPB can also be formulated without magnesium (then it is identical with standard PBS), with higher or lower concentrations of above salts (even as a standard DPBS by some manufacturers), and also including the addition of other salts, starting with CaCl<sub>2</sub>, nutrients like D-Glucose, and antibiotics (like Kanamycin, Penicillin G, Streptomycin), then also known as DMEM media. Finally, Dulbecco didn't proposed only phosphate based solutions and media. So be caution with exact formula.

#### References:

1. Dulbecco, R., and Vogt, M., Plaque Formation and Isolation of Pure Lines with Poliomyelitis Viruses. J. Exp. Med., 99, 167-182 (1954).
1. Moore, G.E., Gerner, R.E. and Franklin, H.A., (1967). Culture of Normal Human Leukocytes. JAMA. 199, 519-524.
2. Eagle, H. (1959). Amino Acid Metabolism in Mammalian Cell Cultures. Science. 130, 432-437.

> Available **Dulbecco's Phosphate Buffered Saline (DPBS, D-PBS)** (others: [inquire](#))

Our HBSS relies on the highest quality and consistency. It is available in multiple formulations and formats to meet your specific research needs, including calcium- and magnesium-free versions that are recommended when tissue or cell dissociation or release is desired, e.g. prior to trypsinization (because calcium and magnesium promote cell adhesion).

DPBS buffer 20X [#RJ226A](#)

DPBS, Sterile 1X Solution, pH 7.4 [GS3577](#), 100ml [GS3573](#), 2x500ml ([GS3574](#))

Dulbecco's formulation without Calcium and Magnesium, pH7.1-7.7, sterile, free of DNase Rnase P/7otease

DPBS buffer *powder* [BB367A](#)

DPBS *Low Glucose* [T95921](#)

See also Phosphate based Buffers.

Others Dulbecco's solutions on [inquire](#) [[&+to\(5\):C0520, X0515,LO325,L0615,P0750](#)]



● **Dulbecco's Eagle Media [DMEM]**, that is DPBS supplemented with other salts, vitamins and glucose.

The most widely used formulation, referred as Dulbecco's Modified Eagle's medium [DME], contains 1000 mg/L of glucose [original formula ] and was first reported for culturing embryonic mouse cells. A further alteration with 4500 mg/L glucose has proved to be optimal for cultivation of certain cell types. Standard DMEM typically contains<sup>[1]</sup> :

Inorganic salts	Organic composants	Aminoacids
<ul style="list-style-type: none"> <li>• CaCl<sub>2</sub> (anhydrous): 200,00mg/ml</li> <li>• Fe(NO<sub>3</sub>)<sub>3</sub> · 9 H<sub>2</sub>O: 0,10mg/ml</li> <li>• KCl: 400,00mg/ml</li> <li>• MgSO<sub>4</sub> (anhydrous): 97,67mg/ml</li> <li>• NaCl: 6400,00mg/ml</li> <li>• NaH<sub>2</sub>PO<sub>4</sub> · H<sub>2</sub>O: 125,00mg/ml</li> <li>• NaHCO<sub>3</sub>: 3700,00mg/ml</li> </ul>	<ul style="list-style-type: none"> <li>• D-Glucose: 4500,00mg/ml</li> <li>• Phenol Red: 15,00mg/ml</li> <li>• Natrium pyruvate: 110,00mg/ml</li> </ul> <p><b>Vitamins</b></p> <ul style="list-style-type: none"> <li>• D-Calcium pantothenat: 4,00mg/ml</li> <li>• Choline chloride: 4,00mg/ml</li> <li>• Folic acid 4,00mg/ml</li> <li>• i-Inositol 7,20mg/ml</li> <li>• Niacinamid 4,00mg/ml</li> <li>• Riboflavin 0,40</li> <li>• Thiamin HCl 4,00mg/ml</li> </ul>	<ul style="list-style-type: none"> <li>• L-Arginin HCl: 84,00mg/ml</li> <li>• L-Cystin 2HCl: 63,00mg/ml</li> <li>• L-Glutamin: 584,00mg/ml</li> <li>• Glycin: 30,00mg/ml</li> <li>• L-Histidin HCl H<sub>2</sub>O: 42,0mg/ml</li> <li>• L-Isoleucin: 105,00mg/ml</li> <li>• L-Leucin: 105,00mg/ml</li> <li>• L-Lysin HCl: 146,00mg/ml</li> <li>• L-Methionin: 30,00mg/ml</li> <li>• L-Phenylalanin: 66,00mg/ml</li> <li>• L-Serine: 42,00mg/ml</li> <li>• L-Threonin: 95,00mg/ml</li> <li>• L-Tryptophan: 16,00mg/ml</li> <li>• L-Tyrosin 2Na 2H<sub>2</sub>O: 104,33mg/ml</li> <li>• L-Valin: 94,00mg/ml</li> </ul>

References:

1. Eagle, H. (1959). Amino Acid Metabolism in Mammalian Cell Cultures. Science. 130, 432-437.

> Available Dulbecco's Eagle Buffered Saline (DME, DMEM)

Dulbecco's Modified Eagle Media

#63426A, (DMEM; for cell culture)

DMEM Dulbecco Modified Eagle Medium, Sterile Culture grade

#GS3580

Cytogenetics & Tissue Culture tested

Others DME Solutions on [inquire](#)<sup>[&+to(5):C0520, X0515,LO325,L0615,P0750]</sup>

● **Hanks's Balanced Salts and Saline Solutions (HBSS )**

[]

Hanks's solutions (HBSS ) provide the essential function of a balanced salt solution is to maintain pH and osmotic balance as well as provide your cells with water and essential inorganic ions.

The typical base HBSS solution contains Sodium Chloride 8g/L, Potassium chloride 0.4g/L, Potassium Phosphate monobasic 60mg/L, , Sodium Phosphate dibasic anhydrous 48mg/L, Magnesium Sulfate anhydrous 98mg/L, Calcium Chloride anhydrous 140mg/L, Sodium Carbonate 350mg/L, Glucose 1g/L, and is generally supplemented with Phenol Red Na salt 10mg/ml. This differs from base DPBS by the addition of *carbonate* and *Glucose*.

Reference:

1. Hanks, J.H. and Wallace, R.E. (1949) Relation of Oxygen and Temperature in the Preservation of Tissues by Refrigeration. Proc. Soc. Exp. Biol. Med., 71:196.

> Available Hanks's Balanced Salts and Saline Solutions (HBSS )

Our HBSS relies on the highest quality and consistency. It is available in multiple formulations and formats to meet your specific research needs, including calcium- and magnesium-free versions for washing cells prior to trypsinization.

Hanks' Balanced Salt Solution (HBSS) ([NJI661](#))<sup>[]</sup> & [see above](#) H-BSS

Others Hank's solutions on [inquire](#)<sup>[&+to(5):C0520, X0515,LO325,L0615,P0750]</sup>

### ● Tyrode's Balanced Salts and Saline Solutions (TBSS )

Typical complete Tyrode's Saline<sup>□</sup> is 0.265g/L  $\text{CaCl}_2 \cdot 2\text{H}_2\text{O}$ , 0.214g/L  $\text{MgCl}_2 \cdot 6\text{H}_2\text{O}$ , 0.2g/L KCl, 1.0g/L  $\text{NaHCO}_3$ , 8.0g/L NaCl, 0.05g/L  $\text{NaH}_2\text{PO}_4$ (anhydrous), + 1.0g/L D-Glucose.

Reference:

1. Tyrode, M.V., (1910). The Mode of Action of Some Purgative Salts. Arch. Intern. Pharmacodyn. 17, 205-209.

> Available Tyrode Buffered Saline (TBS, TBSS)(others: [inquire](#))

Tyrode's buffer

Acidic Tyrode's bufferYP9270.

Others Tyrode solutions on [inquire](#) [[&+to\(5\):C0520, X0515,LO325,L0615,P0750](#)]

### ● Other BSS salts and buffers

Many Balanced Salts collections and corresponding Saline Solutions (BSS ) have been proposed in many applications, and are now well popular in cell culture, cell isolation, cell studies, and even in molecular vitro assays. Please [inquire](#) for:

+

Minimum Essential Media (MME) <sup>□</sup>

Eagle Basal Medium (BME) <sup>□</sup>

Earle's Balanced Salts and solutions (EBSS) <sup>□</sup>

Dulbeccoo's Balanced Salts and solutions (DBSS) <sup>□</sup> & [see above](#) D-PBS

Hanks' Balanced Salt Solution (HBSS) ([NJI661](#))<sup>□</sup> & [see above](#) H-BSS

Puk's Saline A <sup>□</sup>.

Krebs-Ringer Bicarbonate Buffer <sup>□</sup>.

Krebs-Henseleit Buffer <sup>□</sup>.

Gey's Balanced Salt Solution (GBSS) <sup>□</sup>.

Tyrode's Balanced Salts and solutions (TBSS) <sup>□</sup> & [see above](#) TBSS

## Organic buffers

### • Good's Buffers

Good's Buffers are zwitterionic buffering agents developed to address the limitations of mineral buffers (Phosphate, Carbonate) and other biological buffer (Borate, Tris,...). Their characteristics are:

- 1) High water-solubility
- 2) Low cell membrane permeability
- 3) Consistent acid-base dissociation constants
- 4) Low metal chelating capability
- 5) High chemical stability
- 6) Low absorption spectra in UV and visible regions.

These Good's buffers, with pKa values ranging from 6.1 to 10.7, are widely used in biology and biochemistry.

They are used as a buffering agent in many biological and biochemical applications.

Ex: Cell Culture Media | Protein separation | Diagnostic Tests | Cosmetics |



HEPES, free acid UP061940, 250 g 06194P, 1Kg

MW: 238.3 pKa: 7.55 | pH range: 6.8-8.2

MOPS, UltraPure UP062000, 100 g UP062002, 500 g

MW: 209 pKa: 3.7.20 | pH range: 6.5-7.9

MOPS, 1.0M buffer solution, pH 9.0 06200Q, 250 ml

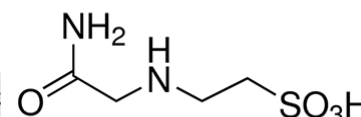
See over 20 more [Good's buffers in the technical sheet FT-062000](#) [pKa 6 to 10; as powder, free of salts forms, solutions].

+

### ACES Buffer (#N1234A)

CAS: 7365-82-4; Syn.: N-(2-Acetamido)-2-aminoethanesulfonic acid | N-(Carbamoylmethyl)-2-aminoethanesulfonic acid | N-(Carbamoylmethyl)taurine | MW: 182.2

□ pKa (20°C) : 6.88 (@20°C)- □ Useful pH range: 6.1-7.5



ACES has been used in buffers for both agarose and polyacrylamide gel electrophoresis, and especially for isoelectric focusing (IEF) of proteins and for analysis of bacterial autolysins in a discontinuous SDS-PAGE system.

ACES is widely used as a separator in the analytical resolution of proteins, notably by chromatography: some studies have shown that ACES responds well to chiral resolutions when working with chiral microemulsion electrokinetic chromatography in comparison to phosphate buffers.

ACES is used in enzyme assay buffers, i.e. for the study of glucosidases

ACES is used in buffer solution to wash and heat cells, in buffered culture media, and in extraction such as in the preparation of buffered charcoal yeast extract agar for the isolation of *Legionella* spp.

ACES is used in buffers for x-ray crystallography of aldehyde dehydrogenase enzyme complexes;

[Technical sheet](#) <sup>FT-062000</sup>; Search [Uptima ACES Buffers](#)

### BES Buffer (#61864)

□ CAS: 10191-18-1; Syn.: N,N-Bis(2-hydroxyethyl)-2-aminoethanesulfonic acid | N,N-Bis(2-hydroxyethyl)taurine

BES Sodium salt : CAS: 66992-27-6 | MW: 235.24

□ pKa (20°C) :  $7.1 \pm 0.2$  □ Useful pH range : 6.4-7.8

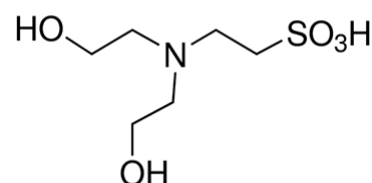
Additionally, BES is widely used as a binding buffer and eluent in cation exchange chromatography as well as a buffer in gel filtration chromatography.

BES is used in cosmetics applications and personal care, acting as a skin desquamation agent while protecting active ingredients against degradation.

This buffer is commonly used in several assays, up to the diagnostic tests industry, as well.

BES interferes with reactions between DNA and restriction enzymes to a lesser extent than similar buffers with less substituted amine groups (e.g.: Tris Buffer), but to a greater extent than other buffers, such as Hepes Buffer.

[Technical sheet](#) <sup>FT-062000</sup>;



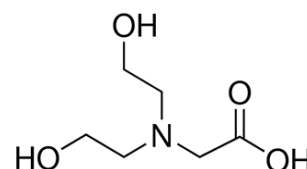
### Bicine Buffer (#T31622)

□ CAS: 150-25-4; Syn.: N,N-Bis(2-hydroxyethyl)glycine | MW: 163.17

□ Useful pH range : 7.6 - 9.0

Bicine is a zwitterionic biological buffer commonly used in solutions for protein crystallization and as a buffering agent in chromatography and polymerase chain reaction. Moreover, Bicine has been as a buffer for the extraction of enzymes from various plant species.

[Technical sheet](#) <sup>FT-06200</sup>; Search [Uptima Bicine Buffers](#)



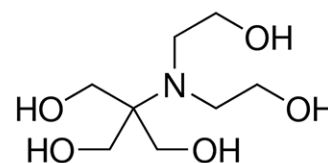
### Bis-Tris Buffer (#36832A)

□ CAS : 6976-37-0 ; Syn.: 2,2-Bis(hydroxymethyl)-2,2',2''-nitrilotriethanol | 2-Bis(2-hydroxyethyl)amino-2-(hydroxymethyl)-1,3-propanediol | Bis(2-hydroxyethyl)amino-tris(hydroxymethyl)methane | Bis-Tris Methane | MW: 209.24

□ Useful pH range : 5.8 - 7.3

Bis-Tris is a popular gel, sample and running buffer for various types of electrophoresis. Its use has also been reported in chromatography, NMR spectroscopy and x-ray crystallography. It is also an excellent substitute for the highly toxic buffer cacodylate.

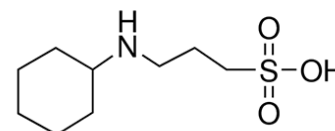
[Technical sheet](#) <sup>FT-06200</sup>.



### CAPS Buffer (#06199B)

□ CAS : 1135-40-6; Syn.: 3-(Cyclohexylamino)-1-propanesulfonic acid | MW: 221.32

□ Useful pH range : 9.7~11.1



This buffer is widely used in different applications, including cation exchange chromatography, capillary electrophoresis, diffusion blotting and electroblotting. Its use has also been reported in the study of enzymatic processes above physiological pH and as an effective crystallization solution for different proteins. The longer carbon chain of the sulfonic acid group in Caps gives it a slightly more alkaline range than Ches Buffer.

[Technical sheet](#) <sup>FT-06200</sup>. See [Uptima CAPS products](#)

#### CAPSO Buffer (#625190)

□ CAS 73463-39-5; Syn.: 3-(Cyclohexylamino)-2-hydroxy-1-propanesulfonic acid | MW: 237.32

□ Useful pH range : 8.9 - 10.3

often used as a buffering agent in biological and biochemical research.

[Technical sheet](#) <sup>FT-06200</sup>. See [Uptima CAPSO products](#)

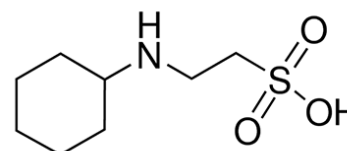
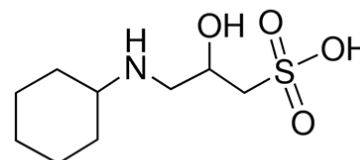
#### CHES Buffer (#2164A)

□ CAS: 103-47-9; Syn.: (N-Cyclohexylamino)ethanesulfonic acid | MW: 207.29

□ Useful pH range : 8.6 - 10.0

This chemical is used as a buffer for enzymatic reactions and as a sample and running buffer for different kinds of capillary electrophoresis. Its use has also been reported in the study of enzymatic processes above physiological pH and as a noncoordinating buffer for use in varied solutions containing metal ions.

[Technical sheet](#) <sup>FT-06200</sup>. See [Uptima CHES products](#)



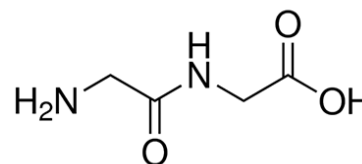
#### Glycyl-Glycyl Buffer (#01829A)

□ CAS: 556-50-3; Syn.: Diglycine | Glycyl-glycine | Gly-Gly | Glycylglycine | MW:

□ Useful pH range : 7.5 - 8.9

a dipeptide also used as a buffering agent in several enzymatic assays and in medical procedures, as well as in ion exchange chromatography. G-132 has also been used as a lysis buffer, running buffer and an enzymatic reaction buffer.

[Technical sheet](#) <sup>FT-06200</sup>. See [Uptima Glycyl-Glycyl products](#)



#### MES Buffer (#14035B)

□ CAS: 4432-31-9 ; Syn.: 2-(N-Morpholino)ethanesulfonic acid | 4-Morpholineethanesulfonic acid | MW: 195.2

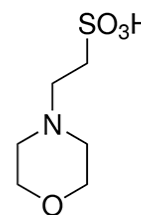
□ Useful pH range : pH 5.5~6.7

a popular choice for buffered culture media for bacteria, yeast and mammalian cells.

Lacks the capability to form a complex with most metal ions. Similarly to Bis-Tris,

MES is considered an excellent substitute for the highly toxic buffer cacodylate. Uses reported in electrophoresis, as well as different types of chromatography, such as gel-filtration, phosphocellulose column, hydrophobic interaction and cation exchange chromatography.

[Technical sheet](#) <sup>FT-06200</sup>.



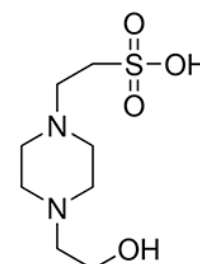
#### HEPES Buffer (#06194)

□ CAS: 7365-45-9; Synonyms : 4-(2-Hydroxyethyl)piperazine-1-ethanesulfonic acid | N-(2-Hydroxyethyl)piperazine-N'-(2-ethanesulfonic acid) | MW: 238.31

□ pKa (20°C): 7.55 ± 0.2 □ Useful pH range : 6.8 - 8.2

Applications : Cell Culture Media | Pharmaceutical | Animal Reproduction | Diagnostic Tests | Electrophoresis | Chromatography

HEPES is one of the most popular Good's buffer. It is widely used as buffering agent in cell culture



medias.

Its use has been reported in electroporation, electrophoresis and studies related to the pH effects on seed germination, among others. Additionally, Hepes is often used as a grinding buffer in plant studies, as a binding buffer for protein studies, as an eluent during cation exchange chromatography and as a running buffer in gel electrophoresis (ocasionally with Tris Buffer).

Solutions prepared with Hepes are strongly advised to be kept in darkness as much as possible.

[Technical sheet](#) <sup>FT-06200</sup>; Search [Uptima HEPES Buffers](#)

### MOPS Buffer (#06200)

□ CAS : 1132-61-2; Synonyms : 3-(N-Morpholino)propanesulfonic acid | 4-Morpholinepropanesulfonic acid; MW: 209.27

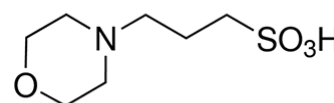
□ pKa (20°C) : □ Useful pH range : 6.5~7.9

Applications : Cell Culture Media | Protein purification | Cosmetics | Animal Reproduction | Electrophoresis | Chromatography

Similarly to MES Buffer, HEPES Good's Buffer lacks the capability to form a complex with most metal ions, therefore it is recommended for use as a non-coordinating buffer in different solutions with metal ions.

Mops is a popular choice for cell culture media and for separating RNA in agarose gels. Moreover, it is widely used as a lysis buffer and as a running buffer in electrophoresis and for protein purification in chromatography. In personal care and cosmetics application, MOPS can protect active ingredients against degradation and functions as a buffer for gelling.

[Technical sheet](#) <sup>FT-06200</sup>; Search [Uptima MOPS Buffers](#)



### Other organic buffers or solutions

#### • Imidazole

Imidazole 020220, 10 g 020228, 50 g  
MW:68.08 pKa: 6.95, pH range 6.2-7.8

Imidazole Proteomics grade BI9270, 10 g BI9271, 50 g

#### • Succinic Acid

Succinic Acid Free Acid N12170, 500 g N12171, 2.5 Kg  
MW: 118.09 pKa1 - 4.21 3.2-5.2, pKa2 - 5.64 5.5-6.5

## Additives for buffers preparation

Here are some substances commonly added to buffers. This is a short list with link to the catalog for more similar products and detailed information.

### \*Antibiotics, Bacteriostatics

Azide, sodium salt 081125, 25g ([081125](#))  
MW:65.; CAS:26628-22-8

Azide, sodium 1% solution DY8950, 100ml ([DY8950](#))

Azide, sodium 10% solution NJK63A-

AEBSF 401071, 1g 401072, 5x1g ([401071](#))

MW:239.7.; CAS:30827-99-7 40107A, 5x100mg 401074, 25g

See more in the catalog for more [Antibiotics/Bacteriostatics](#) <sup>[PW]</sup> with detailed information.

### \*Protease inhibitors

Protease Inhibitor COCKTAILS ([WT0900](#))

PROTEASE INHIBITOR COCKTAIL I (General use) WT0900 [Tech sheet](#)

PROTEASE INHIBITOR COCKTAIL I (General use), Animal-Free WT0940 [Tech sheet](#)



PROTEASE INHIBITOR COCKTAIL VI (General Use - Broad Range)WT8220[Tech sheet](#)  
 PROTEASE INHIBITOR COCKTAIL II, for BacteriaWT8260[Tech sheet](#)  
 PROTEASE INHIBITOR COCKTAIL III (for Mammalian)WT0850[Tech sheet](#)  
 PROTEASE INHIBITOR COCKTAIL III (for Mammalian) Animal-freeWT0920[Tech sheet](#)  
 PROTEASE INHIBITOR COCKTAIL III (for Mammalian) Animal-free, Solvent-freeWT0890[Tech sheet](#)  
 PROTEASE INHIBITOR COCKTAIL IV (for Fungi & Yeast)WT0930[Tech sheet](#)  
 PROTEASE INHIBITOR COCKTAIL V (for Mammalian) EDTA-freeWT8280[Tech sheet](#)  
 PROTEASE INHIBITOR COCKTAIL VI (for Plant)WT0870[Tech sheet](#)  
 PROTEASE INHIBITOR COCKTAIL V (for Serine/Cysteine not Metallo Protease) EDTA-Free Animal-FreeWT0860[Tech sheet](#)  
 PROTEASE INHIBITOR COCKTAIL VII (for broad range cysteine proteases)DZ0280[Tech sheet](#)  
 PROTEASE INHIBITOR COCKTAIL VII (for His Tagged Proteins)WT0880[Tech sheet](#)  
 PROTEASE INHIBITOR COCKTAIL VII (for His-Tagged proteins) DMSO-freeWT0910[Tech sheet](#)  
 PROTEASE INHIBITOR COCKTAIL I (for Serine proteases)WT8230[Tech sheet](#)

### Protease Inhibitor POWDERS

E64 [Cysteine Proteases Irrevers. Inhibitor]789581[Tech sheet](#)

AEBSFUP401071, 1gUP401074, 10g[Tech sheet](#)

See more [Protease Inhibitors](#)<sup>[PW]</sup> with detailed information.

### \*Detergents, Chaotropes,...

CHAPS 33351A, 10g333519, 50g333516, 1Kg([33351A](#))

SDS, powder UP649100, 500 g

MW:288.38; CAS:151-21-3

SDS, 20 % solution UP896826, 500 mlUP896827, 2x500 ml

TritonX100, Oxidant free solution521121, 5x10ml521122, 10x10ml([521121](#))

Tween20, Oxidant free solutionUP158740, ([158740](#))

Urea, Molecular Biology GradeUP031903, 500gUP031904, 1KgUP031909, 5Kg

Urea, 8 M Solution N13830, 250 ml

Urea, 8M solution, proteomics grade N13831, 250 ml

See more [Detergents](#)<sup>[ ]</sup> with detailed information. See also the section '[Protein extraction](#)'<sup>[ ]</sup><sup>[PW]</sup> [powders & soln formulated and kits for extraction]

### \*Saturating agents

BSA [Bovine Serum Albumine]

BSA, powder [Fraction V, Standard]UPQ4170, 100gUPG4171, 500gUPQ4172, 1Kg

[Techn sheet](#)

BSA 30% solutionUP900100, 50mlUP900101, 500mlUP900102, 1L

[Techn sheet](#). Also available as DNase/RNase Free grade (610531)

See more [Saturating agents](#)<sup>[ ]</sup><sup>[PW]</sup> with detailed information.

### \*Others additives: chelatants, stabilisants, reducers...[exemples – check other available size, grades, formats]

DTT [1,4-Dithiothreitol] Biotechnology Grade UP284250, 1 g

DTT 054721, 5g024722, 25g([054721](#))

TCEP 242214, 1g242216, 10x1g24221B, 100g([242214](#))

EDTA0362912, 100g 036291, 500g036290, 1kg([036290](#))

Glycerol047623, 1L

Sucrose UP252031, 1 kg

See more in the [General use Biochemicals](#)<sup>[ ]</sup> list.

See also **Bioactive compounds**<sup>[ ]</sup><sup>[PW]</sup>[Peptides, Proteins, Enzymes, Extract&Lysates,...]



## Formulated buffers by techniques

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- for immunodetections: see [Buffers & Biochemicals for ImmunoAssays](#) <sup>[PW]</sup>

e.g. buffers for coating, Ab dilutions, storage, washing, substrate dilutions [carbonate buffers, PBS, TBS, PBS-T, ...]

- for electrophoresis/blotting: see [Buffers & Electrophoresis & Blotting techniques](#) <sup>[PW]</sup>

e.g. TBE, TAE, TG, TG-SD, TTE...

Antibody Stripping Buffer L7710A, 500 ml L7710E, 30 ml

- for Flow Cytometry:

e.g. Sheath Fluid

- for affinity chromatography:

e.g. Glycine 1M, Tris Ph3, TEA,...

- for cell culture and assays:

e.g. PBS, Dulbecco's PBS, Hepes, DMSO,...

## Annexes

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### Definition of biochemicals quality grades

**ACS : ACS Grade:**

Materials conforming with the specifications and procedures outlined in American Chemical Society specifications

**ANG : Analytical Grade.**

Designates reagents suitable for use in analytical procedures.

**BTG : Biotechnology Grade.** Materials equivalent to Ultra Pure, but particularly suitable for use in Molecular biology applications. Tested for specific contaminants such as nucleases and bacteria where appropriate.

**CERTCertified/certifiable:** Materials, typically dyes and stains, that meet the requirements of the biological stain commission. Certified reagents have been tested and validated by biological stain commission.

**FPG:FluoPure grade:**

High quality reagents for enhanced results of critical applications in fluorescent or luminescent techniques

**HPG : High Purity grade.**

Materials of superior quality where there are no publishing standard

**PRG : Proteomics Grade.**

Materials conforming to the requirements of protein research which are tested to be nuclease, DNase and/or Protease free where applicable. Appropriate for use in Proteomics research applications.

**RGG : Reagent Grade.**

High Purity materials which suits most standard labs applications.

**UPG : Ultra Pure grade.**

Material with a purity level exceeding the various monograph grades

**USP :USP Grade:**

Materials conforming with the specifications and procedures outlined in the United States Pharmacopeia [standards for food ingredients and dietary supplements]

## Related products lines

Interbiotec - BioSciences innovation – proposes a complete range of products for protein biochemistry.

- [General use Biochemicals](#) [buffers, salts, detergents, antibiotics, protease inhibitors,...] <sup>(PH)</sup>
- [Desalting tools](#) – CelluSep tubings, SpectraPor tubings, GebaFlex, FloatALyser, SlideALyser,...

[Products HighLights Overview](#)

## Information inquire

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Reply by Fax : +33 [0] 4 70 03 82 60 or email at [interbiotech@interchim.com](mailto:interbiotech@interchim.com)

☐ I wish to receive the complete documentation about: \_\_\_\_\_

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