

Volume 7, Number 1

# Biofiles

SIGMA-ALDRICH

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Life Science

## Cell Culture Contamination

Antibiotics

Mycoplasma Detection/Elimination

Endotoxin Testing

Cell Culture Equipment

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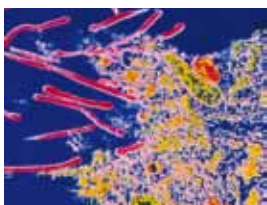
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## Highlights from this issue:

Cell culture contamination is one of the most challenging issues for life science research today. Cell cultures are vulnerable to a wide variety of contaminants, but mycoplasma and cross-contaminated/misidentified

cell lines are particularly challenging to control. In this issue we discuss some useful measures to keep your cell lines authentic and contamination free.



## Coming next issue:

The next issue of Biofiles highlights current research in the areas of Alzheimer's, Parkinson's, and Huntington's disease as representative of major efforts to delineate key events in the development of neurodegenerative

diseases. Neurodegenerative diseases affect the central nervous system causing progressive nervous system dysfunction. These debilitating and incurable conditions are characterized by loss of neuronal cell function and are often associated with atrophy of the affected nervous system structures. Products featured in this issue include antibodies, proteins, peptides and assays which represent a broader set of tools offered to support basic research in neurodegenerative disease.



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# Introduction

## Don Finley

Market Segment Manager

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Life science research using cell cultures has resulted in numerous improvements to the treatment of human disease. In addition, with the advent of stem cell technology, cultured cells are themselves becoming therapeutics. In this light, cell culture contamination could be one of the biggest hindrances to scientific progress today.

Researchers typically think of cell culture contamination in terms of microorganisms such as bacteria, fungi, viruses, and protozoa, but contamination can also be caused by chemical contamination as well as contamination by other cell lines — for example HeLa cells. The difficulty in controlling a particular contaminant is often related to its ease of detection. Most bacterial and fungal contaminations will cause the medium to turn cloudy and quickly kill the cells in culture. Although losing cells and any data relating to the current experiment is never desirable, the damage, however severe, is limited. Comparatively, viruses are difficult to detect. They cannot be detected by conventional light microscopy and may not be detectable by electron microscopy if they are integrated in the host cell genome. However, viruses have stringent requirements for the type of cells they can infect and, as they often result in the death of the cell lines they infect, are self limiting and are much rarer than other types of contamination. The two most worrisome contaminants researchers face today are mycoplasma and cross-contamination and/or misidentification of cell lines.

Mycoplasma are very simple bacteria that do not possess cell walls. As such, they are not killed by typical antibiotics used in cell culture, and are not detectable by conventional light microscopy. In addition, they can grow to very high concentrations in cell culture without causing the media to become cloudy as is seen with other microorganisms. Since mycoplasma have evolved as parasites they are difficult to culture in the absence of mammalian cells. They do not usually kill the mammalian cells they contaminate, but can greatly influence the cells they infect by altering cellular metabolism, causing chromosomal aberrations, slowing cell growth, and interfering with cell attachment. In short, they are likely to influence the results of most experiments performed using affected cell lines. Contaminations can be undetected for long periods of time, and if left unchecked they can contaminate an entire operation or facility.

Misidentified or cross-contaminated cell lines in some ways are the most concerning problem of all. Research based on the premise that, for example a cell line is representative of human colon cancer when in actuality it is an ovarian cancer cell line or perhaps a cell line from a different species, can call the results of that research into question. Considering that a researcher may spend many years performing research using a particular cell line and publish numerous papers on that research, it is easy to understand why this problem has many scientists very uneasy.

How big is the problem of contamination? Based on studies by FDA, ATCC, and others, it is estimated that 11% to 15% (or more) of all cell cultures today are contaminated with mycoplasma. Furthermore, over the past 25 years, numerous studies combined with the experiences of various cell culture repositories, indicate that 18 to 36% of cell lines in existence today are misidentified<sup>1</sup>. This level of contamination and misidentification seems ironic, given that the causes of cell culture contamination are well understood; the methods of prevention, detection, and elimination of mycoplasma are commonplace; and a variety of methods for cell line identification, such as STR analysis, isoenzyme studies, and DNA fingerprinting are readily available.

It is thought that some labs are reluctant to test for cell line contamination for fear that the results could call into question many years of work, and lead to publications being retracted because of erroneous data. As understandable as this reluctance might be, ultimately we all are affected. Erroneous, misinterpreted data not only are economically wasteful but ultimately slow scientific progress. There are a growing number of scientific publications calling for scientists to get control of cell culture contamination and ensure cell lines are correctly identified prior to publication<sup>2-9</sup>. Unfortunately, this is not yet a requirement for publication, and scientists continue to publish using cell lines without first verifying their identity or testing for mycoplasma or other contaminants.

It has been suggested that the high levels of contaminated cultures seen relate primarily to labs lacking a good plan to minimize and test for contamination and cell line mix-ups, as well as a failure to adhere to good aseptic cell culture techniques. Labs that have in place a good plan to reduce cell culture contaminations will usually have a much lower incidence of cell contamination than those labs that do not have such a plan.

The key thing to remember is that while contamination cannot be completely eliminated it can be minimized and controlled. At Sigma, we have in place stringent process controls and we extensively test to ensure the products we offer for cell culture are contamination free. Our line of ZFN-engineered cell lines and the ECACC cell lines we offer are well characterized, correctly identified, and are free of contaminants. We test our cell culture sera, media, and reagents for endotoxin and bacterial contamination, and offer many animal component-free products to eliminate potential risks of TSE and animal virus contamination.

The products included in this Biofiles issue represent some very useful tools to help make contamination control easier for researchers. We offer a comprehensive line of antibiotics that, when used appropriately, reduce the chances of unwanted contamination. We have a number of products to help reliably, effectively, and economically detect and if necessary eliminate mycoplasma contamination from cultures. The Labware products in this issue are useful in contamination control and detection, and include microscopes, glove bags, and sterile plasticware.

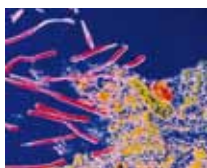
Ultimately, we at Sigma feel strongly that easing the risk of cell culture contamination is part of our mission in research cell culture. In addition to products, we provide a wealth of technical information, both on-line and in print, to help you reduce your risk of contamination. To view our on-line version and to request a copy of our Sigma-ECACC Fundamental Techniques in Cell Culture Laboratory Handbook, please go to:

**[sigma.com/ecacchandbook](http://sigma.com/ecacchandbook)**

To request a copy of our 2011–2012 Cell Culture Manual, please go to **[sigma.com/cellculturemanual](http://sigma.com/cellculturemanual)**

#### References:

1. Editorial, Identity Crisis, *Nature* 457, 935-936 (2009)
2. Podolak, E. Ending Cell Line Contamination by Cutting off Researchers, *Biotechniques Online News* (2010)
3. American Type Culture Collection Standards Development Organization Workgroup ASN-0002. Cell Line Misidentification: The Beginning of the End. *Nature Reviews* 10:441-448 (2010).
4. Nardone, R.M. Eradication of Cross-contaminated Cell Lines: A Call for Action. *Cell Biology and Toxicology* 23:367-372 (2007).
5. Nardone, R.M. Curbing Rampant Cross-contamination and Misidentification of Cell Lines. *BioTechniques* 45:221-227 (2008).
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8. Capes-Davis, A., et al., Check Your Cultures! A List of Cross-contaminated or Misidentified Cell Lines. *International Journal of Cancer*. 127:1-8 (2010).
9. Phuchareon, J. et al., Genetic Profiling Reveals Cross-contamination and Misidentification of Six Adenoid Cystic Carcinoma Cell Lines: ACC2, ACC3, ACCM, ACCNS, ACCS, and CAC2. *PLoS ONE* 4:6 ( 2009).



## Antibiotics

## Antibiotics

The following table is designed as a guide for selecting appropriate antibiotics and their working concentrations. Care should be exercised when using two or more antibiotics

in the same culture system. Combined antibiotics frequently exert cytotoxic effects at lower concentrations than those indicated as appropriate for the individual antibiotics.

Refer to a comprehensive pharmacology guide for more information on antibiotic incompatibilities, as well as other properties of antibiotics not included in this table.

### Antibiotics and Antimycotics

Product Name	Cat. No.	Gram (+) Bacteria	Gram (-) Bacteria	Mycobacteria	Yeasts	Molds	Mycoplasma	Working Concentration (µg/mL)	pcct/mcct <sup>1</sup>
Amphotericin B	<a href="#">A2411</a>				•	•		2.5 mg/L	mcct
Amphotericin B-Solubilized (Approx. 45%)	<a href="#">A9528</a>				•	•		5.6 mg/L (of solid)	mcct
Amphotericin B- (250 mg/mL solution)	<a href="#">A2942</a>				•	•		10 mL/L	mcct
Ampicillin	<a href="#">A0166</a>	•	•					100 mg/L	mcct
Antibiotic Antimycotic Solution (100x) (10,000 units penicillin, 10 mg streptomycin, and 25 µg amphotericin B per mL) (Stabilized)	<a href="#">A5955</a>	•	•		•	•		10 mL/L	mcct
Cephalothin	<a href="#">C3050</a>	•	•					100 mg/L	mcct
Chloramphenicol	<a href="#">C3175</a>	•	•				*	10-35 (TS)	mcct
Dihydrostreptomycin	<a href="#">D5155</a>	•	•					100 mg/L	mcct
Erythromycin	<a href="#">E5389</a>	•	•					100 mg/L	mcct
Gentamicin Sulfate	<a href="#">G1264</a>	•	•				•	50 mg/L	mcct
Gentamicin Sulfate (10 mg/mL solution)	<a href="#">G1272</a>	•	•				•	5 mL/L	mcct
Gentamicin Sulfate (50 mg/mL solution)	<a href="#">G1397</a>	•	•				•	1 mL/L	mcct
Gentamicin Sulfate (50 mg/mL solution) (Hybri-Max)	<a href="#">G1522</a>	•	•				•	1 mL/L	mcct
Gentamicin-Glutamine Solution	<a href="#">G9654</a>	•	•				•	10 mL/L	mcct
L-Glutamine-Penicillin-Streptomycin Solution (200 mM L-Glutamine, 10,000 units Penicillin, and 10 mg Streptomycin per mL)	<a href="#">G1146</a>	•	•					10 mL/L	mcct
L-Glutamine-Penicillin-Streptomycin Solution (200 mM L-Glutamine, 10,000 units Penicillin, and 10 mg Streptomycin per mL) (Stabilized)	<a href="#">G6784</a>	•	•					10 mL/L	mcct
Kanamycin Monosulfate	<a href="#">K1377</a>	•	•				•	100 mg/L	mcct
Kanamycin Sulfate (10 mg/mL solution)	<a href="#">K0129</a>	•	•				•	10 mL/L	pcct mcct
Kanamycin Sulfate (50 mg/mL solution)	<a href="#">K0254</a>	•	•				•	2 mL/L	pcct mcct
Lincomycin HCl	<a href="#">L2774</a>	•						100 mg/L	mcct

• Effective against most species

\* Effective against certain species

<sup>1</sup>pcct = plant cell culture tested; mcct = mammalian cell culture tested

## Antibiotics and Antimycotics continued

Product Name	Cat. No.	Gram (+) Bacteria	Gram (-) Bacteria	Mycobacteria	Yeasts	Molds	Mycoplasma	Working Concentration (µg/mL)	pcct/ mcct <sup>1</sup>
Neomycin Sulfate	<a href="#">N6386</a>	•	•					50 mg/L	mcct
Neomycin Sulfate (10 mg/mL solution)	<a href="#">N1142</a>	•	•					5 mL/L	mcct
Nystatin (5000 units Nystatin per mg)	<a href="#">N6261</a>				•	•		2.5 × 10 <sup>5</sup> U/L (50 mg/L)	mcct
Nystatin γ-Irradiated	<a href="#">N4014</a>				•	•		50 mg/L	mcct
Nystatin Suspension (10,000 units Nystatin per mL)	<a href="#">N1638</a>				•	•		24 mL/L	mcct
Paromomycin Sulfate	<a href="#">P5057</a>	•						100 mg/L	mcct
Penicillin-G (potassium salt)	<a href="#">P7794</a>	•						100,000 U/L	mcct
Penicillin-G (sodium salt)	<a href="#">P3032</a>	•						100,000 U/L	mcct
Penicillin-Streptomycin Solution (5000 units Penicillin-G and 5 mg Streptomycin per mL) (Stabilized)	<a href="#">P4458</a>	•	•					20 mL/L	mcct
Penicillin-Streptomycin Solution (10,000 units Penicillin-G and 10 mg Streptomycin per mL)	<a href="#">P0781</a>	•	•					10 mL/L	mcct
Penicillin-Streptomycin Solution (10,000 units Penicillin-G and 10 mg Streptomycin per mL) (Hybri-Max)	<a href="#">P7539</a>	•	•					10 mL/L	mcct
Penicillin-Streptomycin Solution (10,000 units Penicillin-G and 10 mg Streptomycin per mL) (Stabilized)	<a href="#">P4333</a>	•	•					10 mL/L	mcct
Penicillin-Streptomycin-Neomycin Solution (5000 units Penicillin-G, 5 mg Streptomycin and 10 mg Neomycin per mL)	<a href="#">P4083</a>	•	•					10 mL/L	mcct
Phenoxymethylpenicillanic Acid (potassium salt) [Penicillin V]	<a href="#">P4807</a>	•						100,000 U/L	mcct
Polymyxin B Sulfate	<a href="#">P4932</a>		•					50 mg/L	mcct
Spectinomycin Dihydrochloride	<a href="#">S4014</a>	•	•					7.5–20 mg/L	mcct
Spectromycin Sulfate	<a href="#">S9137</a>	•	•					100 mg/L	mcct
Tetracycline Hydrochloride	<a href="#">T7660</a>	•	•					10 mg/L	mcct
Tylosin Tartrate (8 mg/mL soln.)	<a href="#">T3397</a>	•					•	1 mL/L	mcct
Tylosin Tartrate	<a href="#">T6271</a>	•					•	8 mg/L	mcct

• Effective against most species

\* Effective against certain species

<sup>1</sup>pcct = plant cell culture tested; mcct = mammalian cell culture tested

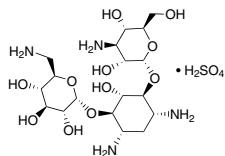
## Antibiotic Selection Agents for Cell Culture

Product Name	Cat. No.	Mode of Action	Suggested Working Conc.
Actinomycin D	<a href="#">A9415</a>	Complexes with DNA and interferes with RNA synthesis	1 µg/mL
Bleomycin Sulfate	<a href="#">B8416</a>	Complexes with DNA, causing strand scissions	10-100 µg/mL
Chloramphenicol	<a href="#">C3175</a>	Inhibits elongation at peptidyl transferase	5 µg/mL
G 418	<a href="#">A1720</a>	Blocks polypeptide synthesis and inhibits chain elongation	100-800 µg/mL
G 418 (50 mg/mL solution)	<a href="#">G8168</a>	Blocks polypeptide synthesis and inhibits chain elongation	100-800 µg/mL
Hygromycin B	<a href="#">H3274</a>	Blocks polypeptide synthesis and inhibits chain elongation	
Mitomycin C	<a href="#">M4287</a>	Inhibits nucleic acid synthesis	10-50 µg/mL
Mycophenolic Acid	<a href="#">M3536</a>	Blocks inosine monophosphate dehydrogenase in guanosine monophosphate pathway	25 µg/mL
Puromycin • HCl	<a href="#">P8833</a>	Inhibits protein synthesis	10-100 µg/mL

## Powders

### Kanamycin sulfate from *Streptomyces kanamyceticus*

Kanamycin A;  
Kanamycin sulfate salt [25389-94-0]  
 $C_{18}H_{36}N_4O_{11} \cdot H_2O_4S$   
FW 582.58



Mode of Action: Binds to 70S ribosomal subunit; inhibits translocation; elicits miscoding. Antimicrobial spectrum: Gram-negative and Gram-positive bacteria, and mycoplasma.

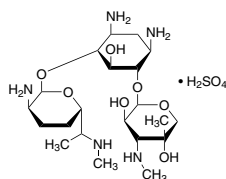
► meets USP testing specifications, powder

Used in biotechnology applications to inhibit protein synthesis. Used as a selection agent for cells transformed with kanamycin B (neoR, kanR) resistance gene.

<b>K1637-1G</b>	1 g
<b>K1637-5G</b>	5 g
<b>K1637-25G</b>	25 g

### Gentamicin sulfate

Gentamicin sulfate salt [1405-41-0]



Mode of action: Gentamicin causes codon misreading by binding to the 30S ribosomal subunit, blocking the translocation of peptidyl-tRNA from the acceptor site to the donor site.<sup>12</sup> The bactericidal effect of gentamicin on *Pseudomonas aeruginosa* is exerted by the binding of gentamicin to the outer membrane, where it displaces natural cations, destabilizes the membrane, and forms holes in the cell surface.<sup>3</sup>

Antimicrobial spectrum: Gram-negative bacteria, *Staphylococcus aureus* and other Gram-positive bacteria

**Lit cited:** 1. Korzybski, T., et al., *Antibiotics: origin, nature, and properties*, American Society for Microbiology (Washington, DC: 1977), 712-723;

2. Lorian, V. (ed.), *Antibiotics in Laboratory Medicine* 2nd ed., Williams and Wilkins (Baltimore, MD: 1986), 694-696;

3. Kadurugamuwa, J., et al., Surface action of gentamicin on *Pseudomonas aeruginosa* *J. Bacteriol.* **175**, 5798-5805 (1993);

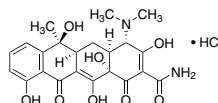
► Garamycin; Gentiomycin C  
meets USP testing specifications, powder

Used as a selection agent (gentamicin-resistance gene) in molecular biology applications.

<b>G1914-250MG</b>	250 mg
<b>G1914-5G</b>	5 g
<b>G1914-25G</b>	25 g

### Tetracycline hydrochloride

[64-75-5]  
 $C_{22}H_{24}N_2O_8 \cdot HCl$   
FW 480.90



► powder

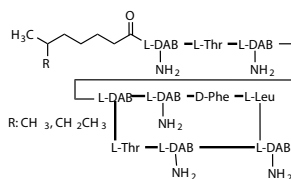
Recommended for use in molecular biology applications at 10-20 µg/ml.

Prepare stock solutions directly in the vial with sterile water (10 mg/ml). Stock solutions should be stored at 2-8 °C for no longer than one week; tetracycline hydrolyzes in aqueous solution.

<b>T8032-10MG</b>	10 mg
<b>T8032-20MG</b>	20 mg

### Polymyxin B sulfate

Polymyxin B sulfate salt [1405-20-5]  
 $C_{55}H_{96}N_{16}O_{13} \cdot 2H_2SO_4$  FW 1385.61



Antibiotic with bactericidal action on *E. coli*.<sup>12</sup> Binds to the lipid A portion of bacterial lipopolysaccharides.<sup>3</sup> Induces pore formation in the membranes of cortex cells from excised sorghum roots.<sup>4</sup>

Mode of Action: Binds to and interferes with the permeability of the cytoplasmic membrane.

Antimicrobial spectrum: Gram-negative bacteria.

Mixture of Polymyxin B<sub>1</sub> and B<sub>2</sub> sulfate.

**Lit cited:** 1. Cornu, J., *Ann. Microbiol.* **131B**, 121 (1980);  
2. Storm, D.R., et al., *Annu. Rev. Biochem.* **46**, 723 (1977);  
3. Morrison, D.C. and Jacobs, D.M., *Immunochemistry* **13**, 813 (1976);  
4. Lerner, H.R., et al., *Physiol. Plant.* **57**, 90 (1983);

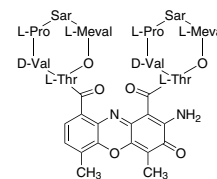
► meets USP testing specifications, powder

Used as immobilized (substrate bound) agent for removal of endotoxins.

<b>P0972-1MU</b>	1000000 units
<b>P0972-10MU</b>	10000000 units
<b>P0972-50MU</b>	50000000 units

### Actinomycin D

Actinomycin IV;  
Actinomycin C;  
Dactinomycin  
[50-76-0]  
 $C_{62}H_{86}N_{12}O_{16}$   
FW 1255.42



► from *Streptomyces* sp., suitable for cell culture, ≥95%

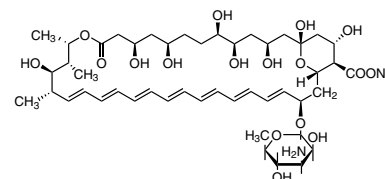
Mode of Action: Complexes with DNA and interferes with RNA synthesis.

powder

<b>A9415-2MG</b>	2 mg
<b>A9415-5MG</b>	5 mg
<b>A9415-10MG</b>	10 mg
<b>A9415-25MG</b>	25 mg

### Amphotericin B solubilized

Fungizone; Amphotericin B from *Streptomyces* sp.  
[1397-89-3]  $C_{47}H_{73}NO_{17}$  FW 924.08



Polyene antifungal antibiotic from *Streptomyces*. Affinity for sterols, primarily ergosterols, of fungal cell membranes. Forms channels in the membranes, causing small molecules to leak out. Antimicrobial spectrum: fungi and yeast.

► powder, BioXtra, suitable for cell culture

Mode of Action: Interferes with fungal membrane permeability by forming channels in the membranes and causing small molecules to leak out.

Recommended for use in cell culture applications at 5.6 mg (solid)/L. It is used to study the formation of ion-permeable channels in fungal cell membranes

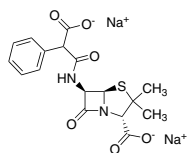
#### Components

Amphotericin B ~45%  
Sodium deoxycholate ~35%  
Sodium phosphate balance

<b>A9528-50MG</b>	50 mg
<b>A9528-100MG</b>	100 mg
<b>A9528-500MG</b>	500 mg
<b>A9528-1G</b>	1 g
<b>A9528-5G</b>	5 g

**Carbenicillin disodium salt**

$\alpha$ -Carboxybenzylpenicillin disodium salt [4800-94-6]  
 $C_{17}H_{16}N_2Na_2O_6S$   
 FW 422.36



Carboxypenicillin antibiotic that inhibits bacterial cell-wall synthesis (peptidoglycan cross-linking) by inactivating transpeptidases on the inner surface of the bacterial cell membrane. Analog to ampicillin.

Antimicrobial spectrum: Gram-positive and Gram-negative bacteria, *Pseudomonas*.

Stable at 37 °C for 3 days

► **BioReagent, plant cell culture tested**

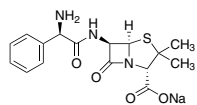
Recommended for antibacterial use in cell culture media at 100 µg/ml and for selection of ampr transformed cells.

Hygroscopic powder

<b>C3416-250MG</b>	250 mg
<b>C3416-1G</b>	1 g
<b>C3416-5G</b>	5 g
<b>C3416-10G</b>	10 g

**Ampicillin sodium salt**

D-(-)- $\alpha$ -Aminobenzylpenicillin sodium salt [69-52-3]  
 $C_{16}H_{18}N_3NaO_4S$   
 FW 371.39



► **powder, BioReagent, suitable for cell culture**

Recommended for antibacterial use in cell culture media at 100 mg/L.

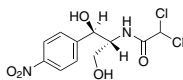
Recommended for use in ampicillin-resistance studies at 20-125 µg/ml.

Stable at 37 °C for 3 days.

<b>A0166-5G</b>	5 g
<b>A0166-25G</b>	25 g
<b>A0166-100G</b>	100 g

**Chloramphenicol**

D-(-)-*threo*-2-Dichloroacetamido-1-(4-nitrophenyl)-1,3-propanediol; Chloromycetin™; D-(-)-*threo*-2,2-Dichloro-*N*-[ $\beta$ -hydroxy- $\alpha$ -(hydroxymethyl)- $\beta$ -(4-nitrophenyl)ethyl]acetamide; D-*threo*-2,2-Dichloro-*N*-[ $\beta$ -hydroxy- $\alpha$ -(hydroxymethyl)-4-nitrophenethyl]acetamide [56-75-7]  $Cl_2CHCONHCH(CH_2OH)CH(OH)C_6H_4NO_2$  FW 323.13



Use as a selection agent for transformed cells containing chloramphenicol resistance genes. Recommended for use in molecular biology applications at 10-20 µg/ml.

Prepare stock solutions directly in the vial at any concentration in the recommended range. Stock solutions should be stored at 2-8 °C. Stable at 37 °C for 5 days.

<b>C7795-20MG</b>	20 mg
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► **plant cell culture tested**

Used as a selection agent for transformed cells containing chloramphenicol resistance genes.

<b>C1919-5G</b>	5 g
<b>C1919-25G</b>	25 g
<b>C1919-100G</b>	100 g

**Chloramphenicol-Water Soluble**

► **powder, BioReagent, suitable for cell culture**

Mode of Action: Inhibits elongation of peptidyl transferase.

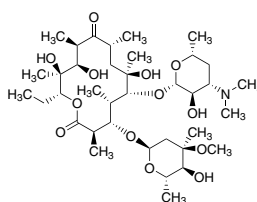
Formulated to contain approx. 100 mg chloramphenicol per gram of powder; balance 2-hydroxypropyl- $\beta$ -cyclodextrin.

Recommended for use in cell culture applications at approximately 5 µg/ml of active component (chloramphenicol).

<b>C3175-100MG</b>	100 mg
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**Erythromycin**

[114-07-8]  
 $C_{37}H_{67}NO_{13}$   
 FW 733.93



Mode of Action: Inhibits elongation at transpeptidation step.

Antimicrobial spectrum: Gram-negative and Gram-positive bacteria.

Macrolide antibiotic.

► **Erythrocin; E-Mycin BioReagent, suitable for cell culture**

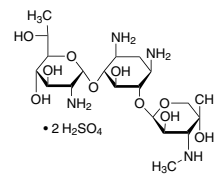
Inhibits protein synthesis (elongation) at the level of transpeptidation (aminoacyl translocation A-site to P-site).

Recommended for use in cell culture applications at 100 mg/L

powder	
<b>E5389-1G</b>	1 g
<b>E5389-5G</b>	5 g

**G 418 disulfate salt**

Antibiotic G418 [108321-42-2]  
 $C_{20}H_{40}N_4O_{10} \cdot 2H_2SO_4$   
 FW 692.71



Mode of Action: Blocks polypeptide synthesis by inhibiting protein elongation. For use in the selection and maintenance of eukaryotic cells stably transfected with neomycin resistance genes.

Aminoglycoside antibiotic similar in structure to gentamicin, neomycin and kanamycin.

► **powder, BioReagent, suitable for cell culture**

Mode of Action: Blocks polypeptide synthesis by inhibiting protein synthesis at the level of the 70S and 80S ribosomes. For use in the selection and maintenance of eukaryotic cells stably transfected with neomycin resistance genes.

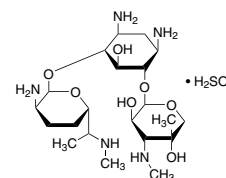
Recommended for use as a selection agent at 100-800 µg/ml.

Recommended for use as a selection of G418 resistant transformed cells in molecular biology applications.

<b>A1720-1G</b>	1 g
<b>A1720-5G</b>	5 g
<b>A1720-25G</b>	25 g

**Gentamicin sulfate salt**

[1405-41-0]



Mode of action: Gentamicin causes codon misreading by binding to the 30S ribosomal subunit, blocking the translocation of peptidyl-tRNA from the acceptor site to the donor site.<sup>12</sup> The bactericidal effect of gentamicin on *Pseudomonas aeruginosa* is exerted by the binding of gentamicin to the outer membrane, where it displaces natural cations, destabilizes the membrane, and forms holes in the cell surface.<sup>3</sup>

Antimicrobial spectrum: Gram-negative bacteria, *Staphylococcus aureus* and other Gram-positive bacteria

**Lit cited:** 1. Korzybski, T., et al, *Antibiotics: origin, nature, and properties*, American Society for Microbiology (Washington, DC: 1977), 712-723;

2. Lorian, V. (ed.), *Antibiotics in Laboratory Medicine* 2nd ed., Williams and Wilkins (Baltimore, MD: 1986), 694-696;

3. Kadurugamuwa, J., et al, Surface action of gentamicin on *Pseudomonas aeruginosa* *J. Bacteriol.* **175**, 5798-5805 (1993);



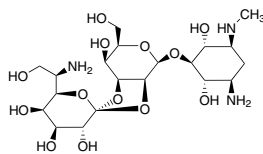
► **Garamycin; Gentiomycin C**  
powder, BioReagent, suitable for cell culture

Used as a selection agent (gentamicin-resistance gene) in cell culture and molecular biology applications. Recommended for use in cell culture applications at 50 mg/L

<b>G1264-50MG</b>	50 mg
<b>G1264-250MG</b>	250 mg
<b>G1264-1G</b>	1 g
<b>G1264-5G</b>	5 g
<b>G1264-100G</b>	100 g

**Hygromycin B from *Streptomyces hygroscopicus***

[31282-04-9]  
C<sub>20</sub>H<sub>37</sub>N<sub>5</sub>O<sub>13</sub>  
FW 527.52



Mode of Action: Blocks polypeptide synthesis and inhibits elongation. For use in the selection and maintenance of prokaryotic and eukaryotic cells.

► **powder, BioReagent, suitable for cell culture, suitable for insect cell culture**

Used as a selection agent for hygromycin resistance gene transformed cells. It is used at a recommended concentration of 100-800 µg/mL.

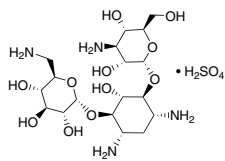
≥60% (HPAE)

Purified by ion exchange chromatography

<b>H3274-50MG</b>	50 mg
<b>H3274-100MG</b>	100 mg
<b>H3274-5X100MG</b>	5 x 100 mg
<b>H3274-250MG</b>	250 mg
<b>H3274-1G</b>	1 g

**Kanamycin sulfate *Streptomyces kanamyceticus***

Kanamycin A;  
Kanamycin sulfate salt; Kanamycin sulfate from *Streptomyces kanamyceticus* [25389-94-0]  
C<sub>18</sub>H<sub>36</sub>N<sub>4</sub>O<sub>11</sub> · H<sub>2</sub>O<sub>4</sub>S  
FW 582.58



Mode of Action: Binds to 70S ribosomal subunit; inhibits translocation; elicits miscoding. Antimicrobial spectrum: Gram-negative and Gram-positive bacteria, and mycoplasma.

► **powder**

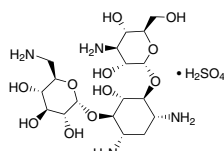
Use in biotechnology applications to inhibit protein synthesis. Recommended for use in molecular biology applications at 10-50 µg/mL.

Prepare stock solutions directly in the vial with sterile water (10mg/mL). Stock solutions should be stored at 2-8°C. Stable at 37°C for 5 days.

<b>K0879-50MG</b>	50 mg
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**Kanamycin sulfate from *Streptomyceskanamyceticus***

Kanamycin A;  
Kanamycin sulfate salt [25389-94-0]  
C<sub>18</sub>H<sub>36</sub>N<sub>4</sub>O<sub>11</sub> · H<sub>2</sub>O<sub>4</sub>S  
FW 582.58



Mode of Action: Binds to 70S ribosomal subunit; inhibits translocation; elicits miscoding. Antimicrobial spectrum: Gram-negative and Gram-positive bacteria, and mycoplasma.

► **powder, BioReagent, suitable for cell culture**

Use in biotechnology applications to inhibit protein synthesis. Recommended for use in cell culture applications at 100 mg/L.

<b>K1377-1G</b>	1 g
<b>K1377-5G</b>	5 g
<b>K1377-25G</b>	25 g

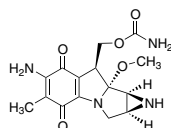
► **BioReagent, plant cell culture tested**

Used in biotechnology applications to inhibit protein synthesis. Used as a selection agent for cells transformed with kanamycin B (neoR, kanR) resistance gene.

<b>K4378-5G</b>	5 g
<b>K4378-25G</b>	25 g

**Mitomycin C from *Streptomyces caespitosus***

[50-07-7] C<sub>15</sub>H<sub>18</sub>N<sub>4</sub>O<sub>5</sub>  
FW 334.33



Inhibitor of DNA synthesis, nuclear division, and cancer cells. Antibacterial to gram positive, gram negative, acid-fast bacilli.

► **powder, BioReagent, suitable for cell culture**

Vial contains 2 mg mitomycin C and 48 mg NaCl.

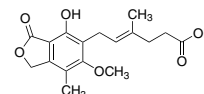
Mitomycin C is used to generate mitotically inactive feeder cells used in cell culture systems, such as mitotically inactive fibroblast used in embryonic stem cell (ESC) systems.

Mitomycin C is an anti-neoplastic antibiotic, DNA inter-strand, cross-linking, alkylating agent that targets guanine nucleoside in the sequence 5'CpG-3'. It produces oxygen radicals and is preferentially toxic to hypoxic cells.

<b>M4287-2MG</b>	2 mg
<b>M4287-5X2MG</b>	5 x 2 mg

**Mycophenolic acid**

6-(4-Hydroxy-6-methoxy-7-methyl-3-oxo-5-phthalanyl)-4-methyl-4-hexenoic acid; 6-(1,3-Dihydro-7-hydroxy-5-methoxy-4-methyl-1-oxoisobenzofuran-6-yl)-4-methyl-4-hexenoic acid [24280-93-1] C<sub>17</sub>H<sub>20</sub>O<sub>6</sub>  
FW 320.34



Immunosuppressive agent. Suppresses cytokine-induced nitric oxide production.

Mode of Action: Blocks inosine monophosphate dehydrogenase in the guanosine monophosphate pathway.

Used to select animal cells expressing the *Escherichia coli* gene for xanthine-guanine phosphoribosyl transferase.

► **powder, BioReagent, suitable for cell culture, ≥98%**

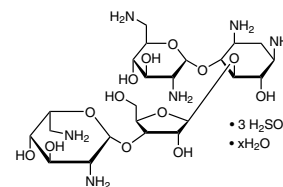
Immunosuppressive agent. Used to inhibit early stage biosynthesis of purine nucleotides. Used as a specific inhibitor of inosine 5'-monophosphate (IMP) dehydrogenase (IMPDH) and inducer of IMP dehydrogenase gene expression.

Recommended for use as a selection agent at 25 µg/ml.

<b>M3536-50MG</b>	50 mg
<b>M3536-250MG</b>	250 mg

**Neomycin trisulfate salt hydrate**

[1405-10-3]  
C<sub>23</sub>H<sub>46</sub>N<sub>6</sub>O<sub>13</sub> · 3H<sub>2</sub>SO<sub>4</sub> · xH<sub>2</sub>O  
FW 908.88 (Anh)



Mode of action: binds to the 30S and in some cases the 50S subunit causing miscoding; inhibits initiation and elongation during protein synthesis.

Antimicrobial spectrum: Gram-negative and Gram-positive bacteria.

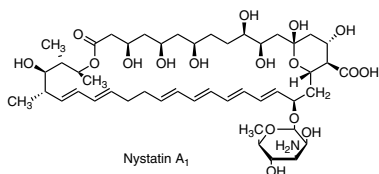
► **powder, BioReagent, suitable for cell culture**

Broadly used in molecular biology and cell culture as a selection agent for prokaryotic cells that have been transformed using the selectable marker gene (neo). Recommended for use in cell culture applications at 50 mg/L.

<b>N6386-5G</b>	5 g
<b>N6386-25G</b>	25 g
<b>N6386-100G</b>	100 g

### Nystatin

Fungicidin; Mycostatin [1400-61-9]



Mode of Action: Increases the permeability of the cell membrane of sensitive fungi by binding to sterols.

Antimicrobial spectrum: Yeasts and molds.

► **powder, BioReagent, suitable for cell culture**

Mode of Action: Used as a fungal membrane (ergosterol binding) pore forming agent and to create nystatin/ergosterol based ion channels in lipid bilayers. Used as a lipid raft-inhibiting reagent and membrane associated cholesterol.

Nystatin is effective as a suspension. Prepare 50 mg/ml stock suspensions in water and store at -20 °C. Stable at 37 °C for 3 days. Use in tissue culture at 50 µg/ml.

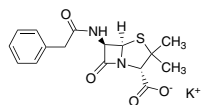
Note: Non-sterile powder. Not recommended for aseptic work. See N1638, Nystatin Suspension, Cell Culture Tested.

<b>N6261-500KU</b>	500000 units
<b>N6261-5MU</b>	5000000 units
<b>N6261-25MU</b>	25000000 units

### ▼ Penicillin G

#### Penicillin G potassium salt

Benzylpenicillin potassium salt  
[113-98-4]  
C<sub>16</sub>H<sub>17</sub>KN<sub>2</sub>O<sub>4</sub>S  
FW 372.48



Mode of Action: Inhibits bacterial cell wall synthesis.

Antimicrobial spectrum: Gram-positive bacteria

► **powder, BioReagent, suitable for cell culture**

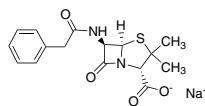
Mode of Action: Use to inhibit the synthesis of bacterial cell walls by inhibition of the cell wall peptidoglycan chain cross-linking. Antimicrobial spectrum: Gram-positive bacteria

Recommended for use in cell culture applications at 100,000 units/L. Solutions should be filter sterilized and stored at 2-8 °C for up to 1 week, -20 °C for extended periods. Solutions are stable at 37 °C for 3 days.

<b>P7794-1MU</b>	1000000 units
<b>P7794-10MU</b>	10000000 units
<b>P7794-100MU</b>	100000000 units

#### Penicillin G sodium salt

Benzylpenicillin sodium salt[69-57-8]  
C<sub>16</sub>H<sub>17</sub>N<sub>2</sub>NaO<sub>4</sub>S  
FW 356.37



Mode of Action: Inhibits bacterial cell wall synthesis.

Antimicrobial spectrum: Gram-positive bacteria.

► **powder, BioReagent, suitable for cell culture**

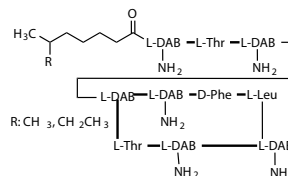
Recommended for use in cell culture media at 100,000 units/L. Solutions should be filter sterilized and stored at 2-8 °C for up to 1 week, -20 °C for extended periods. Solutions are stable at 37 °C for 3 days.

<b>P3032-1MU</b>	1000000 units
<b>P3032-10MU</b>	10000000 units
<b>P3032-25MU</b>	25000000 units
<b>P3032-100MU</b>	100000000 units

### Penicillin G ▲

#### Polymyxin B sulfate salt

[1405-20-5]  
C<sub>55</sub>H<sub>96</sub>N<sub>16</sub>O<sub>13</sub> · 2H<sub>2</sub>SO<sub>4</sub>  
FW 1385.61



Antibiotic with bactericidal action on *E. coli*.<sup>12</sup> Binds to the lipid A portion of bacterial lipopolysaccharides.<sup>3</sup> Induces pore formation in the membranes of cortex cells from excised sorghum roots.<sup>4</sup>

Mode of Action: Binds to and interferes with the permeability of the cytoplasmic membrane.

Antimicrobial spectrum: Gram-negative bacteria.

Mixture of Polymyxin B<sub>1</sub> and B<sub>2</sub> sulfate.

- Lit cited:** 1. Cornu, J., *Ann. Microbiol.* **131B**, 121 (1980);  
2. Storm, D.R., et al., *Annu. Rev. Biochem.* **46**, 723 (1977);  
3. Morrison, D.C. and Jacobs, D.M., *Immunochemistry* **13**, 813 (1976);  
4. Lerner, H.R., et al., *Physiol. Plant.* **57**, 90 (1983);

► **powder, BioReagent, suitable for cell culture**

Recommended for use in cell culture applications at 50 mg/L. Used as a lipid A binding agent that induces pore formation in cell membranes and as immobilized (substrate bound) agent for removal of endotoxins.

Stock solutions should be sterile filtered and stored at 2-8 °C. Stable at 37 °C for 5 days.

<b>P4932-1MU</b>	1000000 units
<b>P4932-5MU</b>	5000000 units

#### Puromycin dihydrochloride from *Streptomyces alboniger*

3'-[α-Amino-*p*-methoxyhydrocinnamido]-3'-deoxy-N,N-dimethyladenosine dihydrochloride [58-58-2]  
C<sub>22</sub>H<sub>29</sub>N<sub>5</sub>O<sub>5</sub> · 2HCl FW 544.43

Nucleoside antibiotic; protein synthesis inhibitor; prevents growth of bacteria, protozoa, algae, and mammalian cells.

► **powder, BioReagent, suitable for cell culture**

Used as a selective agent for cells that contain the resistance gene puromycin N-acetyl-transferase (PAC). Recommended for use at a range of 1-10 µg/ml. Sterilize stock solution by filtration using 0.22 µm filter then store in aliquots at -20 °C.

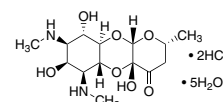
Sterilize stock solution by filtration using 0.22 µm filter then store in aliquots at -20 °C.

≥98% (HPLC)

<b>P8833-10MG</b>	10 mg
<b>P8833-25MG</b>	25 mg
<b>P8833-100MG</b>	100 mg

#### Spectinomycin dihydrochloride pentahydrate

[22189-32-8]  
C<sub>14</sub>H<sub>24</sub>N<sub>2</sub>O<sub>7</sub> · 2HCl · 5H<sub>2</sub>O FW 495.35



Mode of Action: Inhibits protein synthesis (elongation) by interfering with peptidyl tRNA translocation.

Antimicrobial spectrum: Gram-negative and Gram-positive bacteria (*Gonococcus* only).

Mode of Resistance: Mutation in *rpsE* (the gene for ribosomal protein S5) prevents binding of spectinomycin.

► **powder, BioReagent, suitable for cell culture**

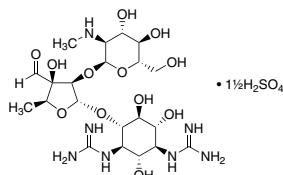
Recommended for use in cell culture applications at 7.5-20 mg/L and as a selection agent for transformed plant cells that contain the selectable marker gene Spcr.

Prepare stock solutions should be prepared (water 10 mg/ml) and filter sterilized. Stock solutions can be stored at 2-8 °C for several weeks or at -20 °C for extended periods.

<b>S4014-5G</b>	5 g
<b>S4014-25G</b>	25 g

### Streptomycin sulfate salt

[3810-74-0]  
 $C_{21}H_{39}N_7O_{12} \cdot 1.5 H_2SO_4$   
 FW 728.69



Mode of Action: Inhibits prokaryote protein synthesis. Binds to S12 protein of 30S ribosomal subunit, preventing the transition from initiation complex to chain-elongating ribosome, causing miscoding or inhibiting initiation.

Mode of Resistance: Mutation in *rpsL* (gene for S12 ribosomal protein) prevents binding of streptomycin to ribosome. Aminoglycoside phosphotransferase also inactivates.

Antimicrobial spectrum: Gram-negative and Gram-positive bacteria.

► powder, BioReagent, suitable for cell culture

Recommended for use in cell culture applications at 100 mg/L. Stock solutions should be sterile-filtered and stored at 2-8 °C for up to a month or at -20 °C for extended periods. Solutions are stable at 37 °C for 3 days.

<b>S9137-25G</b>	25 g
<b>S9137-100G</b>	100 g

► plant cell culture tested

Used together with penicillin and other agents to inhibit bacterial contamination in cell culture applications.

<b>S0774-25G</b>	25 g
<b>S0774-100G</b>	100 g

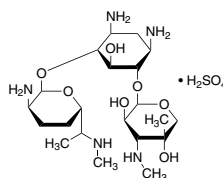
► Biotechnology Performance Certified, cell culture tested

**S1567**

## Solutions

### Gentamicin solution

[1405-41-0]



Mode of Action: Inhibits protein synthesis by binding to L6 protein of 50S ribosomal subunit.

Antimicrobial spectrum: Gram-negative and Gram-positive bacteria, and mycoplasma.

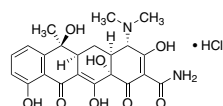
► Garamycin; Gentiomycin C Hybri-Max™, BioReagent, suitable for hybridoma

liquid

<b>G1522-10ML</b>	10 mL
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### Tetracycline hydrochloride

[64-75-5]  $C_{22}H_{24}N_2O_8 \cdot HCl$   
 FW 480.90



► powder, BioReagent, suitable for cell culture

Used in tetracycline controlled gene expression systems (gene switches) such as the tet-on and tet-off systems. Recommended for use in cell culture applications at 10 mg/L.

<b>T7660-5G</b>	5 g
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### L-Glutamine-Penicillin-Streptomycin solution

Mode of Action: Glutamine is essential as an energy source for most mammalian cells in culture because of its amino acid carbon skeleton. Penicillin acts by inhibiting bacterial cell wall synthesis. Streptomycin inhibits prokaryote protein synthesis by preventing the transition from initiation complex to chain-elongating ribosome and causes miscoding.

Antimicrobial spectrum: Gram-negative and Gram-positive bacteria.

► with 200 mM L-glutamine, 10,000 U penicillin and 10 mg streptomycin/mL in 0.9% NaCl, BioReagent, suitable for cell culture

Used to reduce or eliminate bacterial contamination in cell, especially primary cell, cultures. Recommended for use in cell culture applications at 10 mL/L.

liquid

Formulated with 200 mM L-glutamine, 10,000 units/ml penicillin, and 10 mg/ml streptomycin in 0.9% sodium chloride.

<b>G1146-10X5ML</b>	10 × 5 mL
<b>G1146-100ML</b>	100 mL

► streptomycin: 10 mg/mL, L-glutamine: 200 mM, penicillin: 10,000 units, BioReagent, suitable for cell culture

Solubilized in a proprietary buffer.

Use to reduce or eliminate bacterial contamination in cell, especially primary cell, cultures.

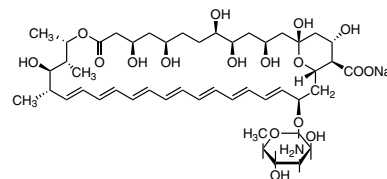
Recommended for use at 10 mL/L.

stabilized

<b>G6784-10X5ML</b>	10 × 5 mL
<b>G6784-100ML</b>	100 mL

### Amphotericin B solution

[1397-89-3]  $C_{47}H_{73}NO_{17}$  FW 924.08



► BioReagent, suitable for cell culture

Mode of action: Interferes with fungal membrane permeability by forming channels in the membranes and causing small molecules to leak out.

Antimicrobial spectrum: Yeasts and molds.

Recommended for use in cell culture applications at 10 mL/L.

Prepared from A 9528.

Stable at 37 °C for 3 days.

<b>A2942-20ML</b>	20 mL
<b>A2942-50ML</b>	50 mL
<b>A2942-100ML</b>	100 mL

### Antibiotic Antimycotic Solution (100×), Stabilized

► with 10,000 units penicillin, 10 mg streptomycin and 25 µg amphotericin B per mL, BioReagent, suitable for cell culture

Mode of Action: Penicillin acts by inhibiting bacterial cell-wall synthesis. Streptomycin inhibits prokaryote protein synthesis by preventing the transition from initiation complex to chain-elongating ribosome and causes miscoding. Amphotericin B interferes with fungal membrane permeability by forming channels in the membranes and causing small molecules to leak out.

Antimicrobial spectrum: Gram-negative bacteria, Gram-positive bacteria, fungi and yeasts.

Solubilized in a proprietary citrate buffer.

Formulated to contain 10,000 units/ml penicillin G, 10 mg/ml streptomycin sulfate and 25 µg/ml amphotericin B.

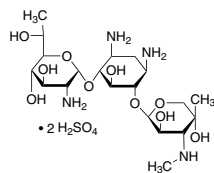
Recommended for use in cell culture applications at 10 ml/L.

suspension

<b>A5955-20ML</b>	20 mL
<b>A5955-100ML</b>	100 mL

#### G 418 disulfate salt solution

Antibiotic G418  
[108321-42-2]  
 $C_{20}H_{40}N_4O_{10} \cdot 2H_2SO_4$   
FW 692.71



Mode of Action: Blocks polypeptide synthesis and inhibits elongation in the selection and maintenance of eucaryotic cells stably transfected with neomycin resistance gene

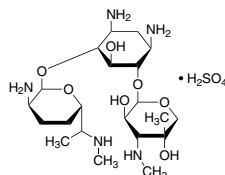
#### ► BioReagent, suitable for cell culture

Used for selection of G418 resistant transformed cells in molecular biology applications at a recommended concentration of 100-800 µg/ml. 50 mg/mL in tissue culture grade water

<b>G8168-10ML</b>	10 mL
<b>G8168-100ML</b>	100 mL

#### Gentamicin solution

[1405-41-0]



Mode of Action: Inhibits protein synthesis by binding to L6 protein of 50S ribosomal subunit.

Antimicrobial spectrum: Gram-negative and Gram-positive bacteria, and mycoplasma.

#### ► liquid, BioReagent, suitable for cell culture

Formulated to contain 50 mg/ml gentamicin in deionized water.

Used as a selection agent (gentamicin-resistance gene) in molecular biology and cell culture applications. Recommended for use in cell culture applications at 1 ml/L.

Stable at 37°C for 5 days.

<b>G1397-10ML</b>	10 mL
<b>G1397-100ML</b>	100 mL

#### ► Garamycin; Gentiomycin C liquid, BioReagent, suitable for cell culture

Formulated to contain 10 mg/ml gentamicin in deionized water.

Recommended for use in cell culture applications at 5 ml/L and used as a selection agent (gentamicin-resistance gene) in molecular biology applications.

Stable at 37 °C for 5 days.

<b>G1272-10ML</b>	10 mL
<b>G1272-100ML</b>	100 mL

#### ► Garamycin; Gentiomycin C for cell biology in accordance for cell culture

sterile filtered

**48755**

#### Gentamicin-Glutamine solution

#### ► with 200 mM L-glutamine and 5 mg gentamicin per mL in tissue culture grade water, liquid, BioReagent, suitable for cell culture

Mode of Action: Glutamine is essential as an energy source for most mammalian cells in culture because of its amino acid carbon skeletons. Inhibits protein synthesis by binding to L6 protein of 50S ribosomal subunit.

Antimicrobial spectrum: Gram-negative and Gram-positive bacteria, and mycoplasma.

Used for selection of transformed cells that contain the aacAaphD gene. Recommended for use in cell culture applications at 10 ml/L.

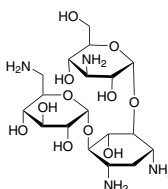
Formulated to contain 200 mM L-glutamine and 5 mg/ml gentamicin in 0.9% sodium chloride.

Stable at 37°C for 5 days.

<b>G9654-10X5ML</b>	10 x 5 mL
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#### Kanamycin solution from *Streptomyces kanamyceticus*

[25389-94-0]



Mode of Action: Binds to 70S ribosomal subunit; inhibits translocation; elicits miscoding.

Antimicrobial spectrum: Gram-negative and Gram-positive bacteria, and mycoplasma.

#### ► BioReagent, liquid, suitable for cell culture

Used as a selection agent for cells transformed with kanamycin B (neoR, kanR) resistance gene. Recommended for use in cell culture applications at 2 ml/L.

Stable at 37 °C for 5 days.

<b>K0254-20ML</b>	20 mL
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#### ► BioReagent, suitable for cell culture

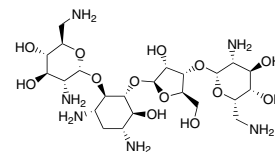
Recommended for use in cell culture applications at 10 ml/L.

Stable at 37°C for 5 days.

<b>K0129-20ML</b>	20 mL
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#### Neomycin solution

[119-04-0]  
 $C_{23}H_{46}N_6O_{13}$   
FW 614.64



#### ► with 10 mg/mL neomycin in 0.9% NaCl, BioReagent, suitable for cell culture

Mode of action: binds to the 30S and in some cases the 50S subunit causing miscoding; inhibits initiation and elongation during protein synthesis.

Antimicrobial spectrum: Gram-negative and Gram-positive bacteria.

Formulated to contain 10 mg/ml neomycin in 0.9% sodium chloride.

Broadly used in molecular biology and cell culture as a selection agent for prokaryotic cells that have been transformed using the selectable marker gene (neo). Recommended for use in cell culture applications at 5 ml/L.

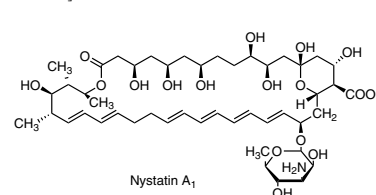
liquid

Stable at 37 °C for 5 days.

<b>N1142-20ML</b>	20 mL
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#### Nystatin Suspension

[1400-61-9]



#### ► suspension, BioReagent, suitable for cell culture

Mode of Action: Increases the permeability of the cell membrane of sensitive fungi by binding to sterols.

Antimicrobial spectrum: Yeasts and molds.

Recommended for use in cell culture applications at 24 ml/L. Used as a fungal membrane (ergosterol binding) pore forming agent and to create nystatin/ergosterol based ion channels in lipid bilayers and as a lipid raft-inhibiting reagent and membrane associated cholesterol aggregator.

Stable at 37 °C for 3 days.

<b>N1638-20ML</b>	20 mL
<b>N1638-100ML</b>	100 mL

#### Penicillin – Streptomycin – Neomycin Solution Stabilized

- ▶ Pen-Strep-Neo formulated to contain ~5,000 units penicillin, 5 mg streptomycin and 10 mg neomycin/mL, BioReagent, suitable for cell culture

Recommended for use in cell culture applications at 10 ml/L.

liquid

<b>P4083-20ML</b>	20 mL
<b>P4083-100ML</b>	100 mL

#### Penicillin–Streptomycin Solution Hybri-Max™

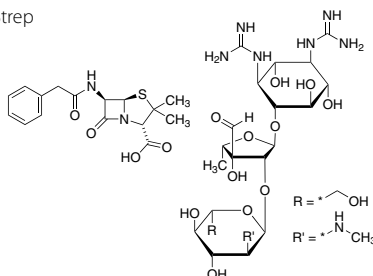
- ▶ Pen-Strep with 10,000 units penicillin and 10mg/ml streptomycin in 0.9% NaCl, BioReagent, suitable for hybridoma

liquid

<b>P7539-20ML</b>	20 mL
<b>P7539-100ML</b>	100 mL

#### Penicillin-Streptomycin

Pen-Strep



liquid

- ▶ Solution Stabilized, with 5,000 units penicillin and 5mg streptomycin/mL, BioReagent, suitable for cell culture

Solubilized in a proprietary citrate buffer.

Recommended for use in cell culture media at 20 ml/L.

<b>P4458-20ML</b>	20 mL
<b>P4458-100ML</b>	100 mL

- ▶ with 10,000 units penicillin and 10 mg streptomycin per mL in 0.9% NaCl, BioReagent, suitable for cell culture

Recommended for use in cell culture applications at 10 ml/L.

<b>P0781-20ML</b>	20 mL
<b>P0781-100ML</b>	100 mL

- ▶ Solution stabilized, with 10,000 units penicillin and 10 mg streptomycin/mL, BioReagent, suitable for cell culture

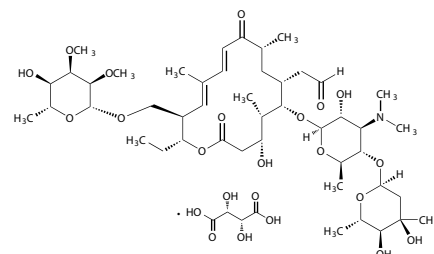
Solubilized in a proprietary citrate buffer.

Recommended for use in cell culture applications at 10 ml/L.

<b>P4333-20ML</b>	20 mL
<b>P4333-100ML</b>	100 mL

#### Tylosin solution

[74610-55-2]



- ▶ BioReagent, suitable for cell culture

Inhibits bacterial protein synthesis at the level of 50S ribosome (L27 protein) binding. Antimicrobial spectrum: Gram-positive bacteria and mycoplasma.

Formulated to contain 8 mg/ml tylosin in 0.9% sodium chloride.

Recommended for use in cell culture applications at 1 ml/L.

<b>T3397-20ML</b>	20 mL
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Biointegrity.

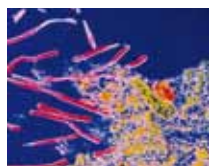
Sigma® Life Science has been a trusted source of reliable, high-quality media, sera and reagents for over 25 years.

Cultivating healthy cell growth means depending on a quality mix of media, sera and reagents. That's why we offer an unparalleled line of cell culture solutions. From classical and specialty media, to fetal bovine serum, supplements and reagents, our offering is extensive and comprehensive.

For more information visit

[sigma.com/cellculture](http://sigma.com/cellculture)

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Mycoplasma Detection/Elimination

# Mycoplasma Detection/Elimination

The maintenance of contamination-free cell lines is essential to cell-based research. Among the biggest concerns are mycoplasma contamination. Although mycoplasma do not usually kill contaminated cells, they are difficult to detect and can cause a variety of effects on cultured cells, including altered metabolism, slowed proliferation and chromosomal aberrations. In short, mycoplasma contamination compromises the value of those cell lines in providing accurate data for life science research.

The sources of mycoplasma contamination in the laboratory are very challenging to completely control. As certain mycoplasma species are found on human skin, they can be introduced through poor aseptic technique. Additionally, they can come from contaminated supplements such as fetal bovine serum, and most importantly from other contaminated cell cultures. Once mycoplasma contaminates a culture, it can quickly spread to contaminate other areas of the lab. Strict adherence to good laboratory practices such as good aseptic technique are key, and routine testing for mycoplasma is highly recommended for successful control of mycoplasma contamination. The products below represent a complete toolkit for myplasma contamination detection and elimination. The three most popular methods for detection include mycoplasma culture, DNA staining method and PCR.

## Mycoplasma Culture

### Mycoplasma Agar

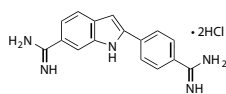
► **powder, suitable for microbiology**

Recommended for the cultivation of mycoplasma  
Powder contains (g/L): 10.0 bacterial peptone, 10.0 LAB-LEMCO powder, 5.0 sodium chloride, 0.5 mineral supplement, 10.0 agar.

**M0660-500G** 500 g

### 4',6-Diamidino-2-phenylindole dihydrochloride

2-(4-Aminophenyl)-6-indolecarbamidine dihydrochloride; DAPI dihydrochloride [28718-90-3] C<sub>16</sub>H<sub>15</sub>N<sub>5</sub> · 2HCl FW 350.25



Cell permeable fluorescent minor groove-binding probe for DNA. Binds to the minor groove of double-stranded DNA (preferentially to AT rich DNA), forming a stable complex which fluoresces approximately 20 times greater than DAPI alone.

DAPI is several times more sensitive than ethidium bromide for staining DNA in agarose gels.

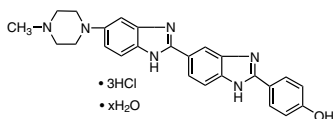
► **powder, BioReagent, suitable for cell culture, ≥98% (HPLC and TLC)**

Protect from light.

**D8417-1MG** 1 mg  
**D8417-5MG** 5 mg  
**D8417-10MG** 10 mg

### Hoechst Stain solution

Bisbenzimidazole H 33258 [23491-45-4]



A fluorescent DNA stain qualified for use in Mycoplasma staining.

Contains 0.5µg/ml Hoechst bisbenzimidazole 33258 fluorochrome stain and thimerosal.

**H6024-10ML** 10 mL

### LookOut® DNA Erase

LookOut® DNA Erase may be applied to steel, glass, ceramic, plastic, rubber, or precious metals including laboratory equipment and pipettors. It should not be applied on light and non-ferrous metals. For other sensitive surfaces, test in a small area before applying.

LookOut® DNA Erase is a potent, ready-to-use solution for rapid DNA decontamination of surfaces in laboratories. This reagent is characterized by its high efficiency. The decontamination spray completely destroys DNA within 60 seconds of surface treatment. The solution contains a unique combination of DNA destroying and surface active agents.

Both the 250 ml spray reagent (Product Number L8917) and the 1 L refill (Product Number L9042) are supplied ready-to-use.

► **Spray reagent for DNA decontamination of equipment and surfaces.**

**L8917-250ML** 250 mL

► **Refill**

**L9042-1L** 1 L

### LookOut® Mycoplasma Elimination Kit

The kit is comprised of a combination of biological agents that reliably and completely eliminate mycoplasma contamination. The initial treatment of this eradication procedure is adequate for mycoplasma elimination in most applications. The second step suppresses and inactivates any remaining mycoplasma using a follow-up antibiotic treatment.

The LookOut® Mycoplasma Elimination Kit has been developed to quickly and efficiently eliminate mycoplasma contamination from cell cultures.

1 kit sufficient for 5 mL, mycoplasma elimination

#### Components

Initial treatment  
Final treatment

**MP0030-1KT** 1 kit

**LookOut® Mycoplasma PCR Detection Kit**

The reaction tubes included with the kit are pre-coated with appropriate dNTPs, primers, and loading dye. Total assay time is greatly reduced compared to general protocols that require individual loading of reaction tubes.

The LookOut® Mycoplasma PCR Detection Kit utilizes the polymerase chain reaction (PCR), which is established as the method of choice for highest sensitivity in the detection of *Mycoplasma*, *Acholeplasma*, and *Ureaplasma* contamination in cell cultures and other cell culture derived biologicals. Detection requires less than 2 mycoplasma genomes per microliter of sample.

**Components**

Pre-coated test reaction tubes  
Pre-coated positive control reaction tubes  
Rehydratin Buffer  
Cap for reaction tubes

**MP0035-1KT** 1 kit

**Mycoplasma Agar****► powder, suitable for microbiology**

Recommended for the cultivation of mycoplasma  
Powder contains (g/L): 10.0 bacterial peptone, 10.0 LAB-LEMCO powder, 5.0 sodium chloride, 0.5 mineral supplement, 10.0 agar.

**M0660-500G** 500 g

**Mycoplasma Broth****► powder, suitable for microbiology**

Recommended for the cultivation of mycoplasma  
Powder contains (g/L): 10.0 bacterial peptone, 10.0 LAB-LEMCO powder, 5.0 sodium chloride, 0.5 mineral supplement.

**M0535-250G** 250 g

**M0535-500G** 500 g

**Mycoplasma Control Slides**

Cells are grown on coverslips which have been mounted on microscope slides. Use caution when handling control slides as cells are exposed to facilitate staining.

For use in Mycoplasma stain kit.

**Components**

negative control slides 10  
positive control slides 10

**M1414-1SET** 1 set

**Mycoplasma Stain Kit**

Recommended for the detection of mycoplasma in cell culture.

1 kit sufficient for 100 tests

**Components**

Hanks' Balanced Salt Solution without phenol red and sodium bicarbonate 3x35 mL  
Hoechst Stain Solution 10 mL  
Mounting Medium 10 mL  
negative control slides 10  
positive control slides 10

**MYC1-1KT** 1 kit

**Venor™GeM Mycoplasma Detection Kit, PCR-based**

Kit employs PCR technology for rapid and reliable detection of mycoplasma DNA in cell cultures and virus stocks.

1 kit sufficient for 25 tests

Does not include *Taq* Polymerase. Optimized for use with D9307, *Taq* DNA Polymerase

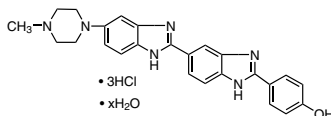
**Components**

Positive Control 1 vial  
Negative Control 1 vial  
PCR 10X Reaction Buffer 1 vial  
Primer/Nucleotide Mix 1 vial

**MP0025-1KT** 1 kit

**bisBenzimide H 33258**

HOE 33258; 2-[2-(4-Hydroxyphenyl)-6-benzimidazolyl]-6-(1-methyl-4-piperazyl)benzimidazole trihydrochloride; 2'-(4-Hydroxyphenyl)-5-(4-methyl-1-piperazinyl)-2,5'-bi(1H-benzimidazole) trihydrochloride; BBH; Hoechst 33258 [23491-45-4] C<sub>25</sub>H<sub>24</sub>N<sub>6</sub>O · 3HCl FW 533.88



Membrane-permeable, fluorescent DNA stain with low cytotoxicity that intercalate in A-T regions of DNA.

Useful for staining DNA, chromosomes, and nuclei. May be used for fluorescence microscopy or flow cytometry.

**► powder, BioReagent, suitable for cell culture, ≥98% (HPLC and TLC)**

passes application test for fluorescence

**B1155-25MG** 25 mg

**B1155-100MG** 100 mg

**Mycoplasma agar base****► for microbiology**

Used for isolation and cultivation of *mycoplasma*.

Ingredients (g/L)

Beef heart, infusion, 250.00  
Peptic digest of animal tissue, 10.00  
Sodium chloride, 5.00  
Agar, 15.00

**M2178-500G** 500 g

**Mycoplasma enrichment supplement****► for microbiology**

A selective supplement for the isolation of *Mycoplasma*.

Composition: (per vial)

Horse serum: 20.00ml  
Yeast extract (25% w/v solution): 10.00ml  
Thallous acetate: 25.00mg  
Penicillin G: 20,000 IU  
Sufficient for 100 ml medium

**M6930-1VL** 1 vial

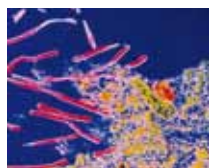
**Frey mycoplasma broth base****► for microbiology**

Used for cultivation of *Avian Mycoplasma*.

Ingredients (g/L)

Casein enzymic hydrolysate, 7.50  
Papaic digest of soyabean meal, 2.50  
Yeast extract, 5.00  
Sodium chloride, 5.00  
Potassium chloride, 0.40  
Magnesium sulphate, 0.20  
Disodium phosphate, 1.60  
Monopotassium phosphate, 0.10

**F6797-500G** 500 g



## Endotoxin Testing

## Endotoxin Testing

### E-TOXATE™ Kit

- ▶ sufficient for 20 assays

#### Components

E-Toxate™ Endotoxin standard (Sigma E8029) 1 vial  
E-Toxate™ reagent (Sigma E8779) 1 vial  
E-Toxate™ Water (Sigma 2107) 30 ml

**ET0200-1KT** 1 kit

### E-Toxate™ Kit

- ▶ sufficient for 50 assays

#### Components

E-Toxate™ Endotoxin standard (Sigma E8029) 1 vial  
E-Toxate™ Reagent (Sigma 21050) 1 vial  
E-Toxate™ Water (Sigma 2107) 30 ml

**ET0100-1KT** 1 kit

### E-TOXATE™ Kit

- ▶ sufficient for 100 assays

#### Components

E-Toxate™ Endotoxin standard (Sigma E8029) 1 vial  
E-Toxate™ Reagent (Sigma 21020) 5 vials  
E-Toxate™ Water (Sigma 2107) 5 x 30 ml

**ET0300-1KT** 1 kit

### E-Toxa-Clean® Concentrate

Alkaline detergent for pre-cleaning glassware prior to inactivation of endotoxin by steam sterilization or baking.

Use at 1% in hot tap water.

**E9029-500G** 500 g

### Lectin from Limulus polyphemus

- ▶ lyophilized powder

#### composition

Protein ~50% (Bradford)

**L7908**

biocells

# Bio**beyond.**

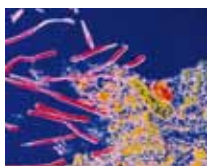
## Cell lines to shape cancer research.

Now, understand the role of specific disease-associated genes in colorectal and breast cancer. Introducing genetically modified human cell lines that model disease-specific patient populations.

[sigma.com/biocells](http://sigma.com/biocells)

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## Cell Culture Equipment

# Cell Culture Equipment

## Anaerobic Culture

### Hypoxia chamber glove box

The hypoxia chamber glove box is ideal for tissue culture work, including tumor cell and stem cell research. The hypoxia chamber features a color operated "Touch Screen" control panel for automatically controlling oxygen levels, temperature levels, and carbon dioxide levels.

- O<sub>2</sub> sensor and CO<sub>2</sub> sensor
- Platinum RTD with sealing gland
- N<sub>2</sub>, CO<sub>2</sub>, and O<sub>2</sub> gas hook-up
- Thermoelectric assembly (Peltier device)
- password protected, configurable PID control
- Configurable for up to six individually controlled sampling chambers
- CO<sub>2</sub> range: 0-20%
- CO<sub>2</sub> accuracy: 0.2%



Z736848-1EA

1 ea

## Innoculation

### Glass spreaders

For inoculating petri dishes

Constructed of 4 mm diameter glass rod with polished ends, with 130 mm long handles and 50 mm long spreader segments.



120 deg bend (top) and 90 deg bend (bottom)

#### ▶ 90° bend

S4522-6EA 6 ea

#### ▶ 120° bend

S4647-6EA 6 ea

### Greiner PS inoculating loop

**Note:** Disposable inoculating loop; hydrophobic



#### ▶ disposable inoculating loop, polystyrene, 10 uL, 200 mm, blue

Z642991

### Lazy-L Spreader™

Lazy-L-Spreaders disposable microbiological spreaders provide an economical alternative to bending glass rods or pipets for spreading samples on agar surfaces and filters in Petri dishes. They are supplied sterile — no need to flame sterilize or autoclave.

- unlike glass spreaders, durable polystyrene Lazy-L spreaders are non-breakable and pose no safety hazard
- L-shaped for convenient "lazy" spreading; just turn the Petri dish for smooth, even sample distribution
- smooth spreading surface and a slight upward turn reduce the chance that the spreader will dig into agar
- presterilization eliminates flaming or autoclaving and reduces risk of contamination
- no more time spent bending glass rods or waiting for glass or metal spreaders to cool before use!

Lazy-L spreaders are an alternative to bending glass rods or pipettes. Because they are sterile, no flaming or autoclaving is required. Turn the dish 360 °C to provide smooth, even sample distribution.



#### ▶ 10 per pouch

Z376779-1PAK 1 pkg

## Culture Dishes

### Anaerobe jar inset for petri disks

#### ▶ for microbiology

Integrated holding clip for the Anaerobe Indicator Test strips.

Diameter: approximately 90 mm

Height: approximately 200 mm

Capacity: 12 Standard Petri dishes

Additional plate carrier for AnaeroJar (Fluka 28029) for 12 petri dishes.

68886

### Anaerobic atmosphere generation bags

#### ▶ Anaerobe gas generation bags for microbiology

The anaerobic atmosphere generation bags are highly innovative products designed to safely and speedily create optimum conditions for the growth of anaerobic organisms. No water is added, no hydrogen is produced, and no catalyst is required. The anaerobic atmosphere is completed within 30 minutes.

68061-10SACHETS-F

10 sachets

### Anaerobic jar

#### ▶ for microbiology

Atmosphere Generation System

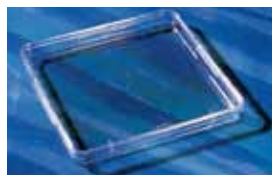
Supplied complete with jar base of 2.5 litre capacity and a lid which is secured to the base by four clips which allow self-venting. The lid incorporates a carrying handle and vacuum release feature. A plate carrier is included.

Anaerobe atmosphere generation bags (Fluka No 68061) are not included.

**28029-1EA-F** 1 ea

### Corning® square bioassay dishes

Certified non-pyrogenic, these dishes are 245 mm square. They are packed with a lid and are designed with a stacking bead so that they will stack securely without slipping.



▶ without handles, TC treated, square

**CLS431110-4EA** 4 ea

**CLS431110-16EA** 16 ea

▶ without handles, not TC treated, square

Dish uses include large-scale colony-counting and plaque-lifting, microbial assays, hybridizations.

**CLS431111-4EA** 4 ea

**CLS431111-16EA** 16 ea

▶ with handles, not TC treated, square

**CLS431272-16EA** 16 ea

▶ low profile, without handles, not TC treated, square

**CLS431301-20EA** 20 ea

### Greiner dishes

Greiner petri dishes afford distortion-free optical surfaces for easy microscope viewing and are suitable for all bacteriological uses. These petri dishes are manufactured under controlled low bioburden conditions ensuring all general bacteriological standards and requirements are met. suitable for (bacteriological applications)



▶ tissue culture dish; cell culture dish; culture dish square dish, 120 x 120 x 17mm, vented

**Z617679-240EA** 240 ea

▶ bacterial culture dish; culture dish petri dish, 94 x 16 mm, triple vented

**Z617636-480EA** 480 ea

▶ bacterial culture dish; culture dish petri dish, 100 x 15 mm, vented, heavy design

**Z666246-420EA** 420 ea

▶ petri dish, 35 x 10 mm, triple vented

**P5112-740EA** 740 ea

▶ petri dish, 60 x 15 mm, vented (6 vents)

**P5237-600EA** 600 ea

▶ petri dish, 94 x 16 mm, non-vented, heavy design

**P5362-480EA** 480 ea

▶ petri dish, 100 x 15 mm, triple vented, heavy design

**P5612-420EA** 420 ea

▶ petri dish, 100 x 20 mm, vented

**P5737-360EA** 360 ea

▶ petri dish, 145 x 20 mm, triple vented

**P5487-120EA** 120 ea

### Nunc® petri dishes

Nunc® Lab-Tek® and standard petri dishes are optimized for culturing fungi, bacteria and other microorganisms in addition to supporting automated high-throughput (HTS) applications.

- For culturing of fungi, bacteria and other microorganisms
- Contact dish useful for sampling in hospital environments (for research use only), as well as in food science and the pharmaceutical industry
- Perform well in automatic dispensers due to complete flatness and uniform height
- Available with a moulded grid
- Deep Petri Dishes allow for longer culture periods
- Compatible with automated systems



▶ vented

**Z717223-320EA** 320 ea

▶ vented

**Z717231-80EA** 80 ea

▶ Deep Petri with stacking ring; non-vented, Lab-Tek® petri dish

**P7741-1CS** 1 case

▶ Deep Petri without stacking ring; non-vented, Lab-Tek® petri dish

**D9054-1CS** 1 case

### Nunclon® cell culture dishes

- Large range available, treated for cell culture but with many other uses
  - Optically clear and very flat for use in microscope
  - Non-toxic
  - Certified surface treatment for optimal cell attachment and growth
- round



**D7804-500EA** 500 ea

**D8054-1CS** 1 case

### Petri dishes, polystyrene

Designed for easy one hand opening and closing, edges of tops and bottoms are squared off to provide a firm sure grip. Flare and length of lid skirt allows lid to be removed and replaced easily. Dishes have three venting ribs on the underside of the lid to prevent condensation build up.

Optically clear with consistently flat bottoms



▶ beveled stacking rings

**P5481-500EA** 500 ea

▶ beveled stacking rings

**P5731-500EA** 500 ea

▶ beveled stacking rings

**P5606-400EA** 400 ea

▶ vertical stacking rings

**Note:** The actual nominal dimensions of these plates possess an inner diameter of 88mm and an outer diameter with lid of 92.4mm.

**P5856-500EA** 500 ea

▶ ringless for easy sliding

**P5981-100EA** 100 ea

▶ compartmentalized I-dish with beveled stacking rings

**P6106-500EA** 500 ea

► compartmentalized I-dish with vertical stacking rings

[P6231](#)

► compartmentalized with vertical stacking rings

[P6481](#)

**Petri-Pad culture dish system**

A complete system for growing microorganisms on a "solid" surface with liquid broth media. Just add sterile broth to saturate the pure absorbent cellulose pad, and the dish is ready. Dishes without pads can be used for agar-based solid media.

The dishes are optically clear polystyrene with lips on both the base and the cover for easy one-hand manipulation. There is a frosted area on the bottom for marking. The 47 mm diameter allows culturing on standard-size filter membranes.



► Complete unit

Unit consists of a 47 mm culture dish and one Millipore pure cellulose Petri-Pad

[C6695-500EA](#) 500 ea

► culture dishes only

[C6570-100EA](#) 100 ea

**TPP tissue culture dishes**

Innovative features and outstanding cell growth properties make the TPP tissue culture dishes the ideal choice for adherent cell culture in research and industry. These optically clear, high-grade polystyrene tissue culture dishes are tissue culture treated only on the base of the dish with a non-treated ring surrounding the growing surface to prevent cell attachment on the edge. A serrated ring around the bottom culture dish makes pick-up and handling of the dishes safe and easy, while also minimizing the risk of dropping dishes due to lid/base disassembly.

A special stacking ring, with spaces for a numeric scale (12, 3, 6, 9) set on the periphery, allows for safe and stable stacking of these tissue culture dishes. The numeric scale serves to ease locating areas of examination while the spaces they create in the stacking ring reduce condensation between stacked dishes and prevent the tissue culture dishes from sticking together.

Two marking areas, located on the top dish wall (yellow) and the bottom dish wall (frosted), act as a reference for top/bottom alignment and orientation. There are also six special stops built into the lid which facilitate optimal gas exchange during incubation.

Features:

- Every batch tested for cell growth characteristics
- Outstanding flatness and optical clarity for microscopic examination
- Unique serrated edge on bottom dish makes handling safe and easy
- Double writing surface
- Numeric scale in lid divides viewing area into quadrants to aid in examination
- Dishes are packaged in easy "peel-off" wrapping
- Guaranteed sterile by gamma irradiation



[Z707651-900EA](#) 900 ea

[Z707678-840EA](#) 840 ea

[Z707686-240EA](#) 240 ea

[Z707694-100EA](#) 100 ea

**Detection/Counting**

**Bright-Line™ Hemacytometer**

H-shaped moat forms two cell-counting areas. The surface features enhanced Neubauer rulings. Replacement cover slips sold separately.

Supplied with two cover slips.



[Z359629-1EA](#) 1 ea

**Bright-Line™ Hemacytometer replacement cover slip**

[Z375357-1EA](#) 1 ea

**Scienceware® colony counter system**



► Complete system

Counting colonies and plaques on culture plates is simple, accurate, and easy on the eyes. The pen-style counter marks, counts, and beeps to confirm each touch. Select count-up, count-down, or error-correction mode. Felt tip markers (one red and one black provided) make water-resistant marks on glass and plastic; alcohol removes marks. The mini light box has a removable grid to assist counting. The free-standing 1.75x mini magnifier enhances the view while it leaves both hands free. All components can be ordered separately and have their own independent laboratory applications.

[Z367893](#)

► Pen style colony counter

[Z367850](#)

► Replacement tip for colony counter

For Manostat Colony counter  
[Z378518-1EA](#) 1 ea

► Mini light box

Provides a 4 × 5 in. (10 × 12.5 cm) viewing area.  
[Z367869-1EA](#) 1 ea

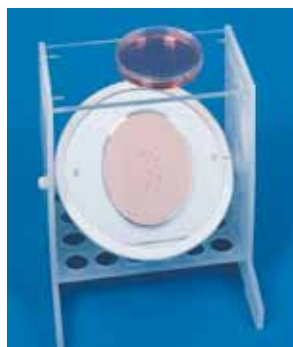
► Magnifier for mini light box, free-standing

This free standing magnifier allows enhanced viewing of slides, petri dishes, multi-well plates, gels or text. The precision molded lens offers 1.75 magnification. The unique stand allows the magnifier to be placed over a variety of objects, including the Mini Light Box. Dimensions: lens 104.8 x 142.9 mm (41/8x 55/8 in.), stand 171.8mm (6 3/4 in.) high.  
[Z367885-1EA](#) 1 ea

**Scienceware® plate reader**

- Easy, magnified viewing; hands-free
- For microplates, view color changes and locate cells for further analysis
- For petri dishes, view cell growth and take advantage of hands-free design to make notes and isolate cell colonies
- Ideal for evaluating monolayer cell growth

The plate reader has a clear deck for resting plates and a large, clear, adjustable mirror for viewing their underside. This tool allows safe examination of the bottom of the plates without risking spills on the face and eyes. It is ideal for Hemagglutination, Hemagglutination Inhibition, Hemolysis and Agglutination testing. Other applications include counting of bacterial cell cultures for colony or plaque growth. Mirror magnification is 3X actual plate size. Polypropylene with an acrylic deck.



**P7613-1EA** 1 ea

**Microscopes****Jenco™ compound microscopes, JC series**

Brightfield infinity plan, achromatic

**3 zoom ranges in either 45 or 60 degree inclination:**

GL6 Series GL7 Series GL9 Series  
Zoom Ratio 6.5:1 7:1 9:1

Zoom Range 1.0X - 6.5X 0.65X - 4.5X 0.65X - 6.0X

A long (100mm) working distance on all 3 models. Achieve a working distance of 260 mm with optional auxiliary lenses.

▶ **binocular**

**Z736945-1EA** 1 ea

▶ **trinocular**

**Z737062-1EA** 1 ea

▶ **binocular**

**Z734977-1EA** 1 ea

▶ **trinocular**

**Z735086-1EA** 1 ea

**Jenco™ compound microscopes, Utility series**

3 Plug

**3 zoom ranges in either 45 or 60 degree inclination:**

GL6 Series GL7 Series GL9 Series

Zoom Ratio 6.5:1 7:1 9:1

Zoom Range 1.0X - 6.5X 0.65X - 4.5X 0.65X - 6.0X

A long (100mm) working distance on all 3 models. Achieve a working distance of 260 mm with optional auxiliary lenses.

▶ **brightfield, infinity eplanachromatic lens, binocular; 20 W halogen bulb**

**Z735299-1EA** 1 ea

▶ **brightfield, achromatic lens, monocular; 20 W halogen bulb**

**Z735183-1EA** 1 ea

**Jenco™ compound microscopes**

Science teachers cannot expend their entire budget on microscopes or sacrifice quality on such an integral tool, so Jenco™ keeps prices low, quality high and offers selection to provide them affordable options. Jenco™ brand microscopes virtually eliminate downtime and our optics facilitate student throughput.

Choose from different frames for the right reason and teach science with the right equipment for your students.

- Illumination can be a mirror, a rechargeable LED, an incandescent bulb or halogen bulb
- Eye pieces come in monocular heads, or teaching heads for assisting students in finding specimens and also binocular heads for easy viewing with both eyes
- Objectives are offered in multiple quality and quantity levels
- Video systems are available to project images on a screen

Industry leading 5 year warranty

3-plug

**3 zoom ranges in either 45 or 60 degree inclination:**

GL6 Series GL7 Series GL9 Series

Zoom Ratio 6.5:1 7:1 9:1

Zoom Range 1.0X - 6.5X 0.65X - 4.5X 0.65X - 6.0X

A long (100mm) working distance on all 3 models. Achieve a working distance of 260 mm with optional auxiliary lenses.



Left to Right: Z735086, Z735299, Z735418

▶ **brightfield, achromatic lens, monocular, fixed stage; LED or 20 W incandescent or fluorescent**

**Z735418-1EA** 1 ea

▶ **brightfield, achromatic lens, monocular, mechanical stage; LED incandescent or fluorescent**

**Z735515-1EA** 1 ea

▶ **brightfield, achromatic lens, monocular, mechanical stage; LED or other illumination**

**Z735620-1EA** 1 ea

▶ **brightfield, achromatic lens, binocular, mechanical stage; LED or other illumination**

**Z735744-1EA** 1 ea

▶ **brightfield, semi-planachromatic lens, monocular; 20w halogen bulb**

EU 2-prong plug

**Z737178-1EA** 1 ea

▶ **brightfield, semi-planachromatic lens, binocular; 20w halogen bulb**

EU 2-prong plug

**Z737275-1EA** 1 ea

▶ **brightfield, achromatic lens, monocular, fixed stage; led or 20w incandescent or fluorescent**

EU 2-prong plug

**Z737380-1EA** 1 ea

▶ **brightfield, achromatic lens, monocular, mechanical stage; led incandescent or fluorescent**

EU 2-prong plug

**Z737496-1EA** 1 ea

▶ **brightfield, achromatic lens, monocular, mechanical stage; led or other illumination**

EU 2-prong plug

**Z737607-1EA** 1 ea

▶ **brightfield, achromatic lens, binocular, mechanical stage; led or other illumination**

EU 2-prong plug

**Z737712-1EA** 1 ea

**Canon® EOS Rebel® T1i digital SLR camera body, no lens, for Jenco™ inverted compound microscopes** NEW

15.1Mp CMOS Sensor  
 HD 1080p, 720p, and VGA Video Capture  
 3 in. Clear View LCD with Live View  
 DIGIC 4 Image Processor  
 ISO Expandable to 12,800  
 EF-S 18-55mm f/3.5-5.6 IS Lens  
 Compatible w/ 60-plus EF & EF-S Optics

[Z570001-1EA](#) 1 ea

**Color video camera for Jenco™ inverted compound microscopes** NEW

Jenco™ offers camera systems for documenting resolved microscopic images from inverted compound microscopes.

Each system is fully integrated with:

- software for image analysis
- optical adapters to obtain the image in the correct focal plane
- cables for connection to computers, monitors or projectors

5 Megapixel, CMOS, with USB 2.0 cable, optical adapter and measurement software

[Z569992-1EA](#) 1 ea

**Jenco™ inverted compound microscopes**

Jenco™ introduces a high optical standard on a versatile frame at budget conscious levels. The long working distance condenser (50 mm) and objectives (six supplied) provide brilliant resolved images in both phase contrast and brightfield techniques. The condenser swings out to accommodate roller bottles or other large cultivation vessels.

- Affordable – Jenco™ delivers exacting performance for routine research without consuming your budget
- Versatile – trinocular body for image documentation; condenser design for observation of virtually all vessel types; mechanical stage with inserts for well plates and petri dishes; three objectives each for both phase contrast and brightfield
- Durable – an all metal frame with an all metal focusing mechanism ensures this instrument will perform well beyond the industry leading 5 Year Warranty
- 230V units are CE Compliant

**Key Specifications:**

Optical body - Seidentopf design inclined 30°; 55 to 75 mm interpupillary adjustment, 360° rotation  
 Nosepiece – quintuple, ball bearing  
 Eye pieces – 10X, Focal Length 25mm, FN 20 mm.  
 Focus mechanism - adjustable tension control to prohibit drift and adjustable up-stop to protect

objective lenses; dial markings at 0.002mm increments  
 Condenser – 1.25 N.A. 2 element Abbe with iris diaphragm and rack and pinion focusing; 55mm working distance, swing out working distance is 3 inches  
 Kohler Illumination, field diaphragm, 30 watt, 6 volt Halogen bulb with electronic dimmer  
 Mechanical stage: (WHD) (in/cm) 8.25 x 8.875 / 20.95 x 22.54; Right-hand Coaxial dropdown X-Y Control Knobs; Four Inserts for: well plates (13 x 8 cm and 8 x 5 cm ) petri dish (6.8 cm diam.) and slides (7.5 x 3.5 cm and 7.5 x 2.5 cm)

Dimensions: (WHD) (in/cm) 9 x 22.5 x 21.5 / 22.86 x 57.15 x 54.61; Gross Weight: (lb/kg) 50/22.7

**Microscope Includes:** the six objectives in the table, dust cover, three color filters, spare halogen lamp and fuse, phase centering telescope, phase annulus sliders and instruction manual

**3 zoom ranges in either 45 or 60 degree inclination:**

GL6 Series GL7 Series GL9 Series  
 Zoom Ratio 6.5:1 7:1 9:1  
 Zoom Range 1.0X - 6.5X 0.65X - 4.5X 0.65X - 6.0X

A long (100mm) working distance on all 3 models. Achieve a working distance of 260 mm with optional auxiliary lenses.



Z723975

▶ **30W halogen bulb**  
[Z723975-1EA](#) 1 ea

▶ **30W halogen bulb**  
[Z724084-1EA](#) 1 ea

**Slides**

**Slides, microscope**

Sealed in a moisture absorbing desiccant pack which can function as a drying stand and a storage box. Slides are 1 mm thick.



Microscope slides with one frosted end (S8400)

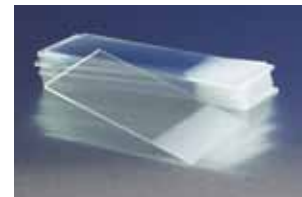
▶ **Frosted one end**  
[S8400-1PAK](#) 1 pkg  
[S8400-1CS](#) 1 case

▶ **Opaque (white)**  
[S9027-1PAK](#) 1 pkg  
[S9027-1CS](#) 1 case

▶ **Plain**  
[S8902-1PAK](#) 1 pkg  
[S8902-1CS](#) 1 case

**Corning® microscope slides, frosted one side, one end**

Corning® 2948



These 3x1 inch Corning® microscope slides are made from water-white glass to maximize clarity and are frosted at one end on only one side. Slides are 0.9 to 1.10mm thick. Corning® frosted slides are highly legible and easy to write on because they are sandblasted instead of etched. To minimize waste, they are inspected for chips and rough edges before being packaged.

Products are packaged in 1/2 gross boxes (approx. 72 slides each).

10 gross = 20 boxes (1440 slides total)

**Note: This product is discontinued; replacement product is CLS294875X25**

[CLS29483X1-1440EA](#) 1440 ea

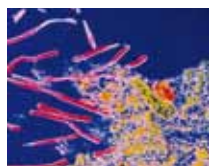
**Corning® microscope slides, plain**

These 75x25mm Corning® microscope slides are made from water-white glass to maximize clarity and are not frosted. Slides are 0.9 to 1.10mm thick. Products are packaged in 1/2 gross boxes (approx. 72 slides each).

10 gross = 20 boxes (1440 slides total)

**Note: This is the suggested replacement for CLS29473X1**

[CLS294775X25-72EA](#) 72 ea  
[CLS294775X25-1440E](#) 1440 ea



Dynamic 3D Cell Culture

## Dynamic 3D Cell Culture

### 3D Perfusion Bioreactor

The transition towards 3D cell culture is revolutionizing traditional cell culture around the world. 3D cell culture provides a more *in vivo* like environment, thereby allowing the cellular responses from cells cultured in 3D to be more realistic. Furthermore, studies have demonstrated cells grow significantly better under dynamic culture conditions as a result of the continuous cycling of nutrients, as well as the removal of metabolic wastes. In some instances, the shear force produced by the flowing medium can act as a mechanical stimuli signal that further promotes stem cell differentiation toward certain cell lineages.

### Perform Dynamic Cell Culture Using 3D Biotek's Novel 3D Perfusion Bioreactor and Your Choice of 3D Insert™

As the leader in providing 3D cell culture products and technologies, 3D Biotek is proud to introduce its novel 3D Perfusion Bioreactor. This unique 3D Bioreactor is a perfect combination of 3D cell culture and dynamic cell culture technologies. The 3D Perfusion Bioreactor consists of multiple independent, autoclavable polycarbonate chambers. The chambers are interchangeable and specially designed to be compatible with 3D Insert scaffolds of varying sizes ranging from 96-well to 6-well. Cell culture medium is 100% perfused through the open porous structure of the scaffolds using a pulsatile pump. The entire unit, excluding the pump, is autoclavable and can be used as a single-use bioreactor system.

### 3D Insert Technology

Porous polymer scaffolds are engineered using 3D Biotek's Proprietary 3D Precision Microfabrication Technology and provide both a 3D cell culture environment as well as a significantly greater total cell growth area than traditional tissue culture plates. These scaffolds are available in both biodegradable (polycaprolactone, PCL - **Figure A**) and non-biodegradable (polystyrene, PS) polymers.



#### 3D Perfusion Bioreactor

The bioreactor consists of multiple independent, autoclavable polycarbonate chambers (4 chambers as shown in the picture).

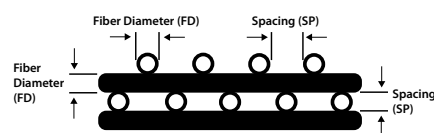
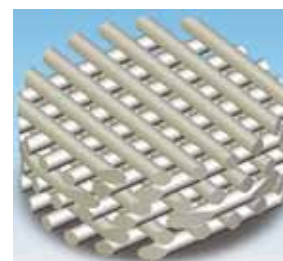


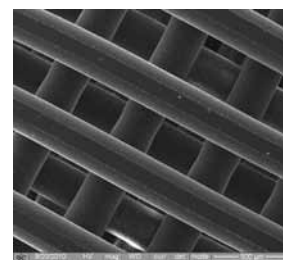
Figure A. 3D Structure Parameters



3D Insert Structure

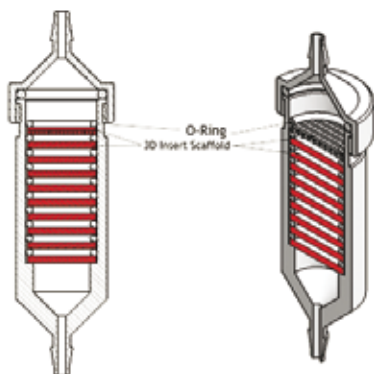


3D Insert Scaffold



3D Insert Scaffold (magnified 80X)

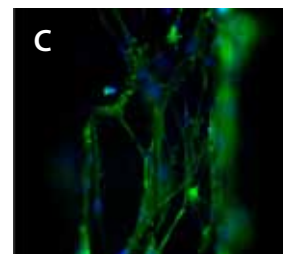
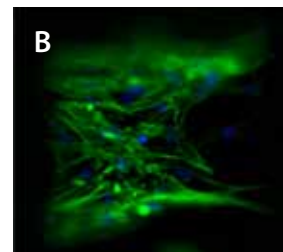
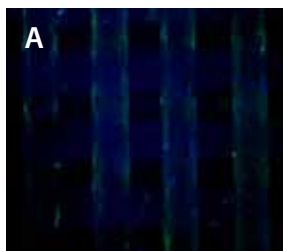
## Chamber/Scaffolds Assembly



- The bioreactor consists of four independent, autoclavable polycarbonate chambers that hold up to 10 scaffolds each.
- The chambers are interchangeable and compatible with 3D Insert™-PCL scaffolds ranging in size from 96-well to 6-well.
- Within each chamber there is a 1.5 mm distance separating each scaffold. This

distance, combined with the offset fiber configuration, ensures the perfusion of medium. Slow perfusion of both sterile CO<sub>2</sub> and medium is achieved with a low pump speed at the same time.

- Chambers containing scaffolds can be easily removed and disassembled.
- The entire unit (except for the pump) is autoclavable and can be used as a single-use bioreactor system.



Fluorescent images of hMSC-osteoblasts at Week 1 on 3D PCL 3030 scaffolds (F-actin: green, DAPI: blue, A: 40X, B-C: 200X).

For more information, visit [sigma-aldrich.com/3dbioreactor](http://sigma-aldrich.com/3dbioreactor)

biomolecules

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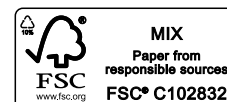
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