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Product Information

Medium 199

Many early tissue culture media were predominantly formulated from animal products and/or tissue extracts. In 1950, Morgan and his coworkers reported their efforts to produce a totally defined nutritional source for cell cultures. Their experiments, conducted with various combinations of vitamins, amino acids, and other factors revealed that growth of explanted tissue could be measured in what has become known as Medium 199.

However, it was found that long-term cultivation of cells required addition of a serum supplement to the culture medium. When properly supplemented, Medium 199 has broad species applicability, particularly for cultivation of non-transformed cells. It is widely used in virology, vaccine production, and *in vitro* cultivation of primary explants of mouse pancreatic epithelial and rat lens tissues.

	M0393	**M0650**	**M2154**	**M2520**	**M3769**
	[powder]	[10×]	[1×]	[powder]	[powder]
COMPONENT	g/L	g/L	g/L	g/L	g/L
Inorganic Salts					
$CaCl_2 \cdot 2H_2O$	0.1396	2	0.2	0.2	0.2
$Fe(NO_3)_3 \cdot 9H_2O$	0.00072	0.0072	0.00072	0.00072	0.00072
$MgSO_4$ (anhydrous)	0.09767	0.9767	0.09767	0.09767	0.0967
KCl	0.4	4.0	0.4	0.4	0.4
KH_2PO_4	0.06	—	—	—	—
Na • Acetate (anhydrous)	0.05	0.5	0.05	0.05	0.05
$NaHCO_3$	—	—	2.2	—	—
NaCl	8.0	68.0	6.8	6.0	6.8
Na_2HPO_4 (anhydrous)	0.04788	—	—	—	—
NaH_2PO_4 (anhydrous)	—	1.22	0.122	0.122	0.122
Amino Acids					
L-Alanine	0.025	0.25	0.025	0.025	0.025
L-Arginine • HCl	0.07	0.7	0.07	0.07	0.07
L-Aspartic Acid	0.03	0.3	0.03	0.03	0.03
L-Cystine • HCl • H_2O	0.00011	0.0011	0.00011	0.00011	0.00011
L-Cysteine • 2HCl	0.026	0.26	0.026	0.026	0.026
L-Glutamic Acid	0.0668	0.668	0.0668	0.0668	0.0668
L-Glutamine	0.1	—	—	0.1	—
Glycine	0.05	0.5	0.05	0.05	0.05
L-Histidine • HCl • H_2O	0.02188	0.2188	0.02188	0.02188	0.02188
Hydroxy-L-Proline	0.01	0.1	0.01	0.01	0.01
L-Isoleucine	0.02	0.2	0.02	0.02	0.02
L-Leucine	0.06	0.6	0.06	0.06	0.06
L-Lysine • HCl	0.07	0.7	0.07	0.07	0.07
L-Methionine	0.015	0.15	0.015	0.015	0.015
L-Phenylalanine	0.025	0.25	0.025	0.025	0.025
L-Proline	0.04	0.4	0.04	0.04	0.04
L-Serine	0.025	0.25	0.025	0.025	0.025
L-Threonine	0.03	0.3	0.03	0.03	0.03
L-Tryptophan	0.01	0.1	0.01	0.01	0.01
L-Tyrosine • 2Na • $2H_2O$	0.05766	0.5766	0.05766	0.05766	0.05766
L-Valine	0.025	0.25	0.025	0.025	0.025
Vitamins					
Ascorbic Acid • Na	0.0000566	0.0005625	0.0000566	0.0000566	0.0000566
D-Biotin	0.00001	0.0001	0.00001	0.00001	0.00001
Calciferol	0.0001	0.001	0.0001	0.0001	0.0001
Choline Chloride	0.0005	0.005	0.0005	0.0005	0.0005
Folic Acid	0.00001	0.0001	0.00001	0.00001	0.00001
Menadione (sodium bisulfite)	0.000016	0.00016	0.000016	0.000016	0.000016
myo-Inositol	0.00005	0.0005	0.00005	0.00005	0.00005
Niacinamide	0.000025	0.00025	0.000025	0.000025	0.000025
Nicotinic Acid	0.000025	0.00025	0.000025	0.000025	0.000025
p-Amino Benzoic Acid	0.00005	0.0005	0.00005	0.00005	0.00005
D-Pantothenic Acid • ½Ca	0.00001	0.0001	0.00001	0.00001	0.00001

Pyridoxal • HCl	0.000025	0.00025	0.000025	0.000025	0.000025
Pyridoxine • HCl	0.000025	0.00025	0.000025	0.000025	0.000025
Retinol Acetate	0.00014	0.0014	0.00014	0.00014	0.00014
Riboflavin	0.00001	0.0001	0.00001	0.00001	0.00001
DL-α-Tocopherol Phosphate • Na	0.00001	0.0001	0.00001	0.00001	0.00001
Thiamine • HCl	0.00001	0.0001	0.00001	0.00001	0.00001
Other					
Adenine Sulfate	0.01	0.1	0.01	0.01	0.01
Adenosine Triphosphate • 2Na	0.001	0.01	0.001	0.001	0.001
Adenosine Monophosphate • Na	0.0002385	0.002385	0.0002385	0.0002385	0.0002385
Cholesterol	0.0002	0.002	0.0002	0.0002	0.0002
Deoxyribose	0.0005	0.005	0.0005	0.0005	0.0005
Glucose	1.0	10.0	1.0	1.0	1.0
Glutathione (reduced)	0.00005	0.0005	0.00005	0.00005	0.00005
Guanine • HCl	0.0003	0.003	0.0003	0.0003	0.0003
HEPES	—	—	—	5.958	—
Hypoxanthine	0.0003	0.003	0.0003	0.0003	0.0003
Phenol Red • Na	0.0213	0.213	0.0213	0.0213	—
TWEEN® 80	0.02	0.2	0.02	0.02	0.02
Ribose	0.0005	0.005	0.0005	0.0005	0.0005
Thymine	0.0003	0.003	0.0003	0.0003	0.0003
Uracil	0.0003	0.003	0.0003	0.0003	0.0003
Xanthine • Na	0.000344	0.00344	0.000344	0.000344	0.000344
ADD					
L-Glutamine	—	0.1 at 1×	0.1	—	0.1
Sodium Bicarbonate	0.35	2.2 at 1×	—	2.2	2.2

	M4530	**M5017**	**M7528**	**M7653**	**M9163**
	[1×]	[powder]	[1×]	[1×]	[10×]
COMPONENT	g/L	g/L	g/L	g/L	g/L
Inorganic Salts					
$CaCl_2 • 2H_2O$	0.2	0.2	0.2	0.1396	1.396
$Fe(NO_3)_3 • 9H_2O$	0.00072	0.00072	0.00072	0.00072	0.0072
$MgSO_4$ (anhydrous)	0.09767	0.09767	0.09767	0.09767	0.9767
KCl	0.4	0.4	0.4	0.4	4.0
KH_2PO_4	—	—	—	0.06	0.6
Na • Acetate (anhydrous)	0.05	0.05	0.05	0.05	0.5
$NaHCO_3$	2.2	—	2.2	0.35	—
NaCl	6.8	6.8	6.0	8.0	80.0
Na_2HPO_4 (anhydrous)	—	—	—	0.04788	0.4788
NaH_2PO_4 (anhydrous)	0.122	0.122	0.122	—	—
Amino Acids					
L-Alanine	0.025	0.025	0.025	0.025	0.25
L-Arginine • HCl	0.07	0.07	0.07	0.07	0.7
L-Aspartic Acid	0.03	0.03	0.03	0.03	0.3
L-Cystine • HCl • H_2O	0.00011	0.00011	0.00011	0.00011	0.0011
L-Cysteine • 2HCl	0.026	0.026	0.026	0.026	0.26
L-Glutamic Acid	0.0668	0.0668	0.0668	0.0668	0.668
L-Glutamine	0.1	0.1	—	—	—
Glycine	0.05	0.05	0.05	0.05	0.5
L-Histidine • HCl • H_2O	0.02188	0.02188	0.02188	0.02188	0.2188
Hydroxy-L-Proline	0.01	0.01	0.01	0.01	0.1
L-Isoleucine	0.02	0.02	0.02	0.02	0.2
L-Leucine	0.06	0.06	0.06	0.06	0.6
L-Lysine • HCl	0.07	0.07	0.07	0.07	0.7
L-Methionine	0.015	0.015	0.015	0.015	0.15
L-Phenylalanine	0.025	0.025	0.025	0.025	0.25
L-Proline	0.04	0.04	0.04	0.04	0.4
L-Serine	0.025	0.025	0.025	0.025	0.25
L-Threonine	0.03	0.03	0.03	0.03	0.3
L-Tryptophan	0.01	0.01	0.01	0.01	0.1
L-Tyrosine • 2Na • $2H_2O$	0.05766	0.05766	0.05766	0.05766	0.5766
L-Valine	0.025	0.025	0.025	0.025	0.25

Vitamins					
Ascorbic Acid • Na	0.0000566	0.0000566	0.0000566	0.0000566	0.000566
D-Biotin	0.00001	0.00001	0.00001	0.00001	0.0001
Calciferol	0.0001	0.0001	0.0001	0.0001	0.001
Choline Chloride	0.0005	0.0005	0.0005	0.0005	0.005
Folic Acid	0.00001	0.00001	0.00001	0.00001	0.0001
Menadione (sodium bisulfite)	0.000016	0.000016	0.000016	0.000016	0.00016
myo-Inositol	0.00005	0.00005	0.00005	0.00005	0.0005
Niacinamide	0.000025	0.000025	0.000025	0.000025	0.00025
Nicotinic Acid	0.000025	0.000025	0.000025	0.000025	0.00025
p-Amino Benzoic Acid	0.00005	0.00005	0.00005	0.00005	0.0005
D-Pantothenic Acid • ½Ca	0.00001	0.00001	0.00001	0.00001	0.0001
Pyridoxal • HCl	0.000025	0.000025	0.000025	0.000025	0.00025
Pyridoxine • HCl	0.000025	0.000025	0.000025	0.000025	0.00025
Retinol Acetate	0.00014	0.00014	0.00014	0.00014	0.0014
Riboflavin	0.00001	0.00001	0.00001	0.00001	0.0001
DL-α-Tocopherol Phosphate • Na	0.00001	0.00001	0.00001	0.00001	0.0001
Thiamine • HCl	0.00001	0.00001	0.00001	0.00001	0.0001
Other					
Adenine Sulfate	0.01	0.01	0.01	0.01	0.1
Adenosine Triphosphate • 2Na	0.001	0.001	0.001	0.001	0.01
Adenosine Monophosphate • Na	0.0002385	0.0002385	0.0002385	0.0002385	0.002385
Cholesterol	0.0002	0.0002	0.0002	0.0002	0.002
Deoxyribose	0.0005	0.0005	0.0005	0.0005	0.005
Glucose	1.0	1.0	1.0	1.0	10.0
Glutathione (reduced)	0.00005	0.00005	0.00005	0.00005	0.0005
Guanine • HCl	0.0003	0.0003	0.0003	0.0003	0.003
HEPES	—	—	5.958	—	—
Hypoxanthine	0.0003	0.0003	0.0003	0.0003	0.003
Phenol Red • Na	0.0213	0.0213	0.0213	0.0213	0.0213
TWEEN 80	0.02	0.02	0.02	0.02	0.2
Ribose	0.0005	0.0005	0.0005	0.0005	0.005
Thymine	0.0003	0.0003	0.0003	0.0003	0.003
Uracil	0.0003	0.0003	0.0003	0.0003	—
Xanthine • Na	0.000344	0.000344	0.000344	0.000344	—
ADD					
L-Glutamine	—	—	0.1	0.1	0.1 at 1×
Sodium Bicarbonate	—	2.2	—	—	0.35 at 1×

References

1. Morgan, J.F., Morton, H.J., and Parker, R.C., The Nutrition of Animal Cells in Tissue Culture. I. Initial Studies on a Synthetic Medium. Proc. Soc. Exp. Biol. Med., **73**, 1-8 (1950).
2. Morgan, J.F., Campbell, E., and Morton, H.J. The Nutrition of Animal Tissues Cultivated *In Vitro*. I. A Survey of Natural Materials as Supplements to Synthetic Medium. J.N.C.I., **16:2**, 557-567 (1955).

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