



Product Information

Minimum Essential Medium Eagle (MEM)

Minimum Essential Medium (MEM), developed by Harry Eagle, is one of the most widely used of all synthetic cell culture media. Early attempts to cultivate normal mammalian fibroblasts and certain subtypes of HeLa cells revealed that they had specific nutritional requirements that could not be met by Eagle's Basal Medium (BME). Subsequent studies using these and other cells in culture indicated that additions to BME could be made to aid growth of a wider variety of fastidious cells. MEM, which incorporates these modifications, includes higher concentrations of amino acids so that the medium more closely approximates the protein composition of cultured mammalian cells. MEM has been used for cultivation of a wide variety of cells grown in monolayers. Optional supplementation of non-essential amino acids to the formulations that incorporate either Hanks' or Earle's salts has broadened the usefulness of this medium. The formulation has been further modified by optional elimination of calcium to permit growth of cells in suspension culture.

COMPONENT	M 0268 g/L	M 4655 [1X] g/L	M 4642 g/L	M 4780 [1X] g/L	M 0643 g/L	M 1018 g/L
INORGANIC SALTS						
CaCl ₂ •2H ₂ O	0.265	0.265	0.185	0.185	0.265	0.185
MgSO ₄ (anhyd)	0.09767	0.09767	0.09767	0.09767	0.09767	0.09767
KCl	0.4	0.4	0.4	0.4	0.4	0.4
KH ₂ PO ₄ (anhyd)	—	—	0.06	0.06	—	0.06
NaHCO ₃	—	2.2	—	0.35	—	—
NaCl	6.8	6.8	8.0	8.0	6.8	8.0
Na ₂ HPO ₄ (anhyd)	—	—	0.04788	0.04788	—	0.04788
NaH ₂ PO ₄ (anhyd)	0.122	0.122	—	—	0.122	—
AMINO ACIDS						
L-Alanine	—	—	—	—	0.0089	0.0089
L-Arginine•HCl	0.126	0.126	0.126	0.126	0.126	0.126
L-Asparagine•H ₂ O	—	—	—	—	0.015	0.015
L-Aspartic Acid	—	—	—	—	0.0133	0.0133
L-Cystine•2•HCl	0.0313	0.0313	0.0313	0.0313	0.0313	0.0313
L-Glutamic Acid	—	—	—	—	0.0147	0.0147
L-Glutamine	0.292	0.292	0.292	0.292	0.292	0.292
Glycine	—	—	—	—	0.0075	0.0075
L-Histidine•HCl•H ₂ O	0.042	0.042	0.042	0.042	0.042	0.042
L-Isoleucine	0.052	0.052	0.052	0.052	0.052	0.052
L-Leucine	0.052	0.052	0.052	0.052	0.052	0.052
L-Lysine•HCl	0.0725	0.0725	0.0725	0.0725	0.0725	0.0725
L-Methionine	0.015	0.015	0.015	0.015	0.015	0.015
L-Phenylalanine	0.032	0.032	0.032	0.032	0.032	0.032
L-Proline	—	—	—	—	0.0115	0.0115
L-Serine	—	—	—	—	0.0105	0.0105
L-Threonine	0.048	0.048	0.048	0.048	0.048	0.048
L-Tryptophan	0.01	0.01	0.01	0.01	0.01	0.01
L-Tyrosine•2Na•2H ₂ O	0.0519	0.0519	0.0519	0.0519	0.0519	0.0519
L-Valine	0.046	0.046	0.046	0.046	0.046	0.046
VITAMINS						
Choline Chloride	0.001	0.001	0.001	0.001	0.001	0.001
Folic Acid	0.001	0.001	0.001	0.001	0.001	0.001
Myo-Inositol	0.002	0.002	0.002	0.002	0.002	0.002
Niacinamide	0.001	0.001	0.001	0.001	0.001	0.001
D-Pantothenic Acid •½Ca	0.001	0.001	0.001	0.001	0.001	0.001
Pyridoxal•HCl	0.001	0.001	0.001	0.001	0.001	0.001
Riboflavin	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Thiamine•HCl	0.001	0.001	0.001	0.001	0.001	0.001
Vitamin B-12	—	—	—	—	—	—
OTHER						
Glucose	1.0	1.0	1.0	1.0	1.0	1.0
Phenol Red•Na	0.011	0.011	0.011	0.011	0.011	0.011
ADD						
NaHCO ₃	2.2	—	0.35	—	2.2	0.35
Grams of powder required to prepare 1 L	9.6	N/A	10.7	N/A	9.7	10.8

Minimum Essential Medium Eagle (MEM) continued

COMPONENT	M 3024 g/L	M 3149 g/L	M 3911 [1X] g/L	M 3786 [1X] g/L	M 2289 [1X] g/L	M 2414 [1X] g/L
INORGANIC SALTS						
CaCl ₂ •2H ₂ O	0.265	0.185	0.265	0.265	0.265	0.265
MgSO ₄ (anhyd)	0.09767	0.09767	0.09767	0.09767	0.09767	0.09767
KCl	0.4	0.4	0.4	0.4	0.4	0.4
KH ₂ PO ₄ (anhyd)	—	0.060	—	—	—	—
NaHCO ₃	—	—	2.2	2.2	2.2	0.85
NaCl	6.8	8.0	6.8	6.8	6.8	6.8
Na ₂ HPO ₄ (anhyd)	—	0.04788	—	—	—	—
NaH ₂ PO ₄ (anhyd)	0.122	—	0.122	—	0.122	0.122
AMINO ACIDS						
L-Alanine	0.0089	0.0089	—	—	—	—
L-Arginine•HCl	0.126	0.126	0.126	0.126	0.126	0.126
L-Asparagine•H ₂ O	0.015	0.015	—	—	—	—
L-Aspartic Acid	0.0133	0.0133	—	—	—	—
L-Cystine•2HCl	0.0313	0.0313	0.0313	—	—	0.0313
L-Glutamic Acid	0.0147	0.0147	—	—	—	—
L-Glutamine	—	—	0.292	—	—	—
Glycine	0.0075	0.0075	—	—	—	—
L-Histidine•HCl•H ₂ O	0.042	0.042	0.042	0.042	0.042	0.042
L-Isoleucine	0.052	0.052	0.052	0.052	0.052	0.052
L-Leucine	0.052	0.052	0.052	0.052	0.052	0.052
L-Lysine•HCl	0.0725	0.0725	0.0725	0.0725	0.0725	0.0725
L-Methionine	0.015	0.015	—	0.015	—	0.015
L-Phenylalanine	0.032	0.032	0.032	0.032	0.032	0.032
L-Proline	0.0115	0.0115	—	—	—	—
L-Serine	0.0105	0.0105	—	—	—	—
L-Threonine	0.048	0.048	0.048	0.048	0.048	0.048
L-Tryptophan	0.01	0.01	0.01	0.01	0.01	0.01
L-Tyrosine•2Na•2H ₂ O	0.0519	0.0519	0.0519	0.0519	0.0519	0.0519
L-Valine	0.046	0.046	0.046	0.046	0.046	0.046
VITAMINS						
Choline Chloride	0.001	0.001	0.001	0.001	0.001	0.001
Folic Acid	0.001	0.001	0.001	0.001	0.001	0.001
myo-Inositol	0.002	0.002	0.002	0.002	0.002	0.002
Niacinamide	0.001	0.001	0.001	0.001	0.001	0.001
D-Pantothenic Acid •½Ca	0.001	0.001	0.001	0.001	0.001	0.001
Pyridoxal•HCl	0.001	0.001	0.001	0.001	0.001	0.001
Riboflavin	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Thiamine•HCl	0.001	0.001	0.001	0.001	0.001	0.001
OTHER						
Glucose	1.0	1.0	1.0	1.0	1.0	1.0
Phenol Red•Na	—	—	0.011	0.011	0.011	0.11
ADD						
NaHCO ₃	2.2	0.35	—	—	—	—
L-Cystine•2HCl	—	—	—	—	0.313	—
L-Glutamine	0.292	0.292	—	—	0.292	0.292
L-Leucine	—	—	—	—	—	—
L-Lysine	—	—	—	—	—	—
L-Methionine	—	—	0.015	—	0.015	—
NaH ₂ PO ₄ (anhyd)	—	—	—	0.122	—	—
Grams of powder required to prepare 1 L	9.4	10.5	N/A	N/A	N/A	N/A

Minimum Essential Medium Eagle (MEM) continued

COMPONENT	M 0894 g/L	M 0644 g/L	M 2645 g/L	M 0769 g/L
INORGANIC SALTS				
CaCl ₂ •2H ₂ O	0.265	0.265	0.265	0.265
MgSO ₄ (anhyd)	0.09767	0.09767	0.09767	0.09767
KCl	0.4	0.4	0.4	0.4
NaCl	6.8	6.8	5.5	6.8
NaH ₂ PO ₄ (anhyd)	0.122	0.122	0.122	0.122
Na Succinate•6H ₂ O	—	—	—	0.1
Succinic Acid (free acid)	—	—	—	0.075
AMINO ACIDS				
L-Alanine	0.025	0.025	—	—
L-Arginine•HCl	0.126	0.126	0.126	0.126
L-Asparagine•H ₂ O	0.05	0.05	—	—
L-Aspartic Acid	0.03	0.03	—	—
L-Cysteine•HCl•H ₂ O	0.1	0.1	—	—
L-Cystine•2HCl	0.0313	0.0313	0.0313	0.0313
L-Glutamic Acid	0.075	0.075	—	—
L-Glutamine	0.292	0.292	0.292	—
Glycine	0.05	0.05	—	—
L-Histidine•HCl•H ₂ O	0.042	0.042	0.042	0.042
L-Isoleucine	0.052	0.052	0.052	0.052
L-Leucine	0.052	0.052	0.052	0.052
L-Lysine•HCl	0.0725	0.0725	0.0725	0.0725
L-Methionine	0.015	0.015	0.015	0.015
L-Phenylalanine	0.032	0.032	0.032	0.032
L-Proline	0.04	0.04	—	—
L-Serine	0.025	0.025	—	—
L-Threonine	0.048	0.048	0.048	0.048
L-Tryptophan	0.01	0.01	0.01	0.01
L-Tyrosine 2Na•2H ₂ O	0.0519	0.0519	0.0519	—
L-Tyrosine (free base)	—	—	—	0.036
L-Valine	0.046	0.046	0.046	0.046
VITAMINS				
L-Ascorbic Acid•Na	0.05	0.05	—	—
Biotin	0.0001	0.0001	—	—
Choline Bitartrate	—	—	—	0.0018
Choline Chloride	0.001	0.001	0.001	—
Folic Acid	0.001	0.001	0.001	0.001
myo-Inositol	0.002	0.002	0.002	0.002
Niacinamide	0.001	0.001	0.001	0.001
D-Pantothenic Acid •½Ca	0.001	0.001	0.001	0.001
Pyridoxal•HCl	0.001	0.001	0.001	0.001
Riboflavin	0.0001	0.0001	0.0001	0.0001
Thiamine•HCl	0.001	0.001	0.001	0.001
Vitamin B-12	0.00136	0.00136	—	—
OTHER				
Adenosine	—	0.01	—	—
Cytidine	—	0.01	—	—
2'-Deoxyadenosine	—	0.01	—	—
2'-Deoxycytidine•HCl	—	0.011	—	—
2'-Deoxyguanosine	—	0.01	—	—
Glucose	1.0	1.0	1.0	1.00
Guanosine	—	0.01	—	—
HEPES	—	—	5.958	—
Phenol Red•Na	0.011	0.011	0.011	0.0064
Pyruvic Acid•Na	0.11	0.11	—	—
Thioctic Acid	0.0002	0.0002	—	—
Thymidine	—	0.01	—	—
Uridine	—	0.01	—	—
ADD				
NaHCO ₃	2.2	2.2	2.2	2.2
L-Glutamine	—	—	—	0.292
Grams of powder required to prepare 1 L	10.1	10.2	14.2	9.4

Minimum Essential Medium Eagle (MEM) continued

COMPONENT	M 0518 g/L	M 4144 g/L	M 4767 g/L	M 8167 [1X] g/L	M 7270 g/L	M 7395 g/L
INORGANIC SALTS						
CaCl ₂ •H ₂ O	—	0.265	—	—	0.265	0.265
MgCl ₂ •6H ₂ O	0.2	—	—	—	—	—
MgSO ₄ (anhyd)	—	0.09767	0.09767	0.09767	0.09767	0.09767
KCl	0.4	0.4	0.4	0.4	0.4	0.4
NaCl	6.5	6.8	6.8	6.8	6.8	6.8
NaH ₂ PO ₄ (anhyd)	1.154	0.122	1.22	1.22	0.122	0.122
AMINO ACIDS						
L-Arginine•HCl	0.126	0.126	0.126	0.126	0.126	0.126
L-Cystine•2HCl	0.0324	0.0313	0.0313	0.0313	0.0313	0.0313
L-Glutamine	0.292	—	0.292	—	0.292	0.292
L-Histidine•HCl•H ₂ O	0.042	0.042	0.042	0.042	0.042	0.042
L-Isoleucine	0.052	0.052	0.052	0.052	0.052	0.052
L-Leucine	0.052	0.052	0.052	0.052	—	0.052
L-Lysine•HCl	0.0725	0.0725	0.0725	0.0725	—	0.0725
L-Methionine	0.015	0.015	0.015	0.015	—	0.015
L-Phenylalanine	0.032	0.032	0.032	0.032	0.032	0.032
L-Threonine	0.048	0.048	0.048	0.048	0.048	0.048
L-Tryptophan	0.01	0.01	0.01	0.01	0.01	0.01
L-Tyrosine•2Na•2H ₂ O	0.05452	0.0519	0.0519	0.0519	0.0519	0.0519
L-Valine	0.046	0.046	0.046	0.046	0.046	—
D-Valine	—	—	—	—	—	0.092
VITAMINS						
Choline Chloride	0.001	0.001	0.001	0.001	0.001	0.001
Folic Acid	0.001	0.001	0.001	0.001	0.001	0.001
myo-Inositol	0.002	0.002	0.002	0.002	0.002	0.002
Niacinamide	0.001	0.001	0.001	0.001	0.001	0.001
D-Pantothenic Acid •½Ca	0.001	0.001	0.001	0.001	0.001	0.001
Pyridoxal•HCl	0.001	0.001	0.001	0.001	0.001	0.001
Riboflavin	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Thiamine•HCl	0.001	0.001	0.001	0.001	0.001	0.001
OTHER						
Glucose	2.0	1.0	1.0	1.0	1.0	1.0
Phenol Red•Na	0.011	—	0.011	0.011	0.011	0.011
NaHCO ₃	—	—	—	2.2	—	—
ADD						
L-Glutamine	—	0.292	—	0.292	—	—
L-Leucine	—	—	—	—	0.052	—
L-Lysine	—	—	—	—	0.0725	—
L-Methionine	—	—	—	—	0.015	—
NaHCO ₃	2.0	2.2	2.2	—	2.2	2.2
Grams of powder required to prepare 1 L	11.2	9.3	10.4	—	9.4	9.6

Minimum Essential Medium Eagle (MEM) continued

COMPONENTS	M 7399 g/L	M 2279 M 7647 [1X] g/L	M 4526 [1X] g/L	M 5775 [1X] g/L	M 8292 [1X] g/L
INORGANIC SALTS					
CaCl ₂ •2H ₂ O	0.265	0.265	0.265	0.185	0.265
MgSO ₄ (anhyd)	0.09767	0.09767	0.09767	0.09767	0.09767
KCl	0.4	0.4	0.4	0.4	0.4
KH ₂ PO ₄ (anhyd)	—	—	—	0.06	—
NaHCO ₃	—	2.2	2.2	0.35	2.2
NaCl	6.8	6.8	6.8	8.0	6.8
Na ₂ HPO ₄ (anhyd)	—	—	—	0.04788	—
NaH ₂ PO ₄ (anhyd)	0.122	0.122	0.122	—	0.122
AMINO ACIDS					
L-Alanine	0.0089	—	0.025	—	0.025
L-Arginine•HCl	0.126	0.126	0.126	0.126	0.126
L-Asparagine•H ₂ O	0.015	—	0.05	—	0.05
L-Aspartic Acid	0.0133	—	0.03	—	0.03
L-Cysteine•HCl•H ₂ O	—	—	0.1	—	0.1
L-Cystine•HCl	0.0313	0.0313	0.0313	0.0313	0.0313
L-Glutamic Acid	0.0147	—	0.075	—	0.075
L-Glutamine	0.292	—	—	—	—
Glycine	0.0075	—	0.05	—	0.05
L-Histidine•HCl•H ₂ O	0.042	0.042	0.042	0.042	0.042
L-Isoleucine	0.052	0.052	0.052	0.052	0.052
L-Leucine	0.052	0.052	0.052	0.052	0.052
L-Lysine•HCl	0.0725	0.0725	0.0725	0.0725	0.0725
L-Methionine	0.015	0.015	0.015	0.015	0.015
L-Phenylalanine	0.032	0.032	0.032	0.032	0.032
L-Proline	0.0115	—	0.04	—	0.04
L-Serine	0.0105	—	0.025	—	0.025
L-Threonine	0.048	0.048	0.048	0.048	0.048
L-Tryptophan	0.01	0.01	0.01	0.01	0.01
L-Tyrosine•2Na•2H ₂ O	0.0519	0.0519	0.0519	0.0519	0.0519
L-Valine	0.046	0.046	0.046	0.046	0.046
VITAMINS					
L-Ascorbic Acid•Na	—	—	0.05	—	0.05
Biotin	—	—	0.0001	—	0.0001
Choline Chloride	0.001	0.001	0.001	0.001	0.001
Folic Acid	0.001	0.001	0.001	0.001	—
myo-Inositol	0.002	0.002	0.002	0.002	0.002
Lipoic Acid	—	—	0.0002	—	0.0002
Niacinamide	0.001	0.001	0.001	0.001	0.001
D-Pantothenic Acid •½Ca	0.001	0.001	0.001	0.001	0.001
Pyridoxal•HCl	0.001	0.001	0.001	0.001	0.001
Pyruvic Acid	—	—	0.11	—	0.11
Riboflavin	0.0001	0.0001	0.0001	0.0001	0.0001
Thiamine•HCl	0.001	0.001	0.001	0.001	0.001
Vitamin B-12	—	—	0.00136	—	0.00136
OTHER					
Glucose	1.0	1.0	1.0	1.0	1.0
Lactalbumin Hydrolysate	0.5	—	—	—	—
Phenol Red•Na	0.011	0.011	0.011	0.011	0.011
ADD					
L-Glutamine	—	0.292	0.292	0.292	0.292
NaHCO ₃	2.2	—	—	—	—
Grams of powder required to prepare 1 L	10.2	N/A	N/A	N/A	N/A

Minimum Essential Medium Eagle (MEM) continued

COMPONENT	M 5650 [1X] g/L	M 8028 [1X] g/L	M 7278 [1X] g/L	M 0275 [10X] g/L	M 9288 [10X] g/L
INORGANIC SALTS					
CaCl ₂ •2H ₂ O	0.265	—	0.265	2.65	1.85
MgCl•6H ₂ O	—	0.2	—	—	—
MgSO ₄ (anhyd)	0.09767	—	0.09767	0.9767	0.9767
KCl	0.4	0.4	0.4	4.0	4.0
KH ₂ PO ₄	—	—	—	—	0.6
NaHCO ₃	2.2	2.0	2.2	—	—
NaCl	6.8	6.5	5.5	68.0	80.0
NaH ₂ PO ₄ (anhyd)	0.122	1.154	0.122	1.22	—
Na ₂ HPO ₄	—	—	—	—	0.4788
AMINO ACIDS					
L-Alanine	0.0089	—	—	—	—
L-Arginine•HCl	0.126	0.126	0.126	1.26	1.26
L-Asparagine•H ₂ O	0.015	—	—	—	—
L-Aspartic Acid	0.0133	—	—	—	—
L-Cystine•2HCl	0.0313	0.0324	0.0313	0.313	0.313
L-Glutamic Acid	0.0147	—	—	—	—
Glycine	0.0075	—	—	—	—
L-Histidine•HCl•H ₂ O	0.042	0.042	0.042	0.42	0.42
L-Isoleucine	0.052	0.052	0.052	0.52	0.52
L-Leucine	0.052	0.052	0.052	0.52	0.52
L-Lysine•HCl	0.0725	0.0725	0.0725	0.725	0.725
L-Methionine	0.015	0.015	0.015	0.15	0.15
L-Phenylalanine	0.032	0.032	0.032	0.32	0.32
L-Proline	0.0115	—	—	—	—
L-Serine	0.0105	—	—	—	—
L-Threonine	0.048	0.048	0.048	0.48	0.48
L-Tryptophan	0.01	0.01	0.01	0.1	0.1
L-Tyrosine•2Na•2H ₂ O	0.0519	0.05452	0.0519	0.519	0.519
L-Valine	0.046	0.046	0.046	0.46	0.46
VITAMINS					
Choline Chloride	0.001	0.001	0.001	0.01	0.01
Folic Acid	0.001	0.001	0.001	0.01	0.01
myo-Inositol	0.002	0.002	0.002	0.02	0.02
Niacinamide	0.001	0.001	0.001	0.01	0.01
D-Pantothenic Acid •½Ca	0.001	0.001	0.001	0.01	0.01
Pyridoxal•HCl	0.001	0.001	0.001	0.01	0.01
Riboflavin	0.0001	0.0001	0.0001	0.001	0.001
Thiamine•HCl	0.001	0.001	0.001	0.01	0.01
OTHER					
Glucose	1.0	2.0	1.0	10.0	10.0
Phenol Red•Na	0.011	0.011	0.011	0.11	0.11
HEPES	—	—	5.958	—	—
ADD					
L-Glutamine	0.292	0.292	0.292	0.292 at 1X	0.292 at 1X
NaHCO ₃	—	—	—	2.2 at 1X	0.35 at 1X

REFERENCES

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