

Product Information

Minimum Essential Medium Eagle (MEM)

**M0268, M0275, M0446, M0643, M9288,
M2279, M2414, M4642, M4655, M4780,
M5650, M0325, M5775, M1018, 51411C,
51412C, 51415C, 51416C, 51417C,
56416C, 56419C**

Product Information

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 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 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 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.

References

1. Eagle, H., et al., myo-Inositol as an Essential Growth Factor for Normal and Malignant Human Cells in Tissue Culture. *J. Biol. Chem.*, 214, 845-847(1956).
2. Eagle, H., Media for Animal Cell Culture. *Tissue Culture Association Manual*, 3, 517-520 (1976).
3. Eagle, H., Amino Acid Metabolism in Mammalian Cell Cultures. *Science*, 130, 432-437(1959).
4. Eagle, H., Nutrition Needs of Mammalian Cells in Culture. *Science*, 122, 501 (1955).

Component	M0268 (Powder) g/L	M0275 (10x) g/L	M0446 (1x) g/L	M0643 (Powder) g/L	M9288 (10x) g/L
Inorganic Salts					
CaCl ₂ • 2H ₂ O	0.2	2.265	0.265	0.2	1.850
MgSO ₄ (anhydrous)	0.09767	0.9767	0.09767	0.09767	0.9767
KCl	0.4	4.0	0.4	0.4	4.0
KH ₂ PO ₄	—	—	—	—	0.6
NaHCO ₃	—	—	2.2	—	—
NaCl	6.8	68	6.8	6.8	80.0
Na ₂ HPO ₄ (anhydrous)	—	—	—	—	0.4788
NaH ₂ PO ₄ (anhydrous)	0.122	1.22	0.122	0.122	—
Amino acids					
L-Alanine	—	—	—	0.0089	—
L-Alanyl-L-Glutamine	—	—	0.4344	—	—
L-Arginine • HCl	0.126	1.26	0.126	0.126	1.26
L-Asparagine • H ₂ O	—	—	—	0.015	—
L-Aspartic acid	—	—	—	0.0133	—
L-Cystine • 2HCl	0.0313	0.313	0.0313	0.0313	0.313
L-Glutamic acid	—	—	—	0.0147	—
L-Glutamine	0.292	—	—	0.292	—
Glycine	—	—	—	0.0075	—
L-Histidine • HCl • H ₂ O	0.042	0.42	0.042	0.042	0.42
L-Isoleucine	0.052	0.52	0.052	0.052	0.52
L-Leucine	0.052	0.52	0.052	0.052	0.52
L-Lysine • HCl	0.0725	0.725	0.0725	0.0725	0.725
L-Methionine	0.015	0.15	0.015	0.015	0.15
L-Phenylalanine	0.032	0.32	0.032	0.032	0.32
L-Proline	—	—	—	0.0115	—
L-Serine	—	—	—	0.0105	—
L-Threonine	0.048	0.48	0.048	0.048	0.48
L-Tryptophan	0.01	0.1	0.01	0.01	0.1
L-Tyrosine • 2Na • 2H ₂ O	0.0519	—	—	0.0519	—
L-Tyrosine	—	0.4176	0.04176	—	0.4176
L-Valine	0.046	0.46	0.046	0.046	0.46

Components	M0268 (Powder) g/L	M0275 (10x) g/L	M0446 (1x) g/L	M0643 (Powder) g/L	M9288 (10x) g/L
Vitamins					
Choline chloride	0.001	0.01	0.001	0.001	0.01
Folic acid	0.001	0.01	0.001	0.001	0.01
<i>myo</i> -Inositol	0.002	0.02	0.002	0.002	0.02
Niacinamide	0.001	0.01	0.001	0.001	0.01
D-Pantothenic acid • ½Ca	0.001	0.01	0.001	0.001	0.01
Pyridoxal • HCl	0.001	0.01	0.001	0.001	0.01
Riboflavin	0.0001	0.001	0.0001	0.0001	0.001
Thiamine • HCl	0.001	0.01	0.001	0.001	0.01
Other					
Glucose	1.0	10.0	1.0	1.0	10.0
Phenol Red • Na	0.011	0.11	0.011	0.011	0.11
Add					
L-Glutamine	—	0.292 at 1x	—	—	0.292 at 1x
NaHCO ₃	2.2	2.2 at 1x	—	2.2	0.35 at 1x

Component	M2279 (1x) g/L	M2414 (1x) g/L	M4642 (powder) g/L	M4655 (1x) g/L	M4780 (1x) g/L
Inorganic Salts					
CaCl ₂ • 2H ₂ O	0.265	0.265	0.2	0.265	0.185
MgSO ₄ (anhydrous)	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	—	—	0.06	—	0.06
NaHCO ₃	2.2	0.85	—	2.2	0.35
NaCl	6.8	6.8	8.0	6.8	8.0
Na ₂ HPO ₄ (anhydrous)	—	—	0.04788	—	0.04788
NaH ₂ PO ₄ (anhydrous)	0.122	0.122	—	0.122	—
Amino acids					
L-Alanine	—	—	—	—	—
L-Alanyl-L-Glutamine	—	—	—	—	—
L-Arginine • HCl	0.126	0.126	0.126	0.126	0.126
L-Asparagine • H ₂ O	—	—	—	—	—
L-Aspartic acid	—	—	—	—	—
L-Cystine • 2HCl	0.0313	0.0313	0.0313	0.0313	0.0313
L-Glutamic acid	—	—	—	—	—
L-Glutamine	—	—	0.292	0.292	0.292
Glycine	—	—	—	—	—
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	—	—	—	—	—
L-Serine	—	—	—	—	—
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	—	—
L-Tyrosine	0.04176	0.04176	—	0.04176	0.04176
L-Valine	0.046	0.046	0.046	0.046	0.046

Components	M2279 (1x) g/L	M2414 (1x) g/L	M4642 (powder) g/L	M4655 (1x) g/L	M4780 (1x) g/L
Vitamins					
Choline chloride	0.001	0.001	0.001	0.001	0.001
Folic acid	0.001	0.001	0.001	0.001	0.001
<i>myo</i> -Inositol	0.002	0.002	0.002	0.002	0.002
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
Riboflavin	0.0001	0.0001	0.0001	0.0001	0.0001
Thiamine • HCl	0.001	0.001	0.001	0.001	0.001
Other					
Glucose	1.0	1.0	1.0	1.0	1.0
Phenol Red • Na	0.011	0.011	0.011	0.011	0.011
Add	1.0				
L-Glutamine	0.292	0.292	—	—	—
NaHCO ₃	—	—	0.35	—	—

Component	M5650 (1x) g/L	M0325 (1x) g/L	M5775 (1x) g/L	M1018 (powder) g/L	51411C (1x) g/L
Inorganic Salts					
CaCl ₂ • 2H ₂ O	0.265	0.265	0.185	0.1396	0.2
MgSO ₄ (anhydrous)	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	—	—	0.06	0.06	—
NaHCO ₃	2.2	2.2	0.35	—	2.2
NaCl	6.8	6.8	8.0	8.0	6.8
Na ₂ HPO ₄ (anhydrous)	—	—	0.04788	0.04788	—
NaH ₂ PO ₄ (anhydrous)	0.122	0.122	—	—	—
Amino acids					
L-Alanine	0.0089	0.0089	—	0.0089	—
L-Alanyl-L-Glutamine	—	—	—	—	—
L-Arginine • HCl	0.126	0.126	0.126	0.126	0.127
L-Asparagine • H ₂ O	0.015	0.015	—	0.015	—
L-Aspartic acid	0.0133	0.0133	—	0.0133	—
L-Cystine • 2HCl	0.0313	0.0313	0.0313	0.0313	0.0313
L-Glutamic acid	0.0147	0.0147	—	0.0147	—
L-Glutamine	—	0.292	—	0.292	0.292
Glycine	0.0075	0.0075	—	0.0075	—
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	0.0115	—	0.0115	—
L-Serine	0.0105	0.0105	—	0.0105	—
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
L-Tyrosine	0.04176	0.04176	0.04176	—	—
L-Valine	0.046	0.046	0.046	0.046	0.046

Component	M5650 (1x) g/L	M0325 (1x) g/L	M5775 (1x) g/L	M1018 (powder) g/L	51411C (1x) g/L
Vitamins					
Choline chloride	0.001	0.001	0.001	0.001	0.001
Folic acid	0.001	0.001	0.001	0.001	0.001
<i>myo</i> -Inositol	0.002	0.002	0.002	0.002	0.002
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
Riboflavin	0.0001	0.0001	0.0001	0.0001	0.0001
Thiamine • HCl	0.001	0.001	0.001	0.001	0.001
Other					
Glucose	1.0	1.0	1.0	1.0	1.0
Phenol Red • Na	0.011	0.011	0.011	0.011	—
Add					
L-Glutamine	0.292	—	0.292	—	—
NaHCO ₃	—	—	—	0.35	—

Component	51412C (1x) g/L	51415C (1x) g/L	51416C (1x) g/L	51417C (1x) g/L
Inorganic Salts				
CaCl ₂ • 2H ₂ O	0.2	0.2	0.2	0.2
MgSO ₄ (anhydrous)	0.09767	0.09767	0.09767	0.09767
KCl	0.4	0.4	0.4	0.4
KH ₂ PO ₄	2.2	2.2	2.2	0.84
NaHCO ₃	6.8	6.8	6.8	6.8
NaCl	0.14	0.14	0.14	0.14
Na ₂ HPO ₄ (anhydrous)	0.2	0.2	0.2	0.2
NaH ₂ PO ₄ (anhydrous)	0.09767	0.09767	0.09767	0.09767
Amino acids				
L-Alanine	—	—	0.0089	0.0089
L-Alanyl-L-Glutamine	0.127	0.127	0.127	0.127
L-Arginine • HCl	—	—	0.015	0.015
L-Asparagine • H ₂ O	—	—	0.0133	0.0133
L-Aspartic acid	0.0313	0.0313	0.0313	0.0313
L-Cystine • 2HCl	—	—	0.0147	0.0147
L-Glutamic acid	—	—	—	0.292
L-Glutamine	—	—	0.0075	0.0075
Glycine	0.042	0.042	0.042	0.042
L-Histidine • HCl • H ₂ O	0.052	0.052	0.052	0.052
L-Isoleucine	0.052	0.052	0.052	0.052
L-Leucine	0.0725	0.0725	0.0725	0.0725
L-Lysine • HCl	0.015	0.015	0.015	0.015
L-Methionine	0.032	0.032	0.032	0.032
L-Phenylalanine	—	—	0.0115	0.0115
L-Proline	—	—	0.0105	0.0105
L-Serine	0.048	0.048	0.048	0.048
L-Threonine	0.01	0.01	0.01	0.01
L-Tryptophan	0.0519	0.0519	0.0519	0.0519
L-Tyrosine • 2Na • 2H ₂ O	0.046	0.046	0.046	0.046
L-Tyrosine	—	—	0.0089	0.0089
L-Valine	0.127	0.127	0.127	0.127

Component	51412C (1x) g/L	51415C (1x) g/L	51416C (1x) g/L	51417C (1x) g/L
Vitamins				
Choline chloride	0.001	0.001	0.001	0.001
Folic acid	0.001	0.001	0.001	0.001
<i>myo</i> -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
Other				
D-Glucose	1.0	1.0	1.0	1.0
HEPES free acid	—	5.958	—	4.7664
Phenol Red • Na	0.011	1.0	1.0	1.0
Add				
L-Glutamine	0.292	0.292	0.292	—
NaHCO ₃	—	—	—	—

Component	56416C (powder) g/L	56419C (powder) g/L
Inorganic Salts		
CaCl ₂ • 2H ₂ O	0.2	0.2
MgSO ₄ (anhydrous)	0.09767	0.09767
KCl	0.4	0.4
KH ₂ PO ₄	—	—
NaHCO ₃	6.8	6.8
NaCl	0.14	0.14
Na ₂ HPO ₄ (anhydrous)	0.2	0.2
NaH ₂ PO ₄ (anhydrous)	0.09767	0.09767
Amino acids		
L-Alanine	0.0089	—
L-Alanyl-L-Glutamine	0.127	0.127
L-Arginine • HCl	0.015	—
L-Asparagine • H ₂ O	0.0133	—
L-Aspartic acid	0.0313	0.0313
L-Cystine • 2HCl	0.0147	—
L-Glutamic acid	0.292	0.292
L-Glutamine	0.0075	—
Glycine	0.042	0.042
L-Histidine • HCl • H ₂ O	0.052	0.052
L-Isoleucine	0.052	0.052
L-Leucine	0.0725	0.0725
L-Lysine • HCl	0.015	0.015
L-Methionine	0.032	0.032
L-Phenylalanine	0.0115	—
L-Proline	0.0105	—
L-Serine	0.048	0.048
L-Threonine	0.01	0.01
L-Tryptophan	0.0519	0.0519
L-Tyrosine • 2Na • 2H ₂ O	0.046	0.046
L-Tyrosine	0.0089	—
L-Valine	0.127	0.127

Component	56416C (powder) g/L	56419C (powder) g/L
Vitamins		
Choline chloride	0.001	0.001
Folic acid	0.001	0.001
<i>myo</i> -Inositol	0.002	0.002
Niacinamide	0.001	0.001
D-Pantothenic acid • ½Ca	0.001	0.001
Pyridoxal • HCl	0.001	0.001
Riboflavin	0.0001	0.0001
Thiamine • HCl	0.001	0.001
Other		
D-Glucose	1.0	1.0
HEPES free acid	—	—
Phenol Red • Na	0.011	0.011
Add		
L-Glutamine	—	—
NaHCO ₃	2.2	2.2

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