

MSM: Mineral Salts Medium

NOTES: This is a carbon-free mineral salts medium for enrichment / isolation / growth of specific nutritional types of microbes. A carbon source (e.g. glucose) **must** be added to MSM before use. Usually best to add carbon sources from filter-sterile stock solutions after autoclaving to avoid possible problems. The ratio of phosphate salts has been chosen so that the medium should be already close to pH 7 without need to adjust. MSM without nitrogen can be prepared (eg. for isolation of N₂-fixers) simply by omitting ammonium sulfate. MSM recipe is from Coleman et al 2002 (AEM, JS666), originally adapted from Hartmans et al (Appl.Micr.Biotech.1992). Many bacteria will grow fine in plain MSM, but some may also require the vitamin solution.

MSM bulk medium

Deionized water:	1 liter
Dipotassium hydrogen phosphate	2.27 g
Potassium dihydrogen phosphate	0.95 g
Ammonium sulfate	0.67 g
Metals solution*	2 ml
Agar (if necc.)	17.0 g
pH 7.0 ± 0.2	

* After autoclaving bulk medium, add 2ml sterile metals solution (recipe below).

MSM metals solution

Deionized water:	1 liter
Na ₂ EDTA.2H ₂ O:	6.37 g
ZnSO ₄ .7H ₂ O:	1.0 g
CaCl ₂ .2H ₂ O:	0.5 g
FeSO ₄ .7H ₂ O:	2.5 g
NaMoO ₄ .2H ₂ O:	0.1 g
CuSO ₄ .5H ₂ O:	0.1 g
CoCl ₂ .6H ₂ O:	0.2 g
MnSO ₄ .H ₂ O:	0.52 g
MgSO ₄ .7H ₂ O:	60.0 g

Dissolve EDTA in water (add NaOH if necessary). Adjust pH to slightly acidic (~ 6.5) with H₂SO₄. Dissolve in all the metal salts. **Filter sterilize (0.2 µm pore size) and store at 4°C in a foil-wrapped bottle.** Solution is green initially, then turns red over time. Metals solution will stay good for at least 1 year if kept refrigerated and sterile.

Optional extra: Vitamin solution (Janssen et al AEM 1997)

Deionized water:	1 L
p-Aminobenzoate:	8 mg
Biotin:	2 mg
Nicotinic acid:	20 mg
Calcium pantothenate:	10 mg
Pyridoxamine HCl:	30 mg
Thiamine HCl:	20 mg
Cyanocobalamin:	10 mg
DL-6,8-thioctic acid:	10 mg
Riboflavin:	10 mg
Folic acid:	4 mg

Filter sterilize, store the bottle wrapped in foil at 4°C.
Add 5 ml vitamins solution per litre of medium, after autoclaving.