Linsmaier and Skoog Modified Medium (With vitamins, Without Sucrose and Agar) RDM-LISM-01

Principle

Linsmaier and Skoog Medium (LS)has been developed by Linsmaier and Skoog in 1965 for optimising the organic requirement of tobacco cultures. The medium contains standard Murashige and Skoog (MS) basal salts supplemented with Linsmaier and Skoog vitamins. The formulation is composed of macronutrients, micronutrients, carbon sources, amino acid and vitamins. The macronutrients contain essential elements like nitrogen (N), phosphorus (P), potassium (K), calcium (Ca), magnesium (Mg) and sulphur (S) for satisfactory growth and morphogenesis. The micronutrients include iron (Fe), manganese (Mn), zinc (Zn), boron (B), copper (Cu) and molybdenum (Mo) required for the growth of plant tissue and cells. Vitamins are required for normal growth and development of plant cells; they are required by plants as catalysts in various metabolic processes. The commonly used vitamins are: thiamin (B1), myo-inositol is added in small quantities to stimulate cell growth of most plant species.

Use: Recommendation for micro propagation, organ culture, callus culture and suspension culture.

Contents*

Ingredients

Ingredients	mg/l	Ingredients	mg/l
MACROELEMENTS		**MICROELEMENTS**	
Nitrate source#	1650.000	Boric acid	6.200
Calcium chloride	332.200	Cobalt chloride	0.025
Magnesium sulphate	180.690	Copper sulphate	0.025
Potassium nitrate	1900.000	EDTA disodium salt	37.300
Potassium phosphate monobasic	170.000	Ferrous sulphate	27.800
		Manganese sulphate	16.900
VITAMINS		Molybdic acid	0.213
Myo-inositol	100.000	Potassium iodide	0.830
Thiamine HCl	0.400	Zinc sulphate	8.600
		Total	4.40 g/l

* Formula adjusted for optimum performance and parameters
# Equivalent to ammonium nitrate

Directions: Dissolve 4.40 gram in 750 ml distilled water mix well to dissolve all the ingredients. Add Heat stable ingredients & make up the volume to 1000 ml. Adjust the pH 5.75 ±0.2 using 1N HCl/NaOH. Boil to dissolve the gelling agar completely. Sterilize by autoclaving at 15 lbs. pressure (121 °C) for 15 min. Cool to 40°C for addition of heat labile ingredient. Aseptically dispense the medium in desired.

Precautions to be taken

All the handling, experiments, storage, and discarding should be performed with the help of skilled and knowledgeable technicians and as per the established guidelines. The material should be disposed only after proper sterilization by autoclaving. Please go through the MSDS of the media to avoid any accidents or in emergency.

Performance and Evaluation
The expected performance of the medium is liable to use as per the direction on the label when stored at optimum conditions and within expiry date.

Quality Control

Appearance	Off-white homogenous, free flowing powder.
Solubility	4.40 g/l soluble in distilled water
pH at 25 ˚C	5.75 ±0.2
Color and clarity of ready medium	Colorless clear solution
Growth promoting properties	Assessed by providing plant cultures with relative humidity of about 60%±2%, temperature 22ºC±2ºC and photoperiod of about 16:8
Cultural Response	Plant species showed actively growing callus and shoots with no structural, necrotic and toxic deformity

Storage and Shelf Life: The product is highly hygroscopic; keep the container tightly closed at all times and store it properly as per the conditions mentioned on the label. The declared expiry is valid only when stored as per the conditions mentioned on the label.
Note: Sterilize media immediately after reconstitution.

Disposal: To avoid the contamination or propagation of any hazardous microbes the used, unusable or modified preparation of this product must be disposed after autoclaving after completion of task.

Reference

1. Kalyan Kumar De (2008), *An introduction to Plant Tissue Culture*,7th Ed., Darjeeling Govt. College, Darjeeling, India. New Central Book Agency(P) Ltd. Kolkota, India.
2. Narayanaswamy S (2005). *Plant cell and tissue Culture*, Tata Mc-Graw Hill publishing Co. Ltd. 6th reprint.
3. Roberta H.Smith .(2005), *Plant Tissue Culture-Techniques and Experiments*, 2nd Ed., Texas A&M University, College Station, Texas. Academic Press. An Imprint of Elsevier, San Diego California, U.S.A.

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