

Algal physiology

Lab. Algal culture media

In their natural habitats algae obtain all the nutrients, minerals and vitamins they require from the water in which they live. To grow them in the lab however, you must provide them with all of these essential resources i.e. you will need to make up some growth media.

Algae require many different nutrients in minute quantities that are difficult to anticipate and prepare in the lab. These organisms have different nutritional requirements, thus various kinds of culture media have been developed. **Algal media** refers to the solution or culture in which algae grow. All the media have several components in common: **sources of nitrogen (in the form of nitrate, nitrite and ammonia), phosphorus, vitamins and trace metals.** However, the specific types of these nutrients, their concentrations and ratios vary between the media. There are many types of algal culturing media, but we will list the most common media as mentioned below:

A-marine algae

F/2 Medium:

There are many recipes for such algal growth media, F/2 medium however, is the most common and widely used general enriched seawater medium designed for growing marine algae used in the phycolgical and aquaculture studies.

B-fresh water algae

1-Allen's medium

Allen's medium is used for the enhancement of algal growth especially blue-green algae.

2- Chu's Medium No. 10(Chu-10 medium)

Chu-10 is used for the enhancement of most algal species growth.

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3-BG-11medium

This medium is used for the enhancement of algal growth especially blue-green algae.

4- BG-11medium with minerals

This medium is used for the enhancement of algal growth especially blue-green algae.

Table(1):The chemical components of Chu-10 medium.

Ingredients
Calcium nitrate
Magnesium sulphate
Dipotassium phosphate
Sodium carbonate
Sodium silicate
Iron chloride

Table(2):The chemical components of BG-11 with minerals medium

Mineral salts	Trace metals mix
Sodium nitrate (NaNO ₃)	Boric acid
Dipotassium hydrogen phosphate (K ₂ HPO ₄)	Manganese chloride tetrahydrate
Magnesium sulphate, heptahydrate (MgSO ₄)	Zinc sulphate heptahydrate
Citric acid	Copper sulphate pentahydrate
Ferric ammonium citrate	Cobalt nitrate hexahydrate
EDTA, disodium salt	Sodium molybdate dehydrate
Sodium carbonate	

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Table(3): the benefits of essential algal media components

The component	function
K ₂ HPO ₄	source of phosphate, it may be responsible for the rapid growth of the algae, this element is comprising higher percentages in the cellular composition as nucleic acid and cellular membrane .
Sodium nitrate (NaNO ₃)	Nitrogen being important constituent of the cell protein was needed for algal growth, either in combined or in molecular form. Also constitute basic part with in nucleic acids .
Sodium Silicate	Silica source, this element is important for group of algae (the diatoms). because they construct their cell wall from silica
MgSO ₄	source of magnesium <ul style="list-style-type: none">• magnesium permitted the maximum growth of the present alga and magnesium deficiency interrupted cell division which results in abnormally large cell formation• cells need magnesium to synthesize chlorophyll
Trace metal mixture	Act as co-factors for enzymes (especially respiration and photosynthetic enzymes) (Cells need the trace metal at elevated concentrations, their increase considered toxic to the cell)
Na ₂ EDTA	EDTA: easily reversible chelate agent provides a buffer system that will maintain ionic concentrations at desirable levels throughout the life of a culture.
Ferric citrate	Iron uptake is strictly required for phytoplankton development, because in the absence of iron, retardation of growth, reduction of photosynthetic activity and chlorophyll content is observed
citric acid	an equal amount of citric acid with the ferric citrate stabilized the concentration of reactive iron in the nutrient solution.