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FORMULATION AND EVALUATION OF MARINE ALGAE WET WIPES

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ABSTRACT: Both biological and chemical diversity can be found in abundance in the maritime environment. Numerous fish and microorganisms found in the marine environment have evolved special metabolic skills to enable their survival in a variety of harsh environments. As a result, a wide range of secondary metabolites with particular functions are produced. For the cosmetics industry, a number of these metabolites are valuable commercial items. This review's objective is to describe the processes involved in the discovery and development of marine natural components used in cosmetics. Numerous substances isolated from marine life have a range of cosmetic properties, including tyrosinase and metalloproteinase inhibition, ultraviolet protection, anti-inflammatory, anti-allergic, anti-aging, and anti-wrinkling benefits.

Keywords: Marine Cosmetics, Marine Algae, Skin Health, Skin Care, UV Radiation, Skin Moisturizing

Definition: Meaning of Marine cosmetics are made using an active component derived from marine sources.

INTRODUCTION:

The marine environment is a rich source of both biological and chemical diversity[1]. The term "cosmetic" refers to a particular product that contains active components. These cosmetics claim to offer medicinal benefits since they include biologically active components. They are designed to enhance favourable physiological effects at the cellular level in addition to improving the appearance of the skin. For the production of cosmetics, new bioactive compounds with inventive, secure, and stable qualities must be found from natural sources at the same time. Marine resources have recently been shown to offer excellent cosmetic potential [2]. One of the special characteristics of marine sources is their ability to thrive in the harsh and varied environment of the sea. It is a fruitful origin of makeup [3]. Numerous chemicals isolated from marine species have a range of cosmetic properties, including ultraviolet protection, tyrosinase and metalloproteinase inhibition, antioxidant, anti-inflammatory, anti-allergic, anti-aging, and anti-wrinkling actions. cosmetics made from seawater and marine life, including caviar, pearls, astaxanthin, and marine collagen. Cosmetic substances with health promoting properties that come from marine sources. It is made up of numerous phytochemical components that have been extracted from different marine resources[2]. Proteins, amino acids, carbohydrates, vitamins, and oligo-elements including copper, iron, and zinc are abundant in algae, both macro and micro. Each of those active ingredients contributes to protection, hydration, firming, slimming, and shine[4].

HISTORY OF MARINE SOURCE

Marine cosmetics' past it should come as no surprise that manufacturers are looking for new supplies of components from freshwater and oceans, since 70% of the globe is made up of water. The majority of biological activity on Earth has been carried by the oceans. As the mother of life, the ocean is thought to have given rise to the earliest living forms from the "primordial soup" and is home to a vast array of marine species with diverse physiologies and adaptations.[2] The vast majority of marine life makes up the ocean population, and they play a significant role in protecting pharmaceutical and cosmetic compounds containing physiologically active ingredients. Researchers are concentrating on a new generation of high-tech cosmetics that use components from the ocean in the competitive world of today[5].

Different marine sources that are used in cosmetics are:

a. Algae
b. Marine Sponges
c. Seaweed
d. Shark fish
e. Marine turtles
f. Coral
g. Jelly fish
h. Hydras
i. Phytoplankton
j. Sea fennel

Sr.no	Marine source	Cosmetic property
1	Algae	Moisturizing[2] Sun protection
2.	Seaweeds	Anti-acne Skin moisturizing Skin toning[4]
3.	Shark fish	Moisturizing[2]
4.	Marine turtle	Skin soothing
5.	Coral	Anti-aging and anti-acne[2]
6.	Hydras	Moisturizing Makeup remover[2]
7.	Jelly fish	Anti-aging property
8.	Sea fennel	Improve skin ton Anti-aging
9.	Phytoplankton	Skin toning Skin wrinkling Skin whitening[2]

Table.NO.1: Different types of marine source and their property

ALGAE:

The complex collection of aquatic creatures known as algae are able to perform photosynthesis. Microalgae and macroalgae are the two main divisions of algae[6]. Polysaccharides, proteins, lipids, phenolic compounds, pigments, vitamins, and other bioactive substances are among the several biochemical compounds found in algae, along with macro and microelements. Global consumer demand for goods that are regarded as ecologically friendly, sustainable, and healthful prompted the cosmetics industry to invest in the research and development of novel products that incorporate natural components or extracts. The algae is therefore among the most widely used natural cosmetic components available.Because algae are naturally occurring, they include a variety of bioactive substances that have a wide range of health impacts on the skin[7]

More emphasis has recently been paid to the use of algae in the cosmetics sector to cure skin conditions like tanning, aging, and pigment disorders. The three primary microalgae found in the cosmetics market are Spirulina sp., Chlorella sp., and Arthrospira sp. Chondrus crispus, F. vesiculosus, and Ascophyllumnodosum are the most widely available micronized macroalgae. Phlorotannin, one of the bioactive chemicals derived from brown algae, has a number of cosmetic properties, including anti-aging, anti-inflammatory, and antioxidant properties[8]. Fucoidan, a sulphated polysaccharide that was extracted from brown algae, also has anti-inflammatory, anti-melanogenic, and anti-cancer properties. A carotenoid called fucoxanthin, which has been extracted from brown, red, green, and microalgae, has antioxidant, anti-melanogenic, and anti-aging properties[9,1].

Wet wipes:

Wet wipes are used for household and personal hygiene cleansing. Praying Disposable wet wipes are moistened non-woven cloth pieces used for sanitary or cleaning applications. During the projected period of 2021 to 2028, the wipes market is anticipated to increase. One of the main factors propelling the wipes market's expansion is the growing awareness about typene among customers worldwide[10] The market for wipes is growing faster due to the rise in demand for specialist wipes for industrial and home applications, including the aerospace industry, and the growing desire for clean-label products created from recyclable chemicals and renewable resources**.**

the introduction of several wipe types, including flushable, wet, and intimate wipes. feminine and perfumed in line with their many uses, and the growing demand for wet wipes—which are regarded as one of the most hygienic products—also has an

impact on the wipes market. Furthermore, the wipes market is positively impacted by the fast urbanization and industrialization, rise in online wipes distribution, growth of the retail industry, rise in health consciousness, changes in lifestyle, and increase in disposable income. Additionally, during the 2021–2028 projection period, product innovations and new launches give the wipes market participants additional lucrative prospects. [11]

- **Materials:**

Sr no.	Ingridients	Quantity	Role
1	Algae	**1ml**	Moisturizing , soothing
2	Aloe vera	**1ml**	SPF, Skin softening
3	Neem extract	**4ml**	Skin healing, antibacterial,
4	Glycerin	**2ml**	Humectant
5	Vitamin E	**0.2ml**	Moisturizing
6	Ethanol	**1ml**	Astringent , organic solvent
7	Citric acid	**0.1g**	pH adjuster
8	Rose water	**3ml**	Skin toner, fragrance
9	Water	**7.7ml**	Solvent
10	Methyl paraben	**0.1g**	Preservative

Table No. 2: List Of Ingridients

Formulation and extraction process development

- **Collection and Preparation of algae extract:**

  - Collect the fresh or dried marine algae from a clean, sustainable source.
  - Rinse thoroughly with freshwater to remove sand, salts, and debris.
  - Dry the algae by using an oven at low temperature (below 50°C) to preserve bioactive compounds.
  - Pulverize the dried algae into a fine powder using a blender or grinder.
  - Treat dried algae powder with ethanol or water
  - Allow it to soak for specific period
  - Stir it
  - Heat above solution for 45 min
  - Filter the solution.

- **Collection And Preparation Of Neem Extract:**
  - Collect the 1-2 g of (3-4) fresh neem leaves
  - Add 5 ml distilled water
  - Wash and crush neem leaves with 5 ml of water.
  - Let sit for a few hours.
  - Filter through muslin cloth.
  - Use 4 ml in the final formulation

- **Collection And Preparation Of aloe vera Extract:**
  - Collect freash aloevera leaf (1 small leaf (~1gm)
  - Wash, peel, and scoop out the gel from the aloe vera leaf.
  - Blend the gel (no water needed for small amounts)
  - Filter to remove fibrous material.
  - Use 3 ml of the clear gel in your formulation.

- **Formulation of algae wet wipes:**

1. Preparation of Aqueous Phase:

In a clean beaker, add 6 ml of distilled water. Dissolve 0.1 g of citric acid and 0.1 g of methyl

paraben in the water completely with stirring. Add 4 ml of rose water and mix well.

2. Addition of Herbal Extracts:

Add 2 ml of algae extract, 3 ml of aloe vera, and 1 ml of neem extract to the aqueous phase. Stir continuously until a uniform solution is obtained.

3. Incorporation of Moisturizing and Active Agents:

Add 2 ml of glycerin and stir until fully mixed. Add 0.4 ml of vitamin E (oil-soluble). Mix

thoroughly. A magnetic stirrer may help achieve a better emulsion if needed.

4. Addition of Ethanol:

Slowly add 1 ml of ethanol while stirring. This acts as a mild preservative and improves the product's shelf life.

5. Final Adjustment:

Check the total volume and adjust to 20 ml using distilled water if necessary. Check the pH of the final formulation and adjust to 5.0-5.5 if needed using a dilute citric acid or sodium hydroxide solution.

6. Storage:

Transfer the formulation into a sterile amber glass bottle or spray bottle label the container properly and store it in a cool, dark place.

EVALUATION PARAMETER:

1. Organoleptic properties of wetting solution

- **Color:** Determined by visual examination of the prepared wetting solution.
- **Odour :** Assessment of the odor by a sensory panel[47]

2. pH

pH was determined by using pH meter. By placing the digital pH meter over the wetting solution[48]

3. Clarity

By visually evaluating the wetting solution for the presence of particle debris clarity was evaluated[49]

4. Irritancy test

An irritancy test was carried out by placing the prepared herbal wet wipes to the skin's surface and timing the procedure. Irritancy, redness, dryness and itching were evaluated[50]

5. Evaporation test

The prepared herbal wet wipes were made to be tested on the skin. After wiping the skin with wipes, the moisture content formed due to rubbing has been evaporated from the skin and the time was noted. Evaporation rate was below 1 min[51]

6. Stability test

Stability study was carried out for the formulation by providing different temperatures. i.e., at room temperature 37°C and hot air oven at 400C. Celsius.

RESULT AND DISCUSSION:

Evaluation	**observation**
Color	Pale yellow
Odor	pleasant
pH	4.5
Dry tissue	
Color	White
Thickness	0.2mm
Volume occupied by dry tissue	2ml
Properties of finished product	
Irritancy test	No Irritation
Evaporation test	Less than 1

Table No.5: characterisation of wetting solution and wet wipes

Conclusion

The formulation of wet wipes using algae-based extracts demonstrated promising results across various evaluation parameters. The pH of the developed wipes remained within the ideal dermal compatibility range (typically 4.5-6.5), ensuring they are suitable for topical application without causing irritation. Spreadability tests confirmed that the wipes allowed for smooth and even application over the skin, enhancing user experience. Organoleptic evaluations, including appearance, color, texture, and odor, revealed that the wipes possessed an acceptable sensory profile, with a natural and pleasant scent attributed to the algae extract. Moisture content analysis showed that the wipes maintained adequate hydration, which is crucial for effective cleansing and skin comfort. Overall, algae-based wet wipes present a sustainable and skin-friendly alternative to conventional products. Their natural origin, combined with favorable physical and sensory properties, supports further development and commercialization in the field of eco-friendly personal care products.

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