

Almond shells as a gel exfoliant

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ABSTRACT

Background: Natural cosmetics are becoming increasingly popular among the general public. Natural beauty products promote a holistic approach to environmental and health preservation. As a result, consumers seeking that type of cosmetics search for products that may ensure a genuinely natural effect. Over the last two decades, the number of studies demonstrating the benefits of natural ingredients in cosmetics for dermatologic and hair care, as well as disease treatment, has increased. For centuries, almonds have been employed in cosmetics. They increase the radiance and fairness of the skin. Almonds are widely available in the Portuguese region of Trás-os-Montes, and suggestions for using them in cosmetics should be made. This study presents a method of using almond shells as a cosmetic product easily reproducible at home. **Materials and Methods:** All equipment employed was cleaned and disinfected beforehand. Almond shells were ground to a powder and incorporated into a gel exfoliant formulation. **Results:** With a gentle rub, apply the almond shell exfoliation gel to the entire body. A sponge, lukewarm water, or damp cotton may be used to remove the product. The product may last for up to one month if properly stored and manufactured. **Conclusion:** As the demand for knowledge, acquisition, and the use of natural and organic cosmetics grows, the topic becomes increasingly relevant, as is the desire to stay young and seek accurate information in order to formulate organic and natural cosmetics.

Key words: Almond Shells; Exfoliant; Natural Cosmetics; Natural Ingredients; Trás-Os-Montes

INTRODUCTION

Natural cosmetics are becoming more popular among the general public. They promote an approach that connects environmental preservation and health protection. As a result, consumers of that type of cosmetic seek products that may guarantee a genuinely natural effect.

The number of studies proving the benefits of natural ingredients in cosmetics for dermatologic and hair care and disease treatment has increased over the last two decades. Colloidal oatmeal, for instance, has been shown to improve the treatment of psoriasis, and aloe vera shows benefits in the treatment of atopic dermatitis. Because of their antioxidative properties, licorice, green tea, arbutin, soy, açai berry, turmeric, and pomegranate have been shown to help reduce hyperpigmentation [1].

Almonds

Trás-os-Montes, Portugal, is bounded on the west by the Minho province, on the south by Douro, on the east by the Douro River, and on the north by Spain. The almond tree is one of the most widely planted tree crops in the Trás-os-Montes region [2]. *Parada*, *Casanova*, *Verdeal*, and *Pegarinhos* are the most common varieties [3]. It is also a region with the most organic farmers, and the region's climatic, topographic, and pedological differences favor agricultural diversity [4].

The *Rosaceae* family includes the almond tree. It is the oldest nut crop in southwest Asia and, therefrom, has spread to other areas and continents [5]. Hippocrates was the first to mention using almonds to treat colds and other phlegmatic disorders [6]. Almond cultivation spread in a narrow horizontal band westward through the Mediterranean Sea to Spain as a result of successive

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Greek, Roman, and Arab invasions [5]. Almonds may be consumed as dried fruit or employed in baking and liquors. The almond shell is converted into biofuel [7].

Sweet almond oil is widely used in cosmetics, particularly in dry skin creams and anti-wrinkle and anti-aging products. It improves the skin's radiance and fairness. It is present in over 280 cosmetic formulations at concentrations ranging from 1% to 50% [8]. It may be used to treat urticaria and wound healing when combined with white wine and honey [9]. Because it is suitable for all skin types, almond oil is one of the most popular oils used in aromatherapy and massage therapy. It promotes skin regeneration and elasticity due to high levels of vitamins E and K. [10]. An *in vivo* study in *Drosophila melanogaster* using the SMART and Comet assays revealed that almonds and almond shells have antigenotoxicological properties [11,12]. Antigenotoxicological properties have been linked to anti-aging properties [13,14].

This study presents a method for using almond shells as a cosmetic product that may be reproduced domestically.

MATERIALS AND METHODS

Chemicals

Glycerin (CAS: 56-81-5) and xanthan gum (CAS: 11138-66-2) were purchased from PlenaNatura (Amadora, Portugal).

Cosgard (INCI: benzyl alcohol and dehydroacetic acid; CAS: 100-51-6/69-72-7/56-81-5/110-44-1), melissa hydrosol (INCI: melissa officinalis water; CAS: 84082-61-1), and lemon essential oil (INCI: citrus limon peel oil; CAS: 8008-56-8/84929-31-7) were purchased from Aroma-Zone (Paris, France).

Equipment Cleaning and Disinfection

To reduce the risk of contamination, the equipment must be cleaned and disinfected. To do so, one needs a cleaning solution, denatured alcohol (70% alcohol by volume) in a spray bottle, boiled water, and clean rags.

The hair was tied back, and protective clothing was worn. The work surfaces were sprayed with alcohol after being cleaned with a cleaning solution. A single-use paper towel was used to dry the surfaces. Metal, silicone, and glass containers were disinfected and sterilized by

boiling in water for twenty minutes and drying them with a single-use paper towel. Following that, each item was sprayed with alcohol, making sure it was contained in the containers and lids. A single-use paper towel was used to dry the items. Alcohol was sprayed on tools and non-heat-resistant plastic containers to ensure it reached the insides. The containers and tools were dried with air.

Almond Harvest and Preparation

Almonds (variety *Pegarinhos*) were chosen as natural ingredients in the Trás-os-Montes region and were obtained from an organic farmer in October 2022. The almond shells were separated from the almonds prior to the experiment. The almond shells were ground into powder (Fig. 1).

RECORDS

A traceability worksheet was created for each preparation (Table 1). This document was created in order to track the quantities and batches of each ingredient. In the event of a cutaneous reaction, it is beneficial to understand and research the irritant or allergenic component. The exact formulation is described in Table 2.

1. Xanthan gum, hydrosol, and glycerin were put in a recipient (Fig. 1a).
2. The preparation was mixed and left to rest for five minutes, then remixed until the xanthan gum dissolved completely and a dense gel formed (Fig. 1b).
3. Almond shells and Cosgard were added, and the preparation was mixed thoroughly (Fig. 1c).
4. Essential oil was added (Fig. 1d).
5. The preparation was transferred to a container (Fig. 1e).

Labelling

Following the cosmetic preparations, it is critical to label them in a reassuring manner. Conscientious labeling avoids confusion about the type of product and its use, secures cosmetics by clearly identifying their ingredients, and provides quick information on the date of manufacture and the shelf life of the preparation for use as directed. The following information should be included on the label:

1. Product name: The precise NAME of the preparation.
2. Composition: A list of all INGREDIENTS used in the formulation.
3. Date of manufacture and shelf life: The product's DATE OF MANUFACTURE and EXPIRATION



Figure 1: Steps of the preparation. a) Ingredients; b) mixture of ingredients; c) addition of almond shells and Cosgard; d) addition of essential oil; e) final exfoliation gel.

Table 1: Example of a traceability worksheet.

Date		02.12.2021	
Ingredient	INCI Name	Quantity	Batch No.
Glycerine	Glycerin	2	0012385
Xanthan Gum	Goma xantana	3	202009B-G05
Melissa Hydrosol	Melissa officinalis water	88	21HY0076/5
Grounded almond shells	Prunus Amygdalus Dulcis (Almond) Shell Powder	5	N/A
Cosgard	Benzyl alcohol & dehydroacetic acid	1	22CG0226/2-2273
Lemon essential oil	Citrus Limon Peel Oil	1	21HE0094/5

Table 2: Almond shell exfoliation gel formulation.

Phase	Ingredient	%
A	Glycerin	2
A	Xanthan gum	3
A	Melissa hydrosol	88
B	Grounded almond shells	5
B	Cosgard	1
C	Lemon essential oil	1

DATE are calculated from the conservation period specified in the protocol. Light and heat should be kept away from the preparation.

- Capacity: The label may be completed by indicating the container's CAPACITY. If necessary, the specific type of USE, skin type, or special PRECAUTIONS for use may be specified.

RESULTS AND DISCUSSION

The term *cosmetics*, according to the European Regulation, refers to a product applied to the body to keep the skin, and thus the body, in good condition, to protect it from environmental influences and aging processes, to change its appearance, and to improve the smell of the body [15]. Natural, conventional,

and organic cosmetics all have the same definition yet differ in some ways. Conventional cosmetics do not require the inclusion of certified natural and organic ingredients [16]. A natural cosmetic product must contain at least one ingredient derived from a natural substance obtained directly from a mineral or a plant, and it must not be produced synthetically. Organic ingredients may be present in small amounts in natural cosmetics. However, natural products are not always organic [17]. At least 95% of the ingredients in an organic cosmetic must be certified organic. These raw materials are derived from approved cultivation and extraction methods. They must be biodegradable and chemically as natural as possible. The remaining 5% of the formulation may be water, agricultural raw materials, or non-certified extracting agents approved for organic formulations [18]. This is why only natural and organic ingredients were chosen to prepare this formulation.

Glycerin has hygroscopic properties and is used in numerous skin moisturizing products as it appears to help alleviate dry skin problems by attracting water from the underlying layers.

Melissa hydrosol has soothing and calming properties, ideal for uncomfortable and itchy skin. It helps to prevent the appearance and reduce the signs of aging. It is a tonic that cares for damaged skin and tones sagging skin.

Xanthan gum is a polysaccharide commonly used for the stabilization and consolidation of cosmetic products.

Cosgard is a preservative that effectively preserves all preparations containing an aqueous phase. It is

of synthetic origin yet is one of the few preservatives authorized by Ecocert and is widely employed in organic cosmetics.

Lemon essential oil provides purifying and tonic properties. Since lemon essential oil is phototoxic, we suggest using the distilled, furocoumarin-free form.

A certified organic farmer from the Trás-os-Montes region in Portugal provided the almonds.

The almond shell exfoliation gel may be applied to the entire body with a gentle rub. The product may be removed with a sponge, lukewarm water, or damp cotton. If well stored and manufactured in excellent condition, the product may last for up to one month.

CONCLUSION

Various societies, organizations, and digital influencers inform consumers on the advantages and benefits of using this type of product, addressing environmental, social, and ecological issues to make the population aware of environmental, social, and ecological concerns, as well as their own well-being.

The search for knowledge, acquisition, and use of natural and organic cosmetics is constantly growing, thus the topic is highly relevant, as is the interest in updating oneself and seeking accurate information to formulate organic and natural cosmetics.

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Data Availability Statement

The data supporting this study's findings are available on request from the corresponding author, SG.

Statement of Human and Animal Rights

All the procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the 2008 revision of the Declaration of Helsinki of 1975.

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