From waste to wonder: Repurposing orange peels extract to sustainable peel-off mask

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Abstract: Often discarded as a waste product, orange peel is a valuable ingredient, rich in Vitamin C and antioxidants and is a natural skincare treasure. It rejuvenates and brightens the skin complexion and also helps reduce signs of aging like fine lines and wrinkles with the help of its Antioxidant and Anti-aging properties. Here, we have obtained orange peel extract by sun - drying orange peels and then grinding it to fine powder, which was later macerated to obtain an extract. This extract was incorporated within the peel-off mask formulation as an active ingredient. It is a sustainable cosmetic product because it repurposes agricultural waste, reducing environmental impact of orange peel disposal and reduces waste and also nature conservation is possible through this approach of up cycling.

Keywords: Orange peels extract; Repurposing; Sustainable cosmetic; Waste reduction

1. INTRODUCTION

Orange peel is a potent natural ingredient in skin care, boasting high levels of Vitamins C and antioxidants. Its active compounds revitalize and even out skin tone, minimizing signs of aging. Rich in flavonoids and limonoids, orange peel calms and soothes irritated skin, revealing a bright complexion. As a key ingredient in skin products, it stimulates collagen production and refined skin texture. Its anti-aging, soothing, and tightening properties make it a prized asset in the cosmetics industry.

The cosmetic industry has a staggering environmental impact, generating millions of tons of waste every year. The primary culprits behind this staggering figure are the widespread use of synthetic ingredients, packaging materials, and water. As consumers become increasingly eco-conscious, the demand for sustainable skincare products is on the rise. To address the industry's environmental footprint, companies are shifting towards eco-friendly practices, prioritizing waste reduction and natural ingredients in their products. This growing trend towards sustainable skincare promises a greener future for the industry.

Orange peels, typically discarded as waste, possess untapped potential as a valuable ingredient in cosmetic products. One such application is in peel-off masks, which have gained widespread popularity for their skin rejuvenating and brightening properties. These masks are sought after for their ability to revitalize and refresh the skin, leaving it feeling smooth and radiant.

Despite their popularity, many commercial peel-off masks rely heavily on synthetic ingredients, which can have detrimental environmental and health impacts. The use of artificial additives, chemicals, and fillers can lead to skin irritation, allergic reactions, and long-term health consequences. Furthermore, the production and disposal of these synthetic ingredients contribute to environmental pollution, exacerbating the already pressing issue of waste management.

This study seeks to develop a sustainable alternative to traditional peel-off masks by harnessing the natural benefits of orange peel extract. By leveraging the antioxidant, anti-inflammatory, and antimicrobial properties of orange peels, researchers aim to create an eco-friendly mask that not only rejuvenates the skin but also promotes environmental responsibility. This innovative approach priorities the use of natural, biodegradable ingredients, reducing reliance on synthetic materials and minimizing waste. The development of such a product would cater to the growing demand for sustainable skincare solutions.

In this study, we have made use of orange peels, which we have obtained after the consumption of the fruit. In order to obtain the extract from the peels, they have been dried under the sun for a long duration of time till it is dried completely. These peels were

later ground into a fine powder. They were also strained so that the finer particles can be obtained and used for a better extract. These have been then added to a solvent. While keeping the level of solvent constant, so that the powder is always submerged within the solvent, this mixture was left to set for about 3 days. Then it was filtered by simple filtration methods to separate the powder and obtain the extract. This extract was measured and then incorporated within the formulation accordingly.

2. MATERIALS AND METHODS

2.1. Collection and Drying of Orange Peels

The collected Orange peels were weighed accurately and dried under the sun for about 15 days. The well dried orange peels were then grinded into a powdered form and underwent sieving to obtain uniform texture and these are used for further Extraction process.

2.2. Extraction of Orange Peels

For the Extraction of powdered Orange peels, suitable solvent can be used. Here, we are incorporating the extract into a peel off mask so using ethanol can be more relevant for easy evaporation and stability.

2.3. Method of Preparation

The powdered orange peels (figure 1) are extracted by maceration of 95% ethanol solvent in the ratio of 2:10 (2gm of powder in 10 ml of solvent). The mixture of powder orange peels and Ethanol is packed with aluminum foil to prevent any contact with external factors. It is kept for 3×24 hours for better extraction of actives. Then it undergoes a filtration process to isolate the filtrate and residue using filter cloth and the filtrate is collected and used for the formulation process. (figure 3)

Figure 1

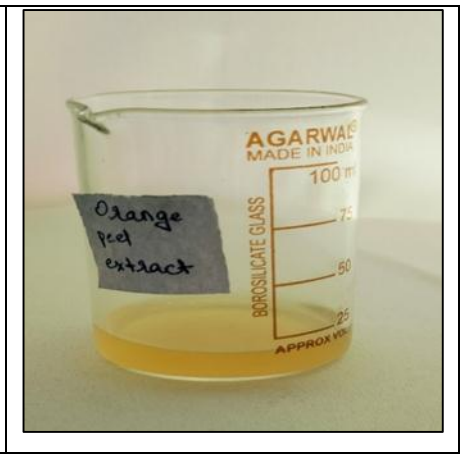

Figure 2

Figure 1: Powder of dried orange peels. Figure 2: Orange peel extract.

2.4. Other Excipients

2.4.1. Polyvinyl Alcohol (PVA)

Polyvinyl Alcohol (PVA) is a water-soluble synthetic polymer known for its excellent film-forming, adhesive, and emulsifying properties. Typically available as a white powder or granules, PVA forms a clear solution when dissolved in solvent. It is environmentally friendly due to its biodegradability, making it a popular choice for eco-conscious applications. Generally considered as safe.

2.4.2. Glycerin

Glycerin, or glycerol, is a colorless, odorless, viscous liquid, with a sweet taste, widely used for its moisturizing and hydrating properties.

2.4.3. Polyethylene Glycol (PEG)

Polyethylene Glycol (PEG) is a water-soluble polymer which is non-toxic and biodegradable used as surfactant in this formulation.

2.4.4. Tween 20

Tween 20, also known as Polysorbate 20, derived from sorbitol and fatty acids, is a nonionic surfactant and polymer.

2.4.5. Ethanol

Ethanol, also known as ethyl alcohol, is a colorless, volatile liquid that is commonly used as a solvent and antiseptic.

2.5. Formulation of Peel - Off Mask

All the above ingredients were accurately weighed. Sufficient water is added to polyvinyl Alcohol and it is left to set for 5 min. The mixture is then placed in a magnetic stirrer for 20 – 25 min for the dissolution of PVA. To form gel-like consistency, the temperature is increased gradually at intervals of five minutes each, from the lowest temperature till 80°C. When desired consistency is achieved, keep the mixture outside to cool down. At 40°C, all the other ingredients are added and mixed well. After a few minutes the Orange peel off mask is ready to use.

Figure 3: Image of final product with necessary labels.

2.6. Application and peel off

Figure 4 Figure 5 Figure 6

Figure 4: Application of orange peel-off mask. Figure 5: Post application of product on hand. Figure 6: Removal of the orange peel-off mask.

3. CONCLUSION

The product formulated gave good results. It was easily applicable and was effortlessly peeled off.
It did not show any type of irritation and itching. The feel of application of product was aesthetic and without greasiness. It showed all the required properties of peel off mask that is cleansing, soft and supple skin, removal of dirt, dust, sebum and dead cells, etc. The attempt was to convert waste into cosmetic product having rich and useful properties for skin. The study concluded that the product formulated was stable and effective.

Compliance with ethical standards

Disclosure of conflict of interest
No conflict of interest to be disclosed.

REFERENCES

[1] Ould Yerou, K., & et al. (2017). The use of orange (Citrus sinensis) peel as antimicrobial and antioxidant agents. *Journal of Fundamental and Applied Sciences*, September 2017.

[2] El Kantar, S., & et al. (2018). High voltage electrical discharges combined with enzymatic hydrolysis for extraction of polyphenols and fermentable sugars from orange peels. *Food Research International, 107*, 755-762.

[3] Gotmare, S. (2018). Orange peel: A potential source of phytochemical compounds. *International Journal of ChemTech Research, 11*(2), 240-243.

[4] Kohli, D., & et al. (2024). Investigating the antioxidant capacity of orange peel extract and its application in shelf-life extension of ghee. *Journal of Stored Products Research*, *107*, 102349.

[5] Park, J.-H., & et al. (2014). Antioxidant activity of orange flesh and peel extracted with various solvents. *Preventive Nutrition and Food Science*, *19*(4), 291–298.

[6] Arsiwala, S., & et al. (2013). Evaluation of topical anti-wrinkle and firming (AWF) for women, anti-wrinkle and firming (AWF) for men, and deep wrinkles for wrinkles on face and neck. *Asian Journal of Pharmaceutical and Clinical Research, 6*(3), 86-89.

[7] Anitha, T. (2012). Medicinal plants used in skin protection. *Asian Journal of Pharmaceutical and Clinical Research, 5*(3), 35-38.

[8] Mohsin, A., & et al. (2022). Advances in sustainable approaches utilizing orange peel waste to produce highly value-added bioproducts. *Critical Reviews in Biotechnology, 42*(8), 1284-1303.

[9] Ashawant, M. S., & Banchhor, M. (2009). Herbal cosmetics: Trends in skin care formulation. *Pharmacon Review, 3*(5), 82-89.

[10] Bampidis, V. A., & Robinson, P. H. (2006). Citrus byproducts as ruminant feeds: A review. *Animal Feed Science and Technology, 128*(3/4), 175-217.

[11] Okereke, J. N., Udebuani, A. C., Ezeji, E. U., Obasi, K. O., & Nnoli, M. C. (2015). Possible health implications associated with cosmetics: A review. *Science Journal of Public Health, 3*(5-1), 58-63.