Hong Kong Student Science Project Competition 2023

Template of Extended Abstract (Invention)
(Word Limit: 1,600 words, Pages: 3 pages only)

Team Number: SABC074

Project Title: Antioxidant Face Cream: Elixir of Life

Project Type: Invention

***To our best knowledge, there are / ~~are no~~* similar works in the market*; (if there are,) related product links are as below:**

https://www.pcaskin.com/c-e-strength-max-3.html

The enhancement our project made / the difference with related products are:

Our product investigates the most effective ratios of vitamin C and vitamin E through conducting the apple enzymatic browning experiment which is then applied in our face cream. We also added other ingredients to further maximise the moisturising and anti-aging effects.

Please delete if not applicable. The competition values the originality of works. Students must do enough literature research to ensure that their works are unique and list relevant reference materials before starting research or invention.

I. Background

Our Antioxidant Face Cream consists of both vitamin C and vitamin E which can reduce free radical damage to our skin by acting as scavengers of reactive oxygen species, thus giving anti-ageing effects and boosting collagen production. When vitamin C and vitamin E are used together, a synergistic antioxidant effect can be observed. Our face cream adopts the best ratio of vitamin C and E which is determined by conducting the apple experiment, where both vitamins are wiped on the surface of the apple and the rate of enzymatic browning at different ratios is observed.

II. Objectives

During the pandemic, a face mask is an essential tool for protection. However, wearing a face mask for a prolonged period may cause skin problems. Some studies show that many people have different degrees of facial skin damage, including dryness, itching and erythema. Therefore, we hope to create a face cream that optimizes hydration, smoothness and anti-ageing of skin, with the synergistic effects of antioxidants vitamin C and E.

III. Methodology

1. Apple oxidation experiment

To determine the most effective ratio of vitamin C and E, different ratios are wiped on the apple surface and their effect on enzymatic browning of apple is investigated. To measure the colour of the apple slices, random sampling is conducted.

2. Oxidation of apple

The oxidation of apples is caused by the oxidation of phenolics into melanin. Enzymes in the apple interact with the released phenolic substrates and rapidly oxidize them, forming brown-coloured

products called melanin. The use of antioxidants vitamin C and E can reduce the rate of oxidation of the apple. Therefore, different ratios of vitamin C and E can be wiped onto the apple surface to examine the colour change and their effectiveness in reducing oxidation.

IV. Design of Invention

1. Vitamin C and vitamin E synergy

When vitamin E is reducing lipid peroxidation, tocopheroxyl radicals will be formed which may oxidise other lipids. To restore it back to its active form, vitamin C is needed.

2. Face cream invention

Different phases of the face cream are added accordingly at different temperatures and are homogenised to obtain a creamy mixture. The texture of the face cream is thick and smooth. When it is applied, the skin is moisturized and hydrated. The cream is also non-greasy and leaves a silky feeling to the skin. Overall, the face cream is non-irritating and indeed gives the effect of moisturizing and hydrating.

V. Application / Market Need

Our face cream can be applied on a daily basis. The best time is when the user's skin is damp as this can help lock in hydration. Users should apply the face cream before their skin has dried post-cleansing. For limitations, the types and numbers of free radicals produced in the human body and Apple may be vastly different. The structure of an apple and the human skin is completely different as well. These differences between an apple and human skin may lead to a difference in the effectiveness of ratio.

VI. If your team will compete the Sustainable Development Award, please indicate the specific sustainable development goal the project is related to, and provide justification for competing for this award. *(Word limit: 300 words)*

N/A

VII. If your team will compete the Social Innovation Award, please list the target group or social issue the project focuses on, and provide justification for competing for this award. *(Word limit: 300 words)*

N/A

VIII. Conclusion

Vitamin C:E ratio of 4:1 was found to be the most effective ratio at reducing free radicals by investigating their effects on the enzymatic browning of apple slices. This ratio was then applied in the face cream along with other active ingredients to optimize its moisturizing, hydrating and anti-aging effects. However, many limitations of the experiment are found which may affect the reliability of the results, including the differences between an apple slice and human skin and difficulty in distinguishing the results. Further improvements and investigation have to be made in order to ensure the reliability of the results. Along with the improvements in the experiment, the formula of the face cream will also be improved in the future through trial and error, and by carrying out a clinical test.

□ **Our project is developed based on previous project and the enhancement is below:**

N/A