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IONIZING ENERGY EFFECT ON MICROBIOLOGY AND PROTEINS OF NAIL SECRETION WHICH IS USED TO ELABORATE COSMETICS PRODUCTS

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ABSTRACT

The snail (*Helix aspersa müller*) secretion or its filtrating is an emerging raw material utilized to elaborate different cosmetics products in Chile. This secretion has properties such as regeneration and healing of tissues, elimination of spots in the body, among others. All of them are associated to some of its own components, like the glycolic acid and alantoine. However, working with the secretion has not been free of complications nor sanitary difficulties due to the great manipulation to which it is exposed to, making it vulnerable to microbiological contaminations and causing it not to qualify according to the sanitary criteria stated by cosmetics laboratories, resulting in the material loss for the producer.

The ionizing energy from radioactive sources appears to be an efficient alternative to control and reduce the microorganisms of these raw materials destined to the cosmetology industry. The proposed study to determine irradiation benefits required cooled secretion samples obtained from a snail hatchery.

The samples were irradiated with doses of 3.0, 5.0 and 7.0 kGy, in order to verify the microbiological reduction and to establish a reduction probability of chemical components that are important in cosmetic products. Our results have allowed to determine that doses of 5.0 and 7.0 kGy reduce the total count of mesophyles in 4 and 5 logarithmic cycles, respectively, These reduction values allow the secretion to be accepted by the laboratories dedicated to process it and elaborate the cosmetic products.

On the other hand, to evaluate the effects of chemical components, like total proteins, alantoine and glycolic acid, samples irradiated were used with doses of 7.0 and 10 kGy. The result values from the chemical analysis were not affected by the irradiation and these were similar to the ones which were not irradiate. The study shows the benefits that this technology could provide to reduce the microbiological burden without affecting the properties of the snail secretion.

1.- INTRODUCTION

The variety of new raw material used in cosmetic products is as diverse as the properties obtained from them. Taking this into account, a series of natural material taken from exotic plants and some other derivates coming from non-traditional animal exploitations are used, as it is the case of the land snail culture.

The filtrating or extract of the snail secretion is a new raw matter with features such as: tissue regeneration and healing, disinfections of wounds, elimination of body stains, amongst others.

All of them are associated with certain components of the snail secretion as the glycolic acid and alantoine.

As a whole, the productive systems of these small animals respond to the fact of self-sustaining needs, that is to say, small producers face the fact of having to generate their own incomes at a low initial cost developing artisan techniques to recover the raw material and the elaboration of the final product. The lack of knowledge of good practices in manufacturing as well as the lack of cleaning in the production, many times avoid these materials from meeting the sanitary regulation demands, especially the ones related to the microbiological load.

Despite its positive characteristics, the way of working with this secretion has not been free of sanitary difficulties because it is submitted to a great manipulation what makes it vulnerable to microbiological contaminations, avoiding it from being well qualified, in accordance with standard criteria, resulting in the material loss.

According to the study results, the ionizing energy coming from radioactive sources, seems to be one more alternative for the control and reduction of the microbiological load of the raw materials destined to the pharmaceutical industry.

2.- DEVELOPMENT

2.1 Objective

Reduce the bacteria load of the snail secretion obtained for commercial use and aligned to the quality acceptance level for its use in cosmetology.

2.2 Material

The radiation service which is carried out by the Food and Health Section has been asked to irradiate the snail secretion in order to reduce the microbiological load, particularly the bacteria load, reason why it has been considered necessary to perform radiation tests before a commercial treatment of big bulks. Once the samples were treated analyses of total microorganisms, fungus and yeast and the presence or absence of pathogens counts were done. A group of irradiated samples was analyzed to determine the protein components of the snail secretion, evaluating the quantity of alantoine, glycolic acid and proteins, in general.

These samples were obtained from artisan producers who work with the snail secretion in terms of applying their own snail secretion processes (not diffused).

The irradiations were done using the Co60 radiator, placed in the Radiation Laboratory of SSYA at The CCHEN. The radioactive source activity up to the radiation date was 3500 Curie (Ci) approximately and the time for each dose was 68.114 and 160 minutes, respectively.

The samples for the microbiological analyses were radiated with doses of 3.0, 5.0 and 7.0 kGy, plus a control group without irradiating.

The samples for the protein component analyses were radiated with doses of 7.0 and 10 kGy, plus a control group without irradiating.

The microbiological and the protein component analyses were done by private enterprises not connected to the Chilean Nuclear Energy Commission.

2.3 Results

2.3.1 Microbiological results

The results are shown in the tables 1 and 2. The microbiological reduction can be seen in the graph 1.

Table 1. Total Count of Mesophyles

	Control	**3.0 kGy**	**5.0 kGy**	**7.0 kGy**
A.P.C.* cfu/g	5.70E+06	2.10E+03	1.50E+02	<1.00E+01
Log cfu/g	6.76	3.32	2.18	1.00

***APC**, Aerobic Plate Count*

Table 2. Fungus and Pathogens

	Control	**3.0 kGy**	**5.0 kGy**	**7.0 kGy**
Fungus ufc/g	<1.00E+01	<1.00E+01	<1.00E+01	<1.00E+01
Pathogens	P*	P*	P*	A$^{\tau}$

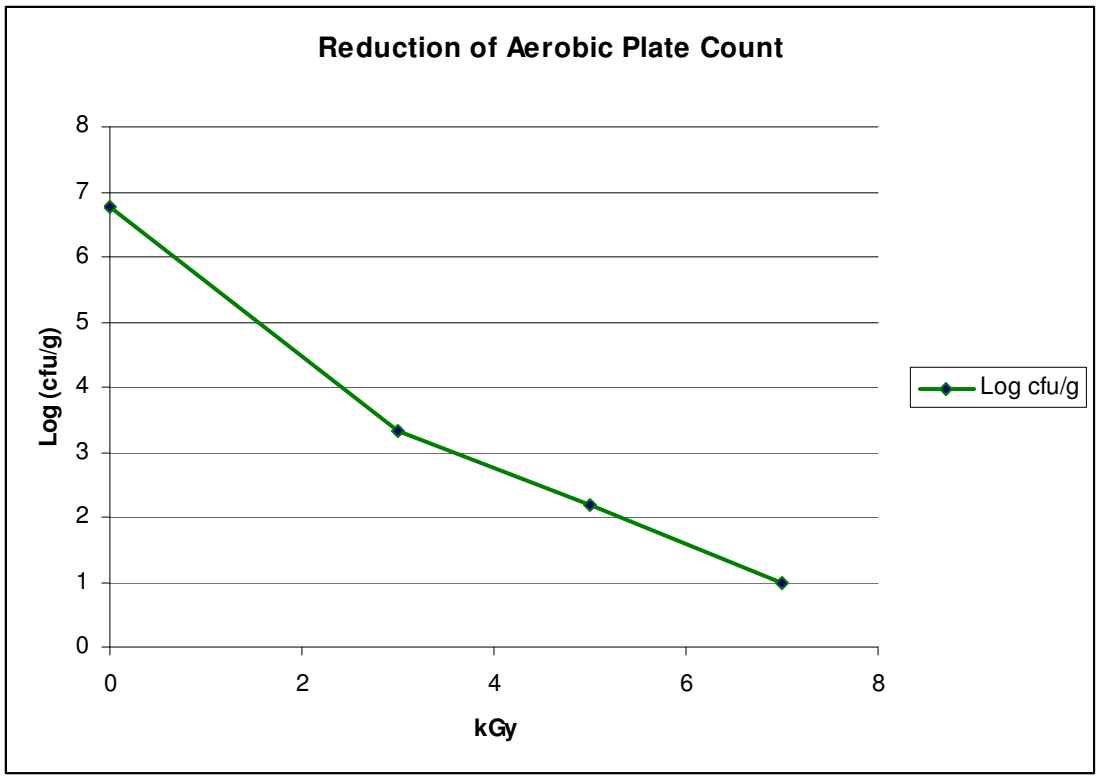
P,** Present* $^{\tau}$A,** Absence*

The specifications of laboratories to accept or reject this snail secretion are presented in the table 3.

Table 3. Specifications

	Specification
A.P.C. cfu/g	<1.0 E+02
Fungus	<1.0 E+01
Pathogens	A

Graph 1. Reduction of Aerobic Plate Count



2.3.2 Proteins results

The result of the proteins analyses are shown in the table 4:

Table 4. Proteins results.

	Control	7.0 kGy	10 kGy
Protein (%)	1.60	1.55	1.55
Alantoine (ppm)	62.15	64.46	63.02
Glycolic acid (ppm)	6637	8280	7854

2.4.- Discussion and Conclusions

The results show that if the dose radiation increases, a progressive reduction of the aerobic mesophyle microorganisms occurs, but the pathogen elimination is obtained around 7.0 kGy of radiation, therefore, the optimal microbiological reduction would occur with doses close to 7.0 kGy, depending on the initial burden of the product.

The results have permitted to establish that doses of 5.0 and 7.0 kGy make reduce 4 and 5 logarithmic cycles, the count of total aerobic mesophyles, respectively, these values are kept to the requirement of the laboratories that carry out the processes of the product manufacturing.

In relation to the components, they were not affected by the radiation, being their values similar to the ones of the control group, not radiated. This fact shows the benefits of this technology on reducing the microbiological burden without altering the properties described for the snail secretion.

The radiation meets the objective of reducing the microorganisms that affect the quality of this product, but it is necessary to take control of the procedures used in obtaining the snail secretion by applying a good manipulation practice since these procedures exert a great influence in the final count.

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