



# IJPPR

INTERNATIONAL JOURNAL OF PHARMACY & PHARMACEUTICAL RESEARCH  
An official Publication of Human Journals

ISSN 2349-7203



Human Journals

**Research Article**

August 2016 Vol.:7, Issue:1

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## Extraction of Pectin from Citrus Fruits and Comparing Its Amount Yield with Different Cosmetic Chemical Face Wash



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ISSN 2349-7203

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**Submission:** 7 August 2016  
**Accepted:** 12 August 2016  
**Published:** 25 August 2016

**Keywords:** Pectin, Heteropolysaccharide, Protopectin, Abdominal cramping, Bloating, Food and Drug Administration (FDA)

### ABSTRACT

The present study was done to extract pectin from citrus fruits and comparing its amount yield with cosmetic chemical face wash which contain pectin coming from citrus fruit peels. Experiment was demonstrated using three fruits namely - Sweet Orange (citrus- species, Citrus × **Sinensis**), Lemon (citrus- species, Citrus × **lemon**), and Mosambi(citrus- species, Citrus **limetta**) and compared it with the three chemical face wash sold in market. Study revealed that fruit peel may contain more pectin than chemical face wash sold in market. Therefore natural citrus fruit's peels as natural source available at low cost in market may prove the better source of pectin which is used for making cosmetic products.



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## INTRODUCTION

Pectin is naturally occurring in leaves, roots and fruits. It is a structural heteropolysaccharide and was first isolated and described in 1825 by Henri Braconnot. The fruits which contain more amount of pectin are citrus fruits, especially, lemons and oranges, according to the study published in a 1997 edition of the “Journal of Food Science”. The majority of the pectin resides in citrus peel and is less pulp. Pectin is extracted by adding hot diluted acid at pH-values from 1.5 – 4.5. During several hours of extraction, the protopectin loses some of its branching and chain length and goes into solution. After filtering, the extract is concentrated in vacuum and the pectin then precipitated by adding 95% alcohol. Alcohol-precipitated pectin is then separated, washed and dried. After drying and milling, pectin is usually standardised with sugar and sometimes calcium salts or organic acids to have optimum performance in a particular application (Eisenbrand and Schreier, 2006).

Pectin was first sold as a liquid extract, but is now most often used as dried powder, which is easier than a liquid to store and handle (IPPA 13 June 2007). Pectin is used as a gelling agent, thickening agent and stabilizer in food (Keppler *et. al.*; 2006), in cosmetics, in pharmaceutical industries (Sriamornsak , 2003). It also been used in gentle heavy metal removal from biological systems (Zy *et. al.*; 2008). Pectin appears to be safe when used orally in recommended amount; large amount can cause abdominal cramping and bloating (Olsen and Aksel, 1940) (Drug Cosmetic Ind. 1942, **50**:317).

## NUTRIENT FACTS IN PECTIN

AMOUNT PER 100 GRAMS-

<b>Calories-325</b>	<b>% Daily Value*</b>
<b>Total Fat</b> 0.3 g	0%
<b>Cholesterol</b> 0 mg	0%
<b>Sodium</b> 200 mg	8%
<b>Potassium</b> 7 mg	0%
<b>Total Carbohydrate</b> 90 g	30%
<b>Protein</b> 0.3 g	0%

The word cosmetic was derived from the Greek word “kosm tikos” meaning having the power, arrange, skill in decorating (Kokate *et. al.*; 2006). The concept of beauty and cosmetics is as ancient as mankind and civilization. Women are obsessed with looking beautiful. So, they use various beauty products that have herbs to look charming and young. Indian herbs and its significance are popular worldwide. An herbal cosmetic have growing demand in the world market and is an invaluable gift of nature. Herbal formulations always have attracted considerable attention because of their good activity and comparatively lesser or nil side effects with synthetic drugs (Pandey and Meshya 2010). Herbs and spices have been used in maintaining and enhancing human beauty. Indian women have long used herbs such as Sandalwood, Turmeric and citrus fruit peels for skin care. The herbal cosmetics manufactured and used commonly for daily purpose include herbal face wash, herbal conditioner, herbal soap, herbal shampoo etc. The skin and hair beauty of individuals depends on the health, habits, routine job, climatic conditions and maintenance (Majeed *et. al.*; 1996). The skin due to excessive exposure to heat will dehydrate during summer and causes wrinkle, freckles, blemishes, pigmentation and sunburns. The extreme winter cause damages to the skin in the form of cracks, cuts, maceration and infections. The skin diseases are common among all age groups and can be due to exposure towards microbes, chemical agents, biological toxin present in the environment, and also to some extent due to malnutrition (CHEMEXCIL 1992). The only factor they had to rely on was the knowledge of nature compiled in the Ayurveda. The science of Ayurveda had utilized many herbs and floras to make cosmetics for beautification and protection from external affects. The natural content in the botanicals does not cause any side effects on the human body; instead enrich the body with nutrients and other useful minerals (AS Boudin, social science medicine, 1999). The herbal cosmetics are the preparations containing phytochemical from a variety of botanical sources, which influences the functions of skin and provide nutrients necessary for the healthy skin (European Commission, Directives 93/35/EEC, 1993). There is common belief that chemical based cosmetics are harmful to the skin and an increased awareness among consumers for herbal products triggered the demand for natural products and natural extracts in cosmetics preparations. The increased demand for the natural product has created new avenues in cosmeceutical market. Herbal products in cosmetics or herb in cosmetics can also be referred as botanical origin products in cosmetics.

**Requirements for the basic skin care:**

a) *Cleansing agent*: which remove the dust, dead cells and dirt that choke the pores on the skin. Some of the common cleansers include vegetable oils like coconut, sesame, citrus peel and palm oil (Rele and Mohile, 2003).

b) *Toners*: The toners help to tighten the skin and keep it from being exposed to many of the toxins that are floating in the air or other environmental pollutants. Some of the herbs used as toners are witch hazel, geranium, sage, lemon, ivy burdock and essential oils. (Sanctis *et.al*; 2004).

c) *Moisturizing*: The moisturizing helps the skin to become soft and supple. Moisturizing shows a healthy glow and is less prone to aging. Some of the herbal moisturizers include vegetable glycerin, sorbitol, rose water, jojoba oil, aloe vera and iris (Brown *et. al.*; 2002).

Herbal medicine have long history of use and better patient tolerance as well as acceptance. Medicinal plants have a renewable source, which is our only hope for sustainable supplies of cheaper medicines for the world growing population (Gediya *et. al.*; 2011).

The United States Food and Drug Administration (FDA) classifies pectin as an ingredient that's "generally recognized as safe," and the Environmental Working Group's Skin Deep Database considers it to be a low-hazard cosmetic ingredient.

**MATERIALS AND METHODS**

All the chemicals and reagents used were of analytical grade.

**Raw material: -**

- 1) Fresh citrus fruits (lemon, mousambi, orange),
- 2) Chemical Face wash bottles (2 ORANGE AND 1 LEMON).

**Other Materials: -**

- 1) Stock solution (1.92 of citric acid + 100 ml distilled water),
- 2) pH 4.2 (31.5ml of stock solution in 100 ml distilled water),
- 3) Glasswares (conical flask, stirrer, Petri-plates, beakers, measuring cylinder),

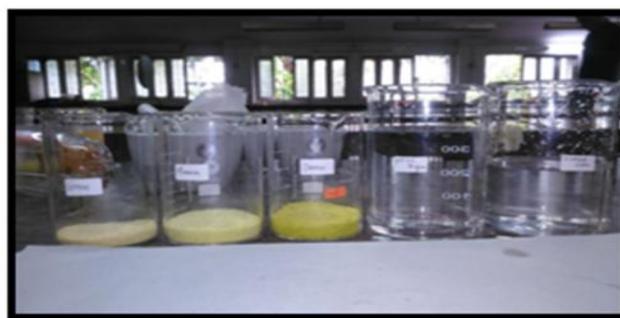
- 4) 95% alcohol,
- 5) Water Bath,
- 6) Filter Papers,
- 7) Cabinet drier.

• **Methods: -**

- 1) Fresh fruit (lemon, mousambi, orange) was purchased from local market. Their peels were cut into small pieces simultaneously inside pulp was removed and dried at 55°C in oven for 48 hrs.
- 2) Dried peel and pulp were then powdered separately using motor and pestle, while 10 g of chemical face wash was taken into different beakers.
- 3) All beakers (containing 10g powder and 10 g face wash + distilled water + buffer) were kept in water bath at 45°C for 1 hour. Continue stirring was done for 1 hour.

**Table No. 1. Showing amount of peels and chemicals used.**

<b>Amount Of Peel powder In g.</b>	<b>Distilled Water in ml.</b>	<b>Buffer.</b>
Orange peel powder 10 g.	180 ml distilled water.	20 ml Buffer.
Mosambi peel powder 10 g.	180 ml distilled water.	20 ml Buffer.
Lemon peel powder 10 g.	180 ml distilled water	20 ml Buffer



**Figure 1. Showing powder of peels and chemical used.**

4) After 1 hour – Beakers were removed from water bath and kept for 10 minutes in room temperature.

**Table No.2. Amount of pulp powder and chemicals used.**

<b>Amount Of Pulp powder in g.</b>	<b>Distilled Water in ml.</b>	<b>Buffer.</b>
Orange pulp powder 10 g.	180 ml distilled water.	20 ml Buffer.
Mosambi pulp powder 10 g.	180 ml distilled water.	20 ml Buffer.
Lemon pulp powder 10 g.	180 ml distilled water	20 ml Buffer.



**Figure 2. Showing powder of pulp.**

**Table No.3 Amount of face wash and chemicals used.**

<b>Amount of face wash in g.</b>	<b>Distilled water in ml.</b>	<b>Buffer.</b>
<b>Chemical face (A1) wash containing orange peel 10g.</b>	180 ml distilled water.	20 ml Buffer.
<b>Chemical face(A2) wash containing lemon peel 10 g.</b>	180 ml distilled water.	20 ml Buffer.
<b>Chemical face (A3) wash containing orange peel</b>	180 ml distilled water	20 ml Buffer.



**Figure 3. Showing filtration process.**

- 5) Then filtered using Whatman filter paper.
- 6) The pectin was precipitated by adding absolute alcohol (95-98%) in filtered solution in the ratio of 1 part extract to 2 parts alcohol and kept at room temperature for overnight
- 7) The precipitated pectin was filtered through the filter paper what man No.1 and washed with 75% alcohol (v/v), 85% alcohol (v/v) and absolute alcohol to remove the soluble impurities.
- 8) Pectin was dried at 40°C for 24 hours in a cabinet drier.

### RESULTS AND OBSERVATIONS

- Results obtain in Face wash-

#### Table No.4 Results obtain in Face wash.

- Result obtain in peel n pulp-

A1 FACE WASH	0.05g.
A2 FACE WASH	0.05g
A3 FACE WASH	0.05g

#### Table No.5 Results obtain in citrus peel and pulp.

	Peel /10 g.	Pulp/10g.
Lemon	0.105 g.	0.035 g.
Orange	0.085 g.	0.0245 g.
Mosambi	0.049 g.	0.0104 g.

## DISCUSSION

The aim of present study was to extract pectin from dried citrus fruit peels, in order to increase profits for citrus fruit growers and processors. Pectin is complex mixture of polysaccharides that makes out about one third of the cell wall of dry substance of higher plants. Highest concentration of pectin is found in middle lamella of cell wall, with a gradual decrease as moving through the primary cell wall toward plasma membrane. (Krishnamurti and Giri.; August 25, 1948). Pectin extracted from citrus peels at pH 4.2 is lesser than pH 1, 2, 3. (Pandharipande and Makode; 2012). Adding alcohol precipitates the pectin n makes it pure. The result of this study is similar compatible with other studies. Pectin in lemon, mousambi, orange is brown in colour while obtained pectin is soluble in hot water between 60°C - 80°C and solubility of pectin suspension in cold alkali forms yellow precipitate and solubility of pectin suspension in hot alkali dissolve and turns milky (Aina *et. al.*; June 15, 2012). Aqueous solutions of pectins are slightly acidic (Fishman *et. al.*; 1984) hence we are in agreement with the studies conducted by above researchers.

The objective of the present work was extraction of pectin from industrial waste of orange fruit peel.

It can be said that natural citrus fruit peels can be used to apply on skin instead of chemical cosmetics sold in market and therefore cream, face wash etc. can be made naturally at home or herbal products can be purchased from market. Herbal cosmetics are natural and free from all the harmful synthetic chemicals which may prove to be toxic to the skin. Instead of traditional synthetic products different plant parts and plant extracts are used in these products, e.g. pectin, aloe vera gel and coconut oil etc.

## CONCLUSION

In present study, pectin was successfully obtained from citrus fruits mentioned above. LEMON peel showed highest yield. Pectin is used in cosmetic and personal care product including facial moisturizers, facial cleansers, sunscreen products, anti-aging treatment, makeup foundation, shampoo, hair conditioner and hair styling products. As pectin swells in presence of water, it increases viscosity of cosmetic and personal care product, giving them a more substantial feel and better performance. All in all, pectin is naturally derived ingredient that comes from the rinds of fruit. Natural cosmetics are not that expensive. In fact, some of these products are more affordable than synthetic ones. They are offered at discounted prices

and are sold for a cheap price during sales. Just need to survey enough to look for great deals. An estimate of WHO demonstrates about 80% of world population depends on natural products for their health care, because of side effects inflicted and rising cost of modern medicine. World Health Organization currently recommends and encourages traditional herbal cures in natural health care programs as these drugs are easily available at low cost and are comparatively safe. So the overall results showed that natural fruit may have rich source of pectin as compared to chemical face wash sold in market. And therefore in older days - Egyptian life- Queen Elizabeth other Queens and many people used to dry orange peels in sun and then dried peel powder was mixed with honey, milk, rose water and many herbal products and then use to apply on skin as cosmetic.

## ACKNOWLEDGEMENT

The authors of the research paper are thankful to Principle of Vidyavardhini's Annasaheb Vartak College of Arts, Commerce and Science for availing the laboratory and library facilities.

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