



PRODUCTION OF BETA-CAROTENE FROM CARROT

Atul D Hemne¹, Akash N Jadhao², Aditya V Kawade³, Prashant R Tayade⁴

¹Chemical department of J.D.I.E.T Yavatmal, Maharashtra, India, atulhemne94@gmail.com

²Chemical department of J.D.I.E.T Yavatmal, Maharashtra, India, akashjadhao8180@gmail.com

³Chemical department of J.D.I.E.T Yavatmal, Maharashtra, India, adikawade9428@gmail.com

⁴Chemical department of J.D.I.E.T Yavatmal, Maharashtra, India, prashanttayade1@rediffmail.com

Abstract

Production of beta-carotene from carrot using extraction method was done by using ethanol solvent. Beta-carotene is the highest constituents in carotene. Fresh carrots are used as a sample in this study. The overall process of this survey involves four major steps which are sample preparation extraction of carotene compound by using mixer settler extraction, solvent separation of extracted compound by using Evaporation process(single effect evaporator) and to convert beta-carotene in powder form by using drying process. At a temperature condition of evaporation column is 100° c and drying process 100° c temperature is maintained. Beta-carotene is best in manufacturing medicines of cancer and to supplement the vitamin A.

Keyword: Carrot juice, Extraction, Evaporation, Drying

1. INTRODUCTION

These days within the era of globalisation, wherever new diseases nearly return of times and unendingly, individuals currently area unit extremely regarding regarding their safety and health. several efforts area unit done like active healthy life, eat right food, have decent sleep and lots of different helpful things. owing to the statistics explicit higher than, individuals currently looking for each single healthy issue particularly in food. that's why we frequently detected the phrase 'we area unit what we tend to eat'. As a result, the demand for "natural food colorants like carotenoids is growing owing to client issues for food safety and quality. Actually, there area unit several sources of carotenoids like plants and vegetables. the color of fruits, roots, flowers and vegetables area unit sometimes will be caused by carotenoids which give the pigments. carotenoid is most long carotenoids. this is often give by eightieth of carotenes area unit beta carotenes. It will be found notably in fruits, orange color vegetables, dark inexperienced foliaceous vegetables together with pumpkin, carrots, winter squash, sweet potatoes, apricots, mangoes, kale, spinach and kale (steinmetz and potter, 1996). Carrots area unit one in every of the most effective sources of beta-carotenes with vary 300mg/100 g Carotenoids square measure normally called provitamin A. aside from that, it's been prove that carotenoids play a job as antioxidants. Since it's giant edges to individual, several experimental tests are worn out order to extract carotenoids from it sources. Since, it's giant edges to individual several experimental tastes are worn out order to extract carotenoids from its sources so as to get carotenoids from plants, several extraction

ways are introduced to fulfil the necessities like distillation. Super important fluid extraction (SFE), solvent extraction, microwave-assisted distillation and extraction. the straightforward definition of extraction could be a quite separation method by exploitation solvent within which the required substance dissolve in whereas the unsought substance doesn't dissolve in. during this project, carrot is employed as a supply of a carotenoids wherever it'll be extracted by exploitation mixer settler extraction instrumentality .The project are going to be investigated for extraction by the kind of solvent square measure grain alcohol is employ One of the foremost public health nutritional issues in Malaysia as a developing country is axerophtholnadequacythis can be as a result of the general public in developing countries don't extremely apprehend the operate of carotenoids. They seldom embody fruits and vegetables into their diet. preventable vision defect is accountable owing to deficiency of axerophthol. diseases such heart diseases, cancer, cataracts, and devolution may be decreased if enough carotenoids ar taken into the diet Carotenoids had best-known of it's attributed to health edges once consumed as a part of human diet. Carotenoids consumption may be reduced the risks of cancers, kind of diseases, disease (cataract), and age-related devolution (luteinlab.unh.edu). So, it may be aforesaid that carotenoids is extremely helpful because it will act as diseases interference.

1.1 Material And Method

Raw Material :

1. Carrot (Juice)
2. Ethanol (Solvent)

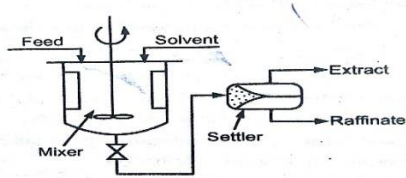
Preparation Method.

CARROT JUICE



1.2 PROCESSES:

Extraction Process:

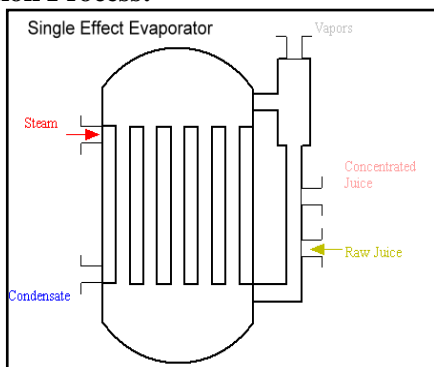


(b) Continuous single-stage Mixer-settler

Procedure

1. Feed the fresh carrot juice in the mixer
2. Add the required amount of ethanol solvent in the feed solution.
3. Start the agitator for mixing process for required span of time
4. After the mixing this mix solution send to the settler.
5. The mixture settles down in settler with formation of two layers. Upper layer is extract layer and bottom layer is raffinate.

Evaporation Process:

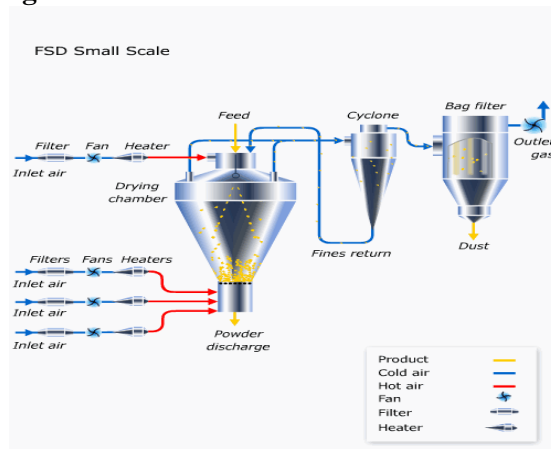


Procedure

1. After extraction operation, extract phase is feed to the single effect evaporator.
2. Then further steam is added top side of evaporator where temperature is maintained about 100 Deg. Celsius.
3. The extract phase consist of ethanol and water and Beta-carotene.
4. As the evaporation process carried out there the boiling temperature of Ethanol and water get vaporised.

5. This ethanol vapours are then removed from the column and concentrated juice further transfer for drying process.
6. Process steam is removed out in the form of condensate.

Drying Process:



Procedure

1. Beta-Carotene slurry feed to the drying chamber.
2. Filter air pass through the heater at top side and bottom side to the drying chamber at a hot air temperature 100° c.
3. Due to evaporation the water content and other components are vaporized from drying chamber to cyclone separator.
4. The evaporated contents contain some amount of beta-carotene and that beta-carotene is separated by cyclone separator and again passed to the dry chamber and unwanted material is passed to the bag filter.
5. The dust practical is filtered out from the bottom and the gas is removed out from the top of bag filter.

2. PROPERTIES

Table-1: Properties Of Beta-Carotene

| | |
|---------------------|---------------------|
| Chemical Formula | C40H56 |
| Molar Mass | 536.89 g.mol-1 |
| Appearance | Dark orange crystal |
| Density | 0.941 g/cm3 |
| Melting Point | 176-184 °C |
| Boiling Point | 654.7 °CS |
| Solubility in water | Insoluble |
| Solubility | Benzene, Ethanol |

Table-2: The amount of Beta – Carotene Extracted from Carrot in different solvent (Temperature:30 °C, Solid/liquid ratio 1/5 and Extraction Vegetables sample time5 Hours)

| Extraction Solvent | Equilibrium value | Of particle | with equivalent diameter (cm)(mg/100g) |
|--------------------|-------------------|--------------|--|
| Solvent | 1.077±0.134 | 0.801±0.1078 | 0.508±0.0456 |
| Ethanol | 1.229 | 2.256 | 2.473 |
| Per Ether | 0.552 | 0.854 | 1.192 |

| | | | |
|---------------|-------|-------|-------|
| n-hexane | 0.279 | 0.958 | 10148 |
| Ethyl Acetate | 0.886 | 1.129 | 1.153 |

3. CONCLUSION

This survey gives complete process on this topic. Starting from the raw material and its nature. Next, the nutrition contain carrot especially beta-carotene and its function. After that some idea on the way mixer settler extractor and then distillation of beta-carotene works. Later, it is converted to powder form using drying process.

ACKNOWLEDGEMENT

The author of thank full to J.D.I.E.T Yavatmal Asst. Prof. Dr. P. R. Tayade for their valuable support providing facilities to carry out this research work

REFERENCE

- [1] [Binay. K. Dutta] principles of mass transfer and separation processes.
- [2] Ferrari, C. K. B., 2004. Functional foods, herbs and nutraceuticals: Towards biochemical mechanisms of healthy aging. *Biogerontology*. 5, 275–289.
- [3] Kanatt, S. R., Chander, R., Sharma, A., 2008. Chitosan and mint mixture: A new preservative for meat and meat products. *Food Chem.* 107, 845–852.
- [4] Borowska, J., Kowalska, M., Czaplicki S., Zadernowski, R., 2003. Effect of hydrothermal processing on carrot carotenoids changes and interactions with dietary fiber. *Nahrung*, 47, 46–48.
- [5] Schüep, W., Schierle, J., 1997. Determination of β -carotene in commercial foods: Interlaboratory study. *J. AOAC Int.*, 80, 1057–1064.