

Vacuum Frying Technology in Fisheries Product

Mata Kuliah
Teknologi Pengolahan Hasil Perikanan Modern



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Frying

Fried Product



Frying

- ✓ **A key process in the manufacture of many snack products**
- ✓ **Exposes oil to high temperatures for extended periods of time**

Traditional Frying Methode

- *Shallow/Pan Frying* atau Penggorengan Dangkal
- *Deep-Fat Frying*

Shallow/Pan Frying

Proses pematangan dan pencoklatan tidak terjadi secara merata di seluruh lapisan permukaan bahan yang digoreng.



Deep Fat Frying

seluruh bagian bahan pangan terendam dalam minyak yang banyak dan seluruh bagian permukaannya mendapat perlakuan panas yang sama sehingga berwarna seragam.

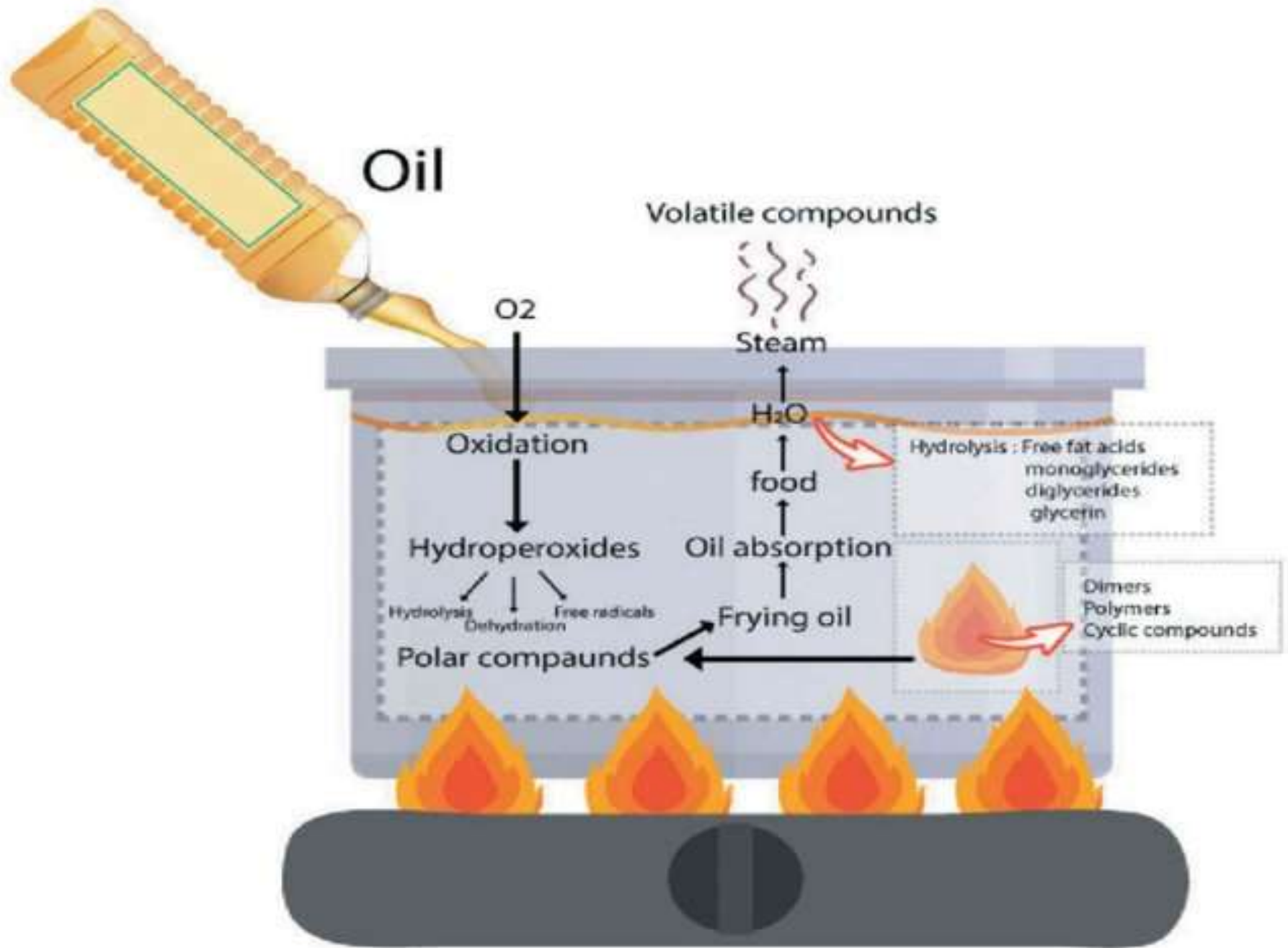
Deep-Fat Frying



Weakness of Traditional Frying Method

Chemical reactions that take place in the frying process:

- **Hydrolysis:** In this process, an oil molecule reacts with a water molecule forming a molecule of free fatty acid and diglyceride.
- **Oxidation:** In this process, the unsaturated fatty acids react with the oxygen and produce various oxidation products. Some impart good flavor to the products, while the majority of them impart an off flavor in the product as it ages in the package.
- Constant heating and improper operation of the fryer also produces thermal decomposition products that impart bad flavor to the fried food.
- Certain metals and other components in the food also accelerate the hydrolysis and oxidation process in the oil during frying.



Vacuum Frying

- Frying process that is carried out at pressures well below atmospheric level
- Menurunkan titik didih air sampai 50° - 60° C
- An alternative way to improve the quality of food product by atmospheric frying (*Dueik and Bouchon, 2011*)
- Penggorengan hampa yang dilakukan dalam ruangan tertutup dengan kondisi tekanan vakum (Lastriyanto, 1997).
- Menghisap kadar air dengan kecepatan tinggi
- Mengatur keseimbangan suhu dan tekanan vakum

Vacuum Frying

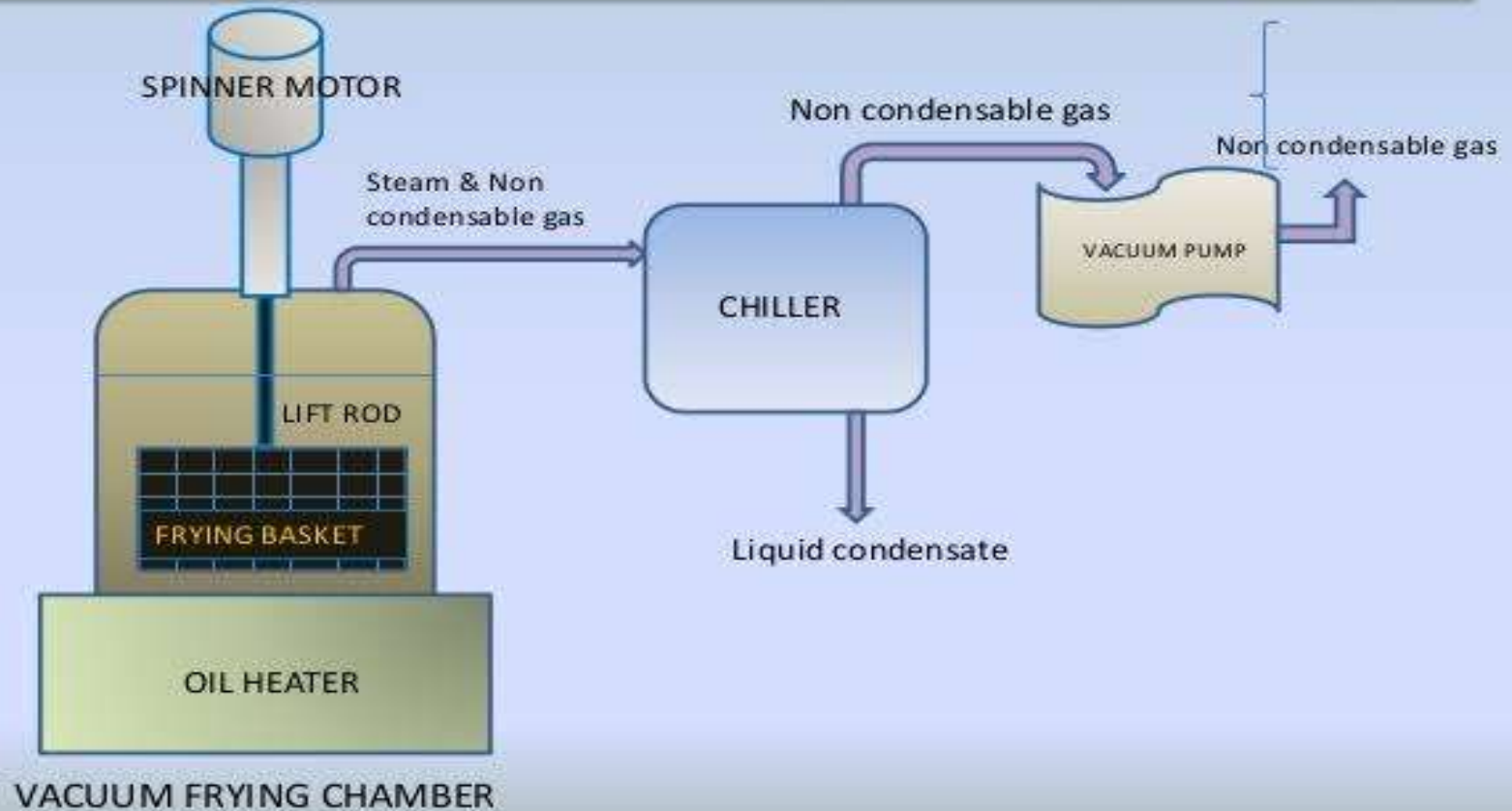
- Menurunkan kadar minyak pada produk, jika dibandingkan dengan penggorengan biasa
- Menghambat ketengikan minyak
- Mempertahankan keaslian warna dan rasa produk
- Memperthankan nutrisi produk (vitamin dan mineral)
- Mengurangi kandungan akrilamida (senyawa karsinogenik)

Komponen *Vacuum Frying* **(Lastriyanto, 1997)**

- **Pompa vakum**
- **Tabung penggoreng**
- **Pengendali temperatur**
- **Kondensor**
- **Sumber pemanas.**

Mekanisme *Vacuum Frying*

Vacuum frying system

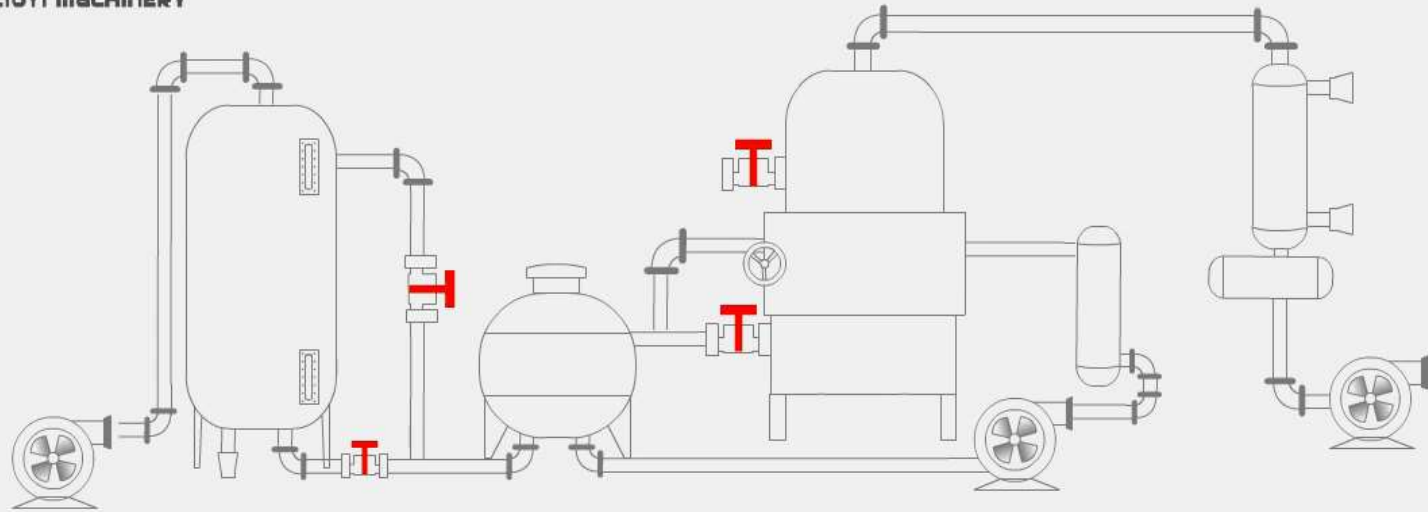


Tahapan Proses *Vacuum Frying*

1. The vacuum frying process required the heating of oil to the required temperature
2. Then the sample to be processed was placed in the basket inside the frying chamber but suspended above the hot oil.
3. The pressure inside the vacuum frying chamber was reduced to the required pressure.
4. The sample was then lowered into the hot oil for the required duration and then the basket was raised above the oil and then centrifuged within the chamber for the required speed and time.
5. The fried product can also be taken out of the chamber and centrifuged using a separate machine or stood in the frying chamber to drain the surface oil.
6. The product was then placed on absorbent paper, cooled and packed in an aluminium laminate bag with or without nitrogen flushing.



LIUYI MACHINERY





Vacum Frying Product



Packaging





Vacuum frying of fish tofu and effect on oil quality usage life

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Abstract

Atmospheric frying (165 °C) and vacuum frying (120 °C at 21 kPa) conditions for the processing of fish tofu made from *surimi* were compared. The application of vacuum frying showed that it could be used to reduce the final oil content of the fish tofu. A high atmospheric frying temperature caused a high rate of increase of temperature toward the center of fried fish tofu and caused microstructure destruction. It could be a concern that changes to the moisture content was obstructed after 60 s. On the other hand, surface collapsing caused an increase of oil uptake

Article

Effects of Vacuum Frying on the Preparation of Ready-to-Heat Batter-Fried and Sauced Chub Mackerel (*Scomber japonicus*)

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Vacuum frying process of gilthead sea bream (*Sparus aurata*) fillets

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ABSTRACT

Vacuum frying was tested as an alternative technique to develop low oil content fried gilthead sea bream fillets. Three oil temperatures for vacuum frying (90, 100, and 110 °C) were considered. For each temperature the times investigated were 1, 2, 3, 4, 5, 6, 8 and 10 min. To compare the effect of vacuum frying to atmospheric frying on the characteristics of gilthead sea bream fillets and frying rate, treatment at 165 °C was considered. The effect of oil temperature and pressure conditions on the drying process and oil absorption of sea bream fillets was investigated. Other product attributes such as shrinkage and colour were analyzed. Atmospheric frying (165 °C) produces a greater decrease in the mass of the fillets than vacuum frying treatment. Compared with atmospheric frying, oil content of vacuum-fried fish fillets was lower. After

EFFECT OF VACUUM FRYING ON THE PROXYMATE QUALITY OF CRISPY CATFISH (*Clarias gariepinus*)

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Abstract

Conventional frying of foods usually is carried out under atmospheric conditions at temperatures near 190°C. The problem that arises most often is excessive darkening or scorching of the product, even before the product is completely cooked. Vacuum frying is a process that is carried out under pressures well below atmospheric level (below 6.65 kPa). Vacuum-fried products are expected to have higher retention of nutritional quality (phytochemicals), color is enhanced (less oxidation), and oil degradation is reduced compared to atmospheric frying. This research aimed to investigate the effect of vacuum frying processing on the quality of crispy catfish produced by the Youth Organization Group of Kandangsemangkon, Paciran Lamongan. We divide the samples into two groups, i.e. 1. Crispy catfish processed using conventional frying and 2. Crispy catfish

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ORIGINAL ARTICLE

Optimizing air-frying process conditions for the development of healthy fish snack using response surface methodology under correlated observations

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