

TECH-KNOWLEDGE

The Official PMG Engineering Newsletter



FOOD & BEVERAGE
INDUSTRY

ENGINEERING
& DESIGN

SCIENCE &
TECHNOLOGY

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LIGHTNING PROTECTION UNIT



Introduction

Lightning is an atmospheric discharge of electricity from thunder, occurs during thunderstorms. The atmospheric discharge lightning can travel at speed of light and its temprature can reach upto 30,000 degree celcius. The effect of lightning strike may cause thousands of death every year. It is a natural phenomenon occuring at any day and this discharge produce a wide range of electromagnetic radiation.

Lightning protection unit are designed to protect the building structures, industrial appliances, commercial building, HT substation, electrical equipments, communication transmission lines etc from damage effect of lightning strike. It play a very important role in safety from lightning storms. A lightning strike could bring thousands of mega ampere current within milliseconds. As a result, failure of home and industrial appliances, fire in building structures, home etc and may cause death also.

Components of lightning protection devices

1.Air terminal

Air terminal is used to intercept lightning strike. It provide a low resistance path to lightning strike and it is connected to downconductor and down conductor is connected with earthing electrode which is directly kept into soil mud. Whenever lightning strike hits, the whole current is discharged through air terminal- which is connected to ground electrode instead of building structure.

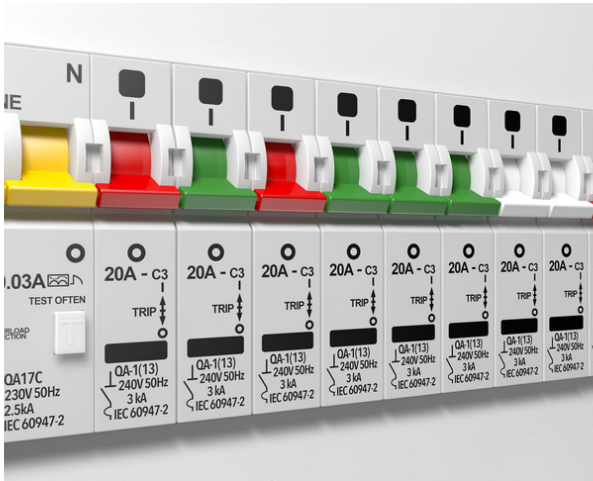
2.Downconductor

Down conductor provide a low resistive path to lightning current from air terminal to ground electrode. It should be installed vertically and straight to avoid the bending of down conductor. This shall ensure minimum inductance because of resistance in the path of discharging current and surges.

3.Grounding

It play a very important role in discharging lightning current. It dissipates all the lightning current into a big mass of soil. The soil resistivity should be less than 10 ohm for comfortable discharge of current, according to electrical standard. A typically earth electrode of copper alloy is deep driven vertically into the soil. Soil have finit conductivity so that current discharges easily. The mixing of charcoal and salt is done in soil pit to decrease the resistivity of soil.

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Lightning Arrestor

These devices are designed to protect the transmission line, insulations, switchgears, transformers communication line by the effect of lightning strike. They directly installed to power substation, distribution system or telecommunication line. It has ground terminal and high voltage terminal and whenever lightning travel along the power line to arrestor then current through surges diverted by arrestor to earth. In telegraphy and telecommunication, it is placed where wires enter a structure so that preventing damage to electronic instrument and ensuring safety near to them. Their purpose is basically to limit the rise in voltage when power lines are struck by lightning.

1.Station class

Typically used in power stations or substations and other high voltages structure and areas. It is designed to protect equipment above 20MVA range.

2.Intermediate class

Designed to used in medium voltage equipment areas, electrical substations, transformer or other substation equipment and it is designed in range of 1 to 20 MVA.

3.Distribution class

Most commonly found on transformers and are commonly used in equipments rated at 1000kva or less.

4.Secondary class

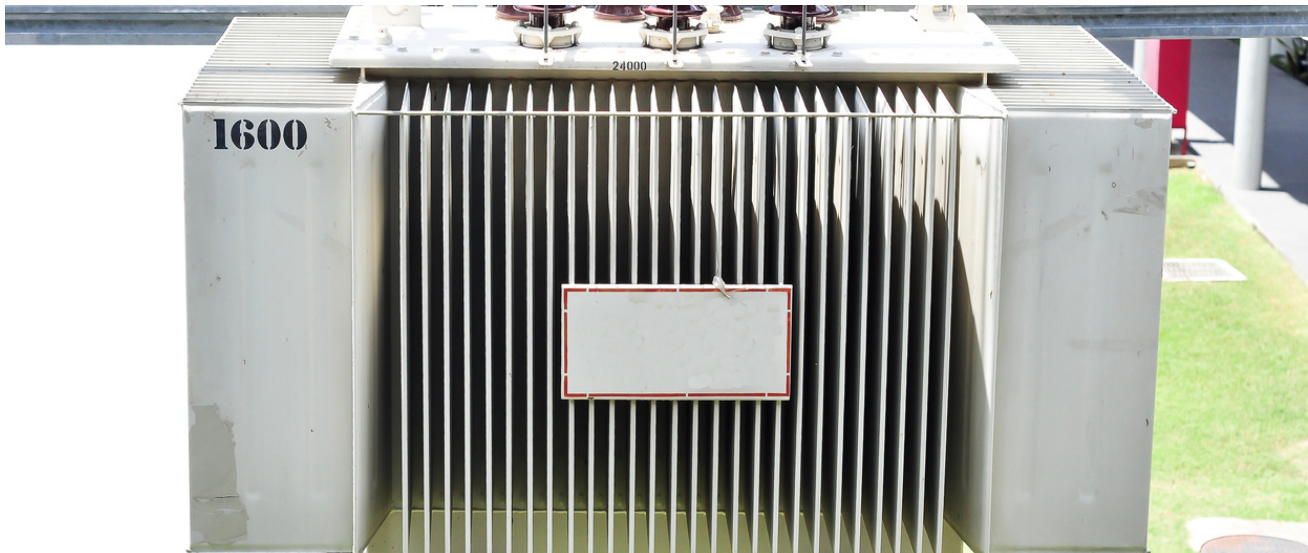
Found in homes and commercial buildings and provide least amount of protection to electrical system.



Conclusion

All electrical equipment in an electrical system needs to be protected from voltage surges. The rating of arrestor, the class of arrestor and location of arrestor all play a important role in the surge protection. In protection of substation, we use different class of lightning arrestors to protect the electrical equipment and In ships, water is used to discharge voltage.

TRANSFORMER



Introduction

It is static device used to step up and step down of voltage level without change in frequency and power. Transformer works on the mutual induction principle. This principle states that when electric current flows in primary winding supply then due to alternating nature of supply voltage, it develops varying nature of flux and whenever varying mutual flux linked to a secondary winding through core then according to faraday law, whenever either conductor cuts a magnetic flux or magnetic flux cuts a conductor, EMF produced in conductor, hence in this way, EMF developed on secondary winding.

Types of Transformer

1.Step up transformer

It is used to step up the level of voltage. This transformer increases voltage from primary to secondary winding. In this transformer, secondary turns are more than primary turns. This transformer has made long distance transmission power practical because it steps up the voltage and corresponding it decrease current at same ratio hence, due to decreases the current level there is much less power losses in line. This is used generally for long distribution.

2.Step down transformer

This transformer decreases level of voltage from primary to secondary. In this transformer, secondary turns are less than primary turns. It is used mainly in distribution and load side. This transformer has a wide variety of application like distribution side and electronic devices etc. When it comes to operating voltage, the step up transformer application can be roughly divided into two groups: LV (voltages up to 1kv) and HV (voltages above 1kv).

Construction of transformer

1.Core

The core of transformer is typically built with high permeability materials, such as silicon steel laminations.

2.Conservator

A cylindrical tank plays a key role in transformer. It is arranged over the main tank roof so that sufficient space can be provided to expand to transformer oil. Once the temperature increases, then oil volume can also be increases, then oil volume can also be increased. Then oil goes to conservator tank after cooling down it returns to main tank.

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3. Breather

As a temperature of transformer increases, the insulating oil in transformer heats up. When oil heats up and spreads, the transformer breathes air in and oil is cooled down and oil level is consumed. The oil level in chamber rises and reduces as breather brings the air in and out to cool the air. The air carries moisture, which contaminates oil and thus deteriorates the consistency of oil. The breather is packed with silica gel to remove moisture content.

4. Radiator

The basic function of radiator is to cool down the transformer oil. Oil immersed power transformer is generally provided with detachable pressed sheet radiator with isolating valves. But in case of small size distributing transformer, the radiators are generally integrated parts of transformer body and projected from main tank. The working principle of radiator is very simple.

5. Bushings

Bushings are the insulation system in construction of transformer that enables an electrical conductor to safely transfer electrical energy through it. When a significant volume of electrical energy travel through it, it provides electrical field power to withstand insulation of conductor.

6. Buchholz relay

In order to protect of transformer from internal short circuit due to oil, buchholz relay is used for oil immersed transformer, buchholz relay is an oil and gas actuated relay which sense the fault occurring in the part immersed in transformer.



Distribution voltages classes and standard ratings of transformer

1. Small transformer

They are used for stationary, portable or hand held power supply units. They may be used to supply three phase power up to 40kva at frequencies up to 1mhz.

2. Distribution Transformer

They are used to distribute power to domestic premises. They may be single phase or three phase. They have rating ranging from 16kva up to 2500kva and this type of transformer like 11, 6.6, 3.3, 440 sand 230V.

3. Supply Transformer

They are used to supply larger industrial premises or distribution substations. Ratings ranging from 4mva to 30mva, with primary winding rated up to 66kv and secondary up to 36kv.

4. Transmission transformer

They are among largest and highest voltage transformer in use. They are used to transmit power between high voltage networks and Rating ranging from 60mva to 1000mva and winding are rated at 33, 66, 132, 275 and 400kv.

5. Power or step up transformer

Power is usually generated in large power station at typically 11kv-20kv, and this transformer are used to step up voltage. These transformers are usually rated at 400, 500, 630,800 or 1000mva and transmit power at 66, 110,132,220, 400 and 765kv.



INDUSTRY BUZZ

The growing importance of copper in Indian kitchens: Copper is here to stay in our kitchens.

With its deep reddish-brown colour, copper has long played a significant role in Indian culture. It has been passed down through the years and is valued in Indian households for its inherent health benefits and aesthetic appeal.

Recall our grandmothers telling us stories about using their exquisitely wrought copper pots and plates to hold food and water. The ancient Indian holistic medical system known as Ayurveda held copper vessels in high regard due to their ability to improve overall health, strengthen immunity, and facilitate better digestion. Although our knowledge of these advantages has grown, our affection for copper has remained strong.

The burgeoning trend of health-conscious and environmentally sensitive lifestyles has sparked a renewed fascination with copper.

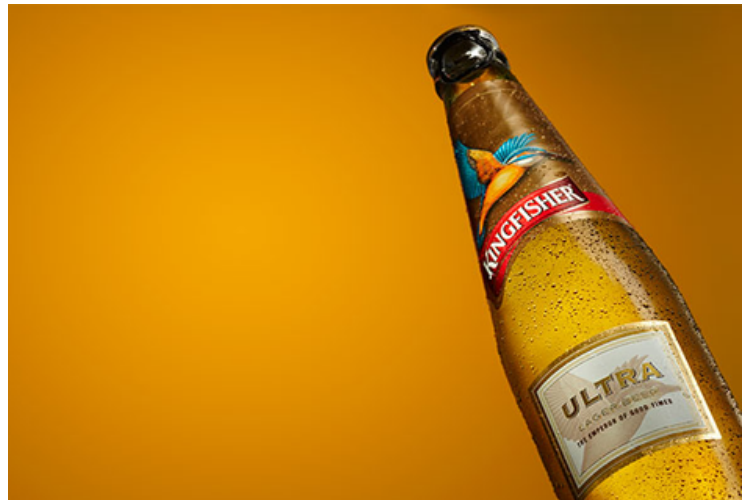


Kingfisher Ultra Max lifts the bar with the release of their premium draught beer in Karnataka.

The release of Kingfisher Ultra Max draught beer in Karnataka has been announced. The beer is known for its exceptional taste and premium quality. Following its tremendous success in Punjab and Chandigarh, Kingfisher Ultra Max is poised to improve the Bengaluru and Mysuru consumer experience.

It is the epitome of sophistication and luxury, expertly and thoroughly crafted. Ultra Max Draught Beer is a golden beer with unrivalled taste and strength thanks to its special combination of four hand-selected premium malts that are expertly roasted and go through a rigorous six-step filtration process.

United Breweries Limited's chief marketing officer, Vikram Bahl, stated: "Kingfisher Ultra Max Draught Beer's introduction in Karnataka represents a critical turning point in our history."





Artificial coloring in 'Gobi Manchurian' and 'Cotton Candy' is forbidden by Karnataka govt.

Because the use of artificial colouring in "Gobi Manchurian" and "Cotton Candy" hurts public health, particularly among youngsters, the Karnataka government has outlawed its use in all 31 districts.

The Food Safety and Quality department claims that samples of the "Cotton Candy" and "Gobi Manchurian" items offered here were gathered and examined in labs. 107 of the 171 "Gobi Manchurian" samples collected had dangerous artificial colours like "Tartrazine," "Sunset Yellow," and "Carmoisine."

Out of the 25 Cotton Candy samples gathered, 15 had dangerous artificial colors like tartrazine, sunset yellow, and rhodamine B.

With HerStore, Britannia Marie Gold continues to support female businesses.

Britain One of the top cookie companies in India, Marie Gold, has introduced HerStore, a special online community for female entrepreneurs. It is intended to provide a forum for all Indian women entrepreneurs to receive ongoing assistance. The brand's dedication to building a positive digital ecosystem where female entrepreneurs gather and support one another to achieve more and be more is encapsulated in the motto "Saath Judo, Saath Udo."

It has demonstrated its dedication by taking the lead and launching a distinctive marketplace that features only goods and services that women own. Soon, the portal will also provide a full range of workshops, training sessions, and upskilling films designed to provide female entrepreneurs with the know-how and abilities they need to succeed in a changing market.



Experience Australia's wonders at Aahar in 2024.

To capitalize on the prospects presented by the Australia-India Economic Cooperation and Trade Agreement (AI-ECTA) and the growing Indian middle class's desire for high-quality agri-food products, Australian premium food and beverage companies will present their finest offerings at Aahar 2024, establishing connections with Indian enterprises and consumers.

The Australian Trade and Investment Commission (Austrade), in collaboration with the state governments of Victoria and New South Wales, is bringing together twenty-plus Australian firms to exhibit their products at the Australian Pavilion, which will be housed in Hall No.1, Stand No.1G-02A in Aahar 2024.

The Australian pavilion at Aahar 2024 will include goods from various categories, including premium health food items, sheep meat, marine and aquaculture, horticulture, cereals, and pulses.

WEEKS HIGHLIGHT

NON-TECHNICAL CONTENT



8 MARCH

MAHASHIVRATRI

Mahashivratri is a Hindu festival celebrated annually in reverence of Lord Shiva. It marks the night of his cosmic dance, symbolizing creation, preservation, and destruction. Devotees observe fasting, offer prayers, and engage in rituals to seek blessings and spiritual enlightenment.



8 MARCH

INTERNATIONAL WOMEN'S DAY

International Women's Day celebrates the social, economic, cultural, and political achievements of women worldwide while advocating for gender equality. It serves as a reminder of the ongoing fight for women's rights and highlights the importance of women's empowerment in all spheres of life.



12 MARCH

RAMADAN

Ramadan, the holiest month in Islam, symbolizes spiritual reflection, fasting, and community. It's a time for introspection, self-discipline, and compassion towards others. As Muslims worldwide observe dawn-to-dusk fasting and engage in increased prayers and charity, let's embrace the values of unity and empathy.

MARCH

DID YOU KNOW?



Vegetable preserves are foods that have been processed and stored to extend their shelf life. The process involves treating the vegetables with salt, vinegar, sugar, or other preservatives to inhibit bacterial growth and prevent spoilage. This can include pickling, canning, or dehydrating vegetables. include pickling, canning, or dehydrating vegetables.

- Pickling involves soaking vegetables in a brine solution, typically made of vinegar, salt, and spices.
- Canning involves heating vegetables in airtight containers to kill bacteria and create a vacuum seal that prevents spoilage.
- Dehydrating involves removing vegetable moisture to inhibit bacterial growth and prevent spoilage.



Market Scope

- The market scope for vegetable preserves is quite broad, as these products have a wide range of applications and appeal to various consumer demographics.
- The global market for vegetable preserves is expected to grow steadily over the next few years, driven by increasing demand for convenient and healthy foods, rising awareness about the benefits of preserving food, and growing interest in ethnic cuisines.

Many companies produce vegetable preserves, ranging from small artisanal producers to large multinational corporations. Some of the major players in the market for vegetable preserves include:

1. The Kraft Heinz Company
2. Del Monte Foods Inc.
3. Bonduelle Group
4. B&G Foods, Inc.
5. Nestle S.A.
6. H.J. Heinz Company
7. Mt. Olive Pickle Company, Inc.
8. Pinnacle Foods Group LLC
9. The J.M. Smucker Company



Fact 1

Canned foods offer convenience, versatility, and extended shelf life, making them a staple in modern kitchens. From vegetables to meats, soups to fruits, they provide quick and easy meal solutions without compromising nutrition. With advancements in packaging technology, canned foods retain freshness and flavor, offering a reliable source of sustenance for households worldwide. Their accessibility and long-lasting nature make them an essential component of any pantry.



1/3

Chocolate is a sweet, usually brown, food made from cocoa beans, which come from the cacao tree. The beans are roasted, ground, and then combined with sugar and other ingredients, such as milk or vanilla, to make chocolate.

Chocolate can come in many forms, including bars, candies, and beverages, and can have varying levels of sweetness, bitterness, and richness depending on the type of cocoa used and how it is processed. Chocolate is widely enjoyed around the world for its delicious taste and has been used in cooking, baking, and desserts for centuries.

Market scope

- The global chocolate market is driven by several factors, including increasing disposable incomes, growing urbanization, changing consumer preferences, and expanding distribution channels. Additionally, the rise in health consciousness among consumers has led to an increased demand for healthier chocolate options, such as dark chocolate with high cocoa content.
- The chocolate industry encompasses various categories such as dark chocolate, milk chocolate, white chocolate, organic chocolate, and chocolate-based products like candies, beverages, and baked goods.
- The market is highly competitive with a large number of players operating in the industry, ranging from small-scale artisanal chocolate makers to large multinational corporations.
- Geographically, the chocolate market is dominated by North America and Europe, with a growing demand for chocolate in emerging markets such as Asia-Pacific, Latin America, Africa.

2/3

Major market players

- | | |
|---------------------------------|----------------------------------|
| a) Mars, Incorporated | f) Lindt & Sprüngli AG |
| b) Mondelez International, Inc. | g) Godiva Chocolatier, Inc. |
| c) Nestlé S.A. | h) Barry Callebaut AG |
| d) The Hershey Company | i) Meiji Holdings Co., Ltd. |
| e) Ferrero SpA | j) Ghirardelli Chocolate Company |

Commercial production

- Sourcing and harvesting cocoa beans:** Cocoa beans are sourced from various regions around the world, including West Africa, South America, and Southeast Asia. They are harvested by hand and then transported to processing facilities.
- Fermentation and drying:** The cocoa beans are first fermented to remove the outer layers and develop the flavor. They are then dried in the sun or using specialized equipment to reduce moisture content.
- Roasting and grinding:** The dried cocoa beans are roasted to bring out the flavor and aroma, and then ground into a paste called chocolate liquor.
- Pressing:** The chocolate liquor is pressed to separate the cocoa solids from the cocoa butter.
- Blending and refining:** The cocoa solids, cocoa butter, sugar, and other ingredients like milk powder or vanilla are blended and refined to achieve a smooth texture and consistent flavor.
- Conching:** The chocolate is conched or mixed continuously at a high temperature to further refine the texture and flavor.
- Tempering:** The chocolate is tempered, or heated and cooled to specific temperatures to create a stable crystalline structure.
- Molding and packaging:** The tempered chocolate is molded into bars, candies, or other shapes and packaged for distribution.

3/3

Fact 2

Chocolate, a beloved indulgence, tempts with its rich taste and velvety texture. Originating from cacao beans, it's crafted into myriad forms, from decadent bars to delicate truffles. Beyond its sensory pleasure, chocolate holds cultural significance, symbolizing love, comfort, and celebration worldwide. With its tantalizing aroma and irresistible flavor, chocolate remains an enduring delight, enticing generations with its timeless allure."



DIFFERENT TYPES OF OILS



1/3

Different types of oils

- Olive oil: This is a popular oil made from pressing olives. It is often used in cooking and for making salad dressings.
- Coconut oil: This oil is extracted from the meat of coconuts and is commonly used in baking and cooking, as well as for skin and hair care.
- Canola oil: Made from the seeds of the canola plant, this oil is often used for frying, baking, and salad dressings.
- Sunflower oil: This oil is made from sunflower seeds and is used for cooking and frying, as well as for making margarine and salad dressings.
- Soybean oil: This oil is extracted from soybeans and is commonly used in cooking, baking, and as a salad dressing base.
- Corn oil: This oil is made from corn and is used in cooking, baking, and making margarine.
- Palm oil: This oil is derived from the fruit of the oil palm tree and is used in cooking, baking, and making margarine and other processed foods.
- Sesame oil: Made from sesame seeds, this oil is used in cooking and as a condiment.
- Peanut oil: This oil is made from peanuts and is often used for frying, cooking, and making salad dressings.
- Avocado oil: This oil is extracted from the fruit of the avocado and is often used in cooking, baking, and making salad dressings.

Market scope

- The market scope for other oils is diverse and can be influenced by a range of factors. As consumer preferences and trends change, the demand for different types of oils can shift, creating opportunities for new players in the market.
- In addition to the food industry, other oils have applications in industries such as cosmetics, pharmaceuticals, and biofuels. For example, coconut oil and palm oil are commonly used in the production of soaps, lotions, and other cosmetic products, while canola oil and soybean oil are as raw materials in the production of biofuels.

2/3

Major market players

- Archer Daniels Midland Company
- Cargill, Incorporated
- Bunge Limited
- IOI Corporation Berhad

Commercial production

- Cultivation: Vegetable oils are typically derived from crops such as soybeans, corn, canola, sunflowers, or palm trees. These crops are cultivated using a combination of farming practices such as tilling, planting, watering, and fertilization.
- Harvesting: Once the crops have reached maturity, they are harvested using specialized equipment such as combines or harvesters. In some cases, the crops may be hand-picked.
- Extraction: The next step is to extract the oil from the harvested crops. There are several different methods for extracting oil, including mechanical pressing, solvent extraction, and cold pressing.
- Refining: After the oil has been extracted, it may undergo a refining process to remove impurities and improve its quality. This may involve processes such as degumming, bleaching, and deodorizing.
- Packaging and distribution: The final step is to package the oil and distribute it to customers. This may involve shipping the oil in bulk to other manufacturers or packaging it in bottles or containers for retail sale.

The specific production process for other oils can vary depending on the type of oil and the industry in which it is used. For example, the production process for coconut oil may differ from the process used to produce palm oil or avocado oil.

3/3

Fact 3

From essential olive oil to versatile coconut oil, various oils offer unique flavors, health benefits, and culinary uses. Nutritious options like avocado oil boast high monounsaturated fats, while sesame oil adds depth to Asian dishes. Flaxseed oil is rich in omega-3 fatty acids, beneficial for heart health. Each oil brings its own distinct profile, enhancing cooking and promoting wellness in diverse ways.



1/3



2/3

Fat for frying is a type of oil or fat that is used to cook food by submerging it in hot oil. The purpose of using fat for frying is to create a crispy and golden exterior on the food while keeping the inside moist and flavorful.

- Different types of fats can be used for frying, including vegetable oils (such as canola, corn, soybean, sunflower, and safflower oil), animal fats (such as lard or tallow), and even butter or margarine. Each type of fat has its unique properties and flavor, so the choice of fat depends on the desired outcome of the fried food.

- It is important to choose a fat with a high smoke point when frying, which is the temperature at which the oil starts to smoke and break down. When the oil reaches its smoke point, it can release harmful compounds and become rancid, which can affect the taste and quality of the food.

Market scope

- The market for fat for frying is expected to continue to grow in the coming years, driven by the increasing demand for fried food around the world. However, with growing awareness about health and wellness, there is also an increasing trend towards healthier cooking oils, which could impact the market demand for certain types of fats for frying.

- The global fat for the frying market is segmented based on the type of fat used, including vegetable oils, animal fats, and others. Among these segments, vegetable oils are expected to hold the largest share of the market, as they are considered to be a healthier option than animal fats.

- The market is also segmented by application, including food service and retail. The food service segment is expected to hold a larger share of the market, as the demand for fried food is high in restaurants, fast food chains, and other food service establishments.

Major market players

- Cargill Inc.
- Archer Daniels Midland Company
- Bunge Limited
- Wilmar International Limited
- IOI Corporation Berhad
- Ventura Foods LLC
- Associated British Foods plc
- CHS Inc.
- Agropur Cooperative
- Ajinomoto Co., Inc.

Commercial Production

a) Raw Material Sourcing: The first step in the production of fat for frying is sourcing the raw materials. Depending on the type of fat being produced, this may include vegetable oils, animal fats, or other types of fats.

b) Processing: The raw materials are then processed to extract the fat or oil. This can involve mechanical pressing, solvent extraction, or other methods, depending on the specific raw material and the desired fat or oil.

c) Refining: Once the fat or oil is extracted, it is typically refined to remove impurities and improve the quality of the final product. This can involve processes such as degumming, bleaching, and deodorizing.

d) Packaging: After refining, the fat or oil is typically packaged into containers such as drums, totes, or bottles, depending on the specific needs of customers.

e) Quality Control: Throughout the production process, quality control measures are put in place to ensure that the final product meets the required standards for safety, quality, and purity.

3/3

Fact 4

Frying fat plays a crucial role in culinary practices, enhancing flavor and texture while influencing the overall quality of fried dishes. Proper selection and management of frying fats are essential to achieve desired results, balancing factors such as smoke point, flavor absorption, and health considerations. From traditional choices like vegetable oils to specialized fats, understanding their properties ensures optimal frying performance and culinary satisfaction.

MARGARINE



1/3

Margarine is a type of spread made from vegetable oils, water, and other ingredients such as salt, emulsifiers, and flavorings.

- Type of spread made from vegetable oils, water, and other ingredients such as salt, emulsifiers, and flavorings. It was originally developed as a cheaper alternative to butter, and it became popular in the early 20th century as a more affordable and widely available option for cooking and spreading.
- The process of making margarine involves mixing vegetable oils with water and emulsifiers to create a stable, spreadable product. The mixture is then hardened through a process called hydrogenation, which involves adding hydrogen to the oils to make them solid at room temperature.
- Margarine is often marketed as a healthier alternative to butter because it is lower in saturated fat, which is associated with an increased risk of heart disease. However, some types of margarine may contain trans fats, which have been linked to an increased risk of heart disease and other health problems. It's important to read the label carefully and choose a margarine that is low in trans fats and other unhealthy ingredients.

Market scope

- The global margarine market is projected to grow in the coming years due to increasing demand from the food industry, rising health awareness among consumers, and the availability of various types of margarine with different flavors and ingredients.
- The market scope for margarine is also influenced by changing dietary patterns and the increasing demand for plant-based and vegan food products. Margarine made from vegetable oils and free from animal products is gaining popularity among consumers who are looking for alternatives to dairy-based spreads.
- However, the margarine market is also facing competition from other substitutes such as butter, spread made from other vegetable oils, and healthy fats like avocado and olive oil.

2/3

Major market players

- Unilever
- Upfield
- Nestle
- Bunge
- Dairy Crest

Commercial production

a) **Blending:** The first step is to blend the vegetable oils with other ingredients such as water, salt, and emulsifiers. The exact recipe will depend on the desired texture, flavor, and nutritional profile of the final product.

b) **Emulsifying:** The blended ingredients are then emulsified to create a stable, smooth mixture. This is typically done using high-speed mixers or homogenizers, which break down the oil droplets and distribute them evenly throughout the mixture.

c) **Hardening:** The emulsified mixture is then partially or fully hardened through a process called hydrogenation. This involves adding hydrogen to the vegetable oils to make them more solid at room temperature. The level of hydrogenation will determine the final texture and consistency of the margarine.

d) **Packaging:** Once the margarine has been hardened to the desired consistency, it is packaged in tubs or other containers and prepared for distribution to stores and other customers.

Throughout the production process, quality control measures are taken to ensure that the margarine meets food safety and quality standards. This includes testing for things like flavor, texture, and nutritional content, as well as checking for any potential contaminants or other issues.

3/3

Fact 5

Margarine, a versatile alternative to butter, offers a spreadable, flavorful option for cooking, baking, and spreading. Made from vegetable oils, margarine provides a source of unsaturated fats, essential for a balanced diet. With its lower saturated fat content compared to butter, margarine can contribute to heart health when consumed in moderation. Enjoy its creamy texture and rich taste in various culinary creations.



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