

TECH-KNOWLEDGE

The Official PMG Engineering Newsletter

**FOOD & BEVERAGE
INDUSTRY**

**ENGINEERING
& DESIGN**

**SCIENCE &
TECHNOLOGY**

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CARBONATED BEVERAGES



Introduction

People in the past believed that natural springs which were naturally carbonated, could cure many diseases. As such, scientists and inventors thought of ways to artificially produce these mineral waters. Artificially produced carbonated beverages get their start from this. The first carbonated beverages were just non-flavored carbonated water sold as mineral water tonics.

Flavored carbonated drinks/ soft drinks were initially introduced in the United States in the early 1800s. The purpose of adding flavour was not just to make it taste better, but also to improve on the supposed natural curative properties of mineral water. Popular ingredients to add were birch bark, dandelions, ginger, lemon, coca, and kola (the latter two combined ended up producing Coca-Cola).

Obviously, as the name explains carbonated beverages are those drinks that have carbon dioxide added to them. Carbon dioxide is a colourless and odourless gas. Usually, flavours and sweeteners are added to them to enhance their palatability. The water always has some amount of dissolved oxygen in it, but carbonated water is the one that is supersaturated with carbon dioxide.

The reaction between carbon dioxide and water produces carbonic acid. It is this carbonic acid that creates the tangling effect on your tongue.

Bubbling Effect/Sparkling Effect

The maximum amount of carbon dioxide that can get into the water is 8 grams per liter. The excess carbon dioxide will generally only stay in the water when the water is under pressure. Once the pressure is released (i.e. normal atmospheric pressure on the earth is restored), the carbon dioxide will start to escape. Once a bottle or can of a Carbonated Beverage is opened, giving the carbon some way to start escaping, it will, causing the beverage to go flat.

Ingredients

1. Water

Water is the major ingredient in carbonated beverages. It comprises more than 90% of the total volume. The water which is used in the preparation of carbonated beverages must of very high potable standards. Therefore, water pre-treatment is necessary to ensure the high standards of finished beverages.

2. Sweeteners

The sweeteners impart flavour, improve the mouth feel, and adds calories to the beverage. It is used in the form of sugar syrup and the final concentration of sugar varies between 8 to 14 percent in the finished beverage.

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3. Carbon dioxide

CO₂ gas is inert, non-toxic, almost tasteless, and is easy to produce. It is also available at a relatively lower cost in liquefied form. It is soluble in liquids where its solubility increases when the temperature of the liquid is decreased and it can exist as a gas, liquid, or solid.

4. Acids

Acids improve the flavour and also contribute towards the preservation of the beverage. Kola beverages mainly use phosphoric acid for preservation and taste.

5. Flavouring and Colouring agents

The flavouring component has a major influence on the flavour of the final product. They are used at very minor amounts (0.01 to 0.02 %). The nature of flavouring usually is determined by the type of the product. Fruit flavours are most commonly used, except in colas, which are flavoured by extract of cola root together with about 10% caffeine and a mixture of essences.

6. Emulsifiers, stabilizers, and clouding agents

They are used to improve the stability of the solution, improve the appearance, etc. They should be added in appropriate proportion to ensure the quality of the product during storage. Gum Arabic and modified starches are the most common emulsifiers and stabilizers used in beverage emulsions.

7. Foaming agents

The presence of foams at the top of the bottle for some beverages like cola is considered desirable. The most effective foaming agents are saponins which are extracted either from the bark of Quillaia or Yucca trees.



Manufacturing Process

1. Syrup Preparation

The syrup is usually prepared by mixing 1 part (volume) syrup to 3-6 parts (volume) water in stainless steel tanks fitted with agitators. In sugar-based products, syrup contains sugar syrup, citric acid, flavouring agents, preservatives, and water. It is initially heated to reduce the microbial load.

2. Mixing

The syrup is pre-prepared, tested, and diverted to proportioner for mixing with water and carbonation. Flow meters are most frequently used for proportioning.

3. Carbonation and Chilling

Carbonation is the impregnation of a liquid with CO₂ gas. The degree of carbonation is judged by the amount of effervescence produced and it is the most important characteristic of carbonated beverages.

4. Bottle Filling

Carbonated soft drinks are filled into either bottles or cans. Thick-walled, reusable, glass bottles were used for many years, but are being replaced by thin-walled, non-reusable glass and increasingly, PET bottles.

FLOORING IN FOOD INDUSTRY



Introduction

Flooring is the general term for a permanent covering of a floor, or for the work of installing such a floor covering. The food industry is one of the most challenging ones when it comes to the field of flooring. Many factors are to be considered in the selection of flooring materials and their finish. Floors in food manufacturing or food preparation premises must be able to be cleaned effectively and thoroughly, must not absorb grease, food substances, or water, harbor pests or bacteria, and should be laid to a safe design so as not to cause the pooling or ponding of the water.

Pre-requisite for flooring

1. Hygienic and easy to clean surface

As part of its HACCP quality system, a producer must assure himself that a floor will not compromise food safety. The easiest way to do this is to use a flooring system that has appropriate third-party certification for use in food handling facilities.

2. Safe working environment

The floor must provide a safe working environment for operatives so it must have an appropriate level of slip resistance.

3. Durability

Durability comes from a combination of physical and chemical properties. It requires resistance to chemicals and thermal shock, as well as mechanical abrasion and impact.

Floor Zoning

A zoning plan on the surface of the floor is a good idea if a food plant has identified any areas at risk of cross-contamination or other hazards and is looking to segregate areas or zones by different processes or procedures or to designate different levels of hygiene through a simple color-coded system.

Flooring Options

There are many different food processing floor options available in the marketplace. [Epoxy and urethane systems](#) are readily available.

1. Tiles/ Stones

When looking at food processing floor options, dairy brick, and quarry tile quickly come to mind. These are products that have widely been used in the food processing industry.

READ MORE....



2. Floor Coatings

Floor coatings are tough, protective layers used in applications where heavy surface wear or corrosion is expected. Food processing plant flooring options are different types of coating, which go onto something like concrete flooring.

2.1.Epoxy Coatings

There are numerous types of food-grade epoxy flooring available in the market. They are a fantastic option and are incredibly durable, with many benefits. They can withstand exposure to agents like acids and alkalis, which have the potential to damage other kinds of flooring.

2.2.Urethane Coatings

A polyurethane coating (or urethane floor coating), is a highly flexible, highly abrasion-resistant floor coating that is known for its shine and longevity. These can have a more considerable upfront cost but will last much longer than other flooring options.

2.3.Methyl Methacrylate(MMA) Coatings

Methyl methacrylate (MMA) systems offer food manufacturing and processing environments certain performance advantages compared to alternative resin materials, most notably their ability to cure at an incredible speed and be installed at extremely low temperatures.

2.4.Poly Ureas Coatings

For a flooring option that does well in demanding environments, there are polyureas coatings. These coatings are impact resistant. They are the quickest to cure and give off virtually no odor. Because polyureas coatings are flexible flooring, they are also better able to withstand extreme temperatures found in various facilities.



Cleaning and Maintenance

An effective cleaning and maintenance routine should be in place to preserve the aesthetic and performance of the floor finish but more importantly to reduce the risk of microbial contamination. Between wash cycles, resin-based flooring materials should, where possible, be maintained in a dry state and at low relative humidity conditions.

Flooring must be sloped at around 1.5-2% to allow water to drain correctly. Resin flooring will not be affected by most special-purpose cleaning materials when these are used in accordance with the Chemical Cleaning Manufacturers' instructions. Specific cleaning instructions should also be sought from the resin flooring manufacturer.

With so many options to choose from, selecting a fit-for-purpose flooring solution that can withstand the operational demands of food manufacturing, processing, and packaging environments can be challenging. On top of this, stringent health, safety, and hygiene standards, as well as budget constraints, must be considered.



SUPPLY
CHAIN

INDUSTRY BUZZ

The largest F&B trade expo in Singapore, FHA-Food & Beverage, is returning this year with an anticipated 60,000 guests.

The largest food and beverage trade fair in Singapore, FHA-Food & Beverage, has announced its 2024 dates, slated for April 23-26. This move reflects the event's preparation to become the premier one-stop shop for F&B professionals and industry leaders in Asia.

It will reappear over four days in the 65,000 square meter Singapore EXPO, which will feature 70 international pavilions. Additionally, more than 1,500 exhibitors from 50 different nations and regions are planned to participate, and 60,000 attendees are projected to attend.

Strong bilateral ties continue between Germany and Singapore, which view one another as essential regional allies, particularly after the strategic signing of the Joint Declaration in 2022.

Tea Takes Center Stage: Culinary Innovations Bring Bold Flavors to Every Dish!

Are you sick of the same old recipes? Tea is exploding in the culinary world, bringing bold new flavours to your favourite foods and beverages. The days of drinking tea just from a cup are over! You may now make fragrant jasmine tea sorbet, bake with chai-infused cakes, or give your cream a distinctive touch using liquorice or mint tea.

Put boring pastries behind you! Make warm chai-flavoured pastries or serve fragrant jasmine tea sorbet as a refreshing treat. Do you want a delightful surprise? Add unusual flavours to your cream, like mint or liquorice.

Tea is now more than just a beverage! Add Moroccan mint to your couscous, steep aromatic jasmine tea in your rice, or marinate leftover Earl Grey leaves for tofu or poultry. Are you in the mood for adventure? For a unique twist on your meat meals, combine white pepper and oolong tea to make an Asian-inspired rub.





Enjoying a stylish celebration of Women's Day at Coriander Kitchen, Conrad Pune

Coriander Kitchen is unveiling a brunch to remember as International Women's Day draws near. The day's centrepiece will be a specially curated menu created by the chef that features dishes that women often enjoy.

The brunch, which has the theme "Women Empowerment," will provide a variety of delicious dishes that showcase the diversity and inventiveness of female cooks in the food industry. Every dish is expertly and passionately prepared, from delicious appetizers to filling main courses and lovely desserts.

Savour various poached seafood treats, which go well with salmon tataki, fried capers, and salmon cured with bergamot. Savour the richness of duck confit accompanied by grilled peaches, mint, and salted lavender mousse.



India's food processing industry: enhanced supply chain and standards

India's food processing industry hopes to improve its prospects for expansion. This has emerged in light of the industry's recent strong signs of growth potential. There is a growing demand for packaged and processed foods in India due to the country's expanding population, shifting consumer preferences, and growing urbanization.

Experts point out that growth in this industry can result in several advantages, such as more job openings, higher food safety regulations, better supply chain management, and increased agricultural produce value addition. Additionally, encouraging exports, drawing in investments, and lowering post-harvest losses can aid in the economy's expansion as a whole.



Request feedback on the novel source of human-identical milk, oligosaccharide found in baby formula.

An application to allow the use of a new genetically modified source organism in the synthesis of a human-identical milk oligosaccharide for use in infant formula products is being made available for public comment by Food Standards Australia New Zealand (FSANZ).

Human milk naturally contains a non-digestible carbohydrate called 2'-fucosyllactose (2'-FL). It is utilized in amounts similar to human milk as a nutrient in newborn formula products.

"FSANZ's safety assessment concluded there were no public health and safety concerns associated with the application," stated Dr. Sandra Cuthbert, CEO of FSANZ. The applicant's 2'-FL and other 2'-FL that have already been evaluated and approved by FSANZ are structurally and chemically identical to the naturally occurring component found in human milk.

WEEKS HIGHLIGHT

NON-TECHNICAL CONTENT



1 MARCH

EMPLOYEE APPRECIATION DAY

Employee Appreciation Day is celebrated to recognize and honor the hard work, dedication, and contributions of employees in organizations. It's a day for employers to show gratitude towards their employees for their efforts, commitment, and achievements throughout the year.



4 MARCH

NATIONAL SAFETY DAY

National Safety Day, observed on March 4th annually, promotes awareness about occupational safety and health. It encourages individuals, organizations, and communities to prioritize safety measures to prevent accidents and injuries in workplaces and daily life. Through campaigns, workshops, and training sessions, National Safety Day aims to foster a culture of safety,



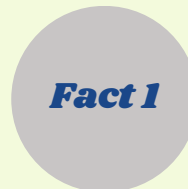
5-8 MARCH

WORLD SUSTAINABLE ENERGY DAY

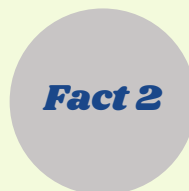
World Sustainable Energy Day is a crucial reminder of our collective responsibility to transition towards cleaner, renewable sources of energy. It's a day to celebrate progress in sustainable energy and to recommit to innovative solutions that reduce carbon emissions and combat climate change.

MARCH

DID YOU KNOW?



Soybean oil, derived from soybeans, is one of the most widely used vegetable oils globally, prized for its neutral flavor and high smoke point. It is a versatile ingredient in cooking, baking, and food processing, and also serves as a key component in industrial applications such as biodiesel production and lubricants. With its nutritional benefits and diverse applications, soybean oil remains a staple in many households and industries.



Grapeseed oil, extracted from grape seeds, is a versatile culinary oil with a light, neutral flavor and high smoke point, making it ideal for frying, sautéing, and salad dressings. Rich in antioxidants and omega-6 fatty acids, it offers numerous health benefits, including promoting heart health and reducing inflammation. Its delicate taste and nutritional profile make it a popular choice for both cooking and skincare.

ARGAN OIL



1/3

- Argan oil is a type of oil that is extracted from the kernels of the argan tree, which is native to Morocco. It is also known as Moroccan oil or liquid gold, due to its many benefits and uses.
- High in vitamin E, antioxidants, and essential fatty acids, which make it great for nourishing and moisturizing the skin, hair, and nails. It is often used as a beauty treatment.
- Also used in culinary applications. It has a nutty flavor and is used as a condiment or ingredient in dishes like salads, couscous, and grilled meats.
- Argan oil production is also an important part of the economy in Morocco, where it is primarily produced. The process of extracting the oil involves hand-cracking the nuts, which is a labour-intensive process that has traditionally been done by women's cooperatives in the region.

Market scope

- The global Argan oil market size was valued at USD 223.7 million in 2020 and is expected to reach USD 406.7 million by 2028, growing at a CAGR of 7.8% during the forecast period.
- The rising awareness about the benefits of using natural and organic products, coupled with the increasing disposable income of consumers, has led to a surge in demand for Argan oil-based cosmetics and personal care products. The oil's anti-aging, moisturizing, and nourishing properties make it a popular ingredient in skincare and haircare products, especially in the premium and luxury segments.
- In addition to its use in cosmetics and personal care products, Argan oil is also used in the food industry, particularly in the gourmet and high-end food markets.

2/3

Market scope

- a) ZineGlob Ltd
- b) OLVERA Morocco
- c) Argan Oils
- d) Melvita
- e) The Body Shop

Commercial production

Commercial production of Argan oil primarily takes place in Morocco, where the Argan tree is native. The Argan tree is well adapted to the semi-arid climate of Morocco and is grown mainly in the southwestern region of the country, particularly in the Sous Valley and the High Atlas Mountains.

1. The first step is to collect the Argan fruit, which resembles a small, yellow-green olive. The fruit is then dried in the sun before the pulp is removed to reveal the Argan nut, which is enclosed in a hard shell.
2. The Argan nuts are then hand-cracked using stones to extract the kernels, which are then roasted to bring out their nutty flavor. The roasted kernels are then ground into a paste using a stone mill, and the paste is then kneaded by hand to extract the oil.
3. The oil that is extracted is a golden-yellow color and has a distinctive nutty aroma. The oil can be further processed to produce cosmetic Argan oil or culinary Argan oil, depending on its intended use.

3/3

Fact 3

Argan oil, extracted from the kernels of the argan tree, is a potent elixir revered for its diverse benefits. Rich in antioxidants, essential fatty acids, and vitamins, it nourishes skin, hair, and nails. Its hydrating properties help combat dryness and promote elasticity, while its anti-inflammatory effects soothe irritation. As a versatile beauty aid, Argan oil is cherished for its ability to enhance natural radiance and promote overall wellness.



Sesame oil is a vegetable oil that is derived from sesame seeds. It is commonly used in Asian cuisine and has a nutty flavor and aroma that can enhance the taste of a variety of dishes.

- Sesame oil can be made from raw or toasted sesame seeds, and the resulting oil can vary in color from light to dark brown. In addition to being used in cooking, sesame oil is also used in cosmetics, traditional medicine, and oil pulling.
- Sesame oil is rich in antioxidants and contains healthy fatty acids, such as omega-6 and omega-9. It is also a good source of vitamin E, which helps protect cells from damage caused by free radicals.

Market scope

- The market scope for sesame oil is quite broad, as it is a popular ingredient in many different types of cuisines and has a range of potential health benefits. Sesame oil is widely used in Asian cooking, particularly in China, Japan, Korea, and Southeast Asia, where it is used for stir-frying, deep-frying, and as a condiment or dressing for salads and other dishes. It is also used in Middle Eastern and Mediterranean cooking, as well as in some African and Indian dishes.
- In addition to its use in cooking, sesame oil is also used in cosmetics, skincare products, and massage oils, due to its moisturizing and nourishing properties. It is also used in traditional medicine, particularly in Ayurvedic medicine.
- The global sesame oil market was valued at around USD 7.6 billion in 2020 and is expected to grow at a compound annual growth rate (CAGR) of around 6% from 2021 to 2028. The increasing demand for natural and healthy ingredients in food and personal care products, as well as the growing awareness of the health benefits of sesame oil, are expected to drive the growth of the market.

Major market players

- Kadoya Sesame Mills Inc.
- Etsuji Kikkoman Corporation
- Flavor Full Foods Inc.
- Eden Foods Inc.
- Kuki Sangyo Co. Ltd.
- La Tourangelle Inc.
- Hubei Fuda Food Co. Ltd.
- Henan Dingzhiyuan Sesame Oil Co. Ltd.
- Hain Celestial Group Inc.
- Wilmar International Ltd.

Commercial production

The of sesame oil typically involves several steps, including cleaning, roasting, pressing, filtering, and bottling. Here is a general overview of the process:

- Cleaning:** Sesame seeds are cleaned to remove any impurities or debris, such as dirt, stones, or plant matter.
- Roasting:** The cleaned sesame seeds are roasted at a low temperature to enhance their flavor and aroma. The roasting can be done either in a pan or in a specialized roasting machine.
- Pressing:** The roasted sesame seeds are then pressed to extract the oil. This can be done using a hydraulic press or an expeller press, which uses mechanical pressure to extract the oil.
- Filtering:** The extracted oil is filtered to remove any remaining solids or impurities. This can be done using a filter press or a centrifuge.
- Bottling:** The filtered oil is then bottled and packaged for sale. The oil may be sold in bulk to food manufacturers or packaged for retail sale to consumers.

The quality of the sesame oil depends on several factors, including the quality of the sesame seeds, the roasting temperature and time, the pressing method, and the filtration process. High-quality sesame oil is typically cold-pressed, unrefined, and made from high-quality sesame seeds. It has a light, nutty flavor rich in antioxidants and healthy fatty acids.

Fact 4

Sesame oil, derived from sesame seeds, is a versatile and flavorful cooking oil with a rich nutty taste. It's a staple in Asian cuisine, prized for its distinct aroma and high smoke point, making it suitable for frying, sautéing, and stir-frying. Beyond the kitchen, sesame oil is also valued for its potential health benefits, including its antioxidant properties and potential role in promoting heart health.



Fact 5

Pure and versatile, sunflower oil is a golden elixir in the kitchen. Extracted from sunflower seeds, it embodies health and flavor. With its high smoke point, it's perfect for frying and sautéing, while its light taste enhances dishes without overpowering. Packed with heart-healthy fats and Vitamin E, it's a staple for conscious cooks seeking both taste and nutrition. Sunflower oil: your culinary sunshine.



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