

TECH-KNOWLEDGE

The Official PMG Engineering Newsletter

**FOOD & BEVERAGE
INDUSTRY**

**ENGINEERING
& DESIGN**

**SCIENCE &
TECHNOLOGY**

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SAFETY ISSUES IN FOOD PACKAGING MATERIALS



Introduction

Foods and packaging can be detrimental to quality and/or safety. Changes in product flavor due to aroma sorption and the transfer of undesirable flavors from packaging to foods are important mechanisms of deterioration when foods are packaged in polymer-based materials. Careful consideration must be given to those factors affecting such interactions when selecting packaging materials in order to maximize product quality, safety, and shelf-life while minimizing undesirable changes. Product considerations include sensitivity to flavor and related deteriorations, color changes, vitamin loss, microbial activity, and amount of flavor available. Storage considerations include temperature, time, and processing method. Polymer considerations include type of polymer and processing method, volume, or mass of polymer to product ratio.

Food contact materials are an underestimated source of chemical food contamination. They have the potential to release and subsequent transfer components into the food. The extent to which migration occurs depends on physicochemical properties of the migrant, of the packaging material and the food composition (e.g., fat content). Different additives which are added in large amount are the largest challenge for control of food packaging contaminants. More than 3000 substances of varying origin (packaging, storage, and processing) are considered relevant for food safety control.

Plastic food packing materials

The additives like plasticizers, antioxidants, UV stabilizers, colors, printing inks, etc. can migrate into the packaged food. Furthermore, the residues of mono and oligomers of the materials as well as additives required for the polymerization may also be migrated into the food.

Timer, Paper, and paper board – Printing inks and chemical used in the pulp and paper production can migrate through paper boards into the foods. chlorophenols formed during the bleaching of wood pulp for paper manufacture can be responsible for taints.

Iron-based metal bodies – Usually these are coated inside the polymers to avoid direct contact with food. Corrosion by high-salt or acidic food items is a major issue. Aluminum cans have to be covered with polymers as well since aluminum is a quite corrosion-prone metal.

Food packaging materials are also a source of heavy metals. It is not always possible to analyze actual food for nature and quantity of migrants from the plastics so simulants or extractants are used as substitute.

READ MORE....



How Packaging Materials Affect Food Safety?

- Ø Migration of residual chemicals
- Ø Insufficient barrier properties
- Ø Packaging failure
- Ø Loss of seal integrity

Migration

Migration involves the mass transfer from an external source into food by sub microscopic processes impacting food safety and quality. Migration can occur by

Diffusion

- Classified as direct contact migration as it is physicochemical dependent
- Packaging components penetrate and diffuse across packaging material layers due to chemical interactions

Gas phase

- Indirect contact migration where molecules travel through gas phase
- Volatile components can migrate or "jump" from material into foods

Set off

- Migration due to set off components during manufacture or storage

Migration of additives from packaging material to food -

1.Global Migration - It refers to the total transfer that is the quantity of all substances migrating from the package into the packaged food (Unit: mg/dm²)

2.Specific migration - It related to the transfer of one or more identifiable substances that is a constituent of the packaging material (Unit: mg/kg)



Factor Affecting Rate and Extent of Migration in Packaged Food

- 1.Concentration and properties of migrant in the packaging materials
- 2.Concentration and properties of migrant in the printing ink
- 3.Properties of polymer used to produce the food packaging materials.
- 4.Maximum solvent absorption in the polymer
- 5.Storage period
- 6.Storage temperature
- 7.Contact area.
- 8.Fat content in the food
- 9.Adhesives used to seal packaging.

Conclusion

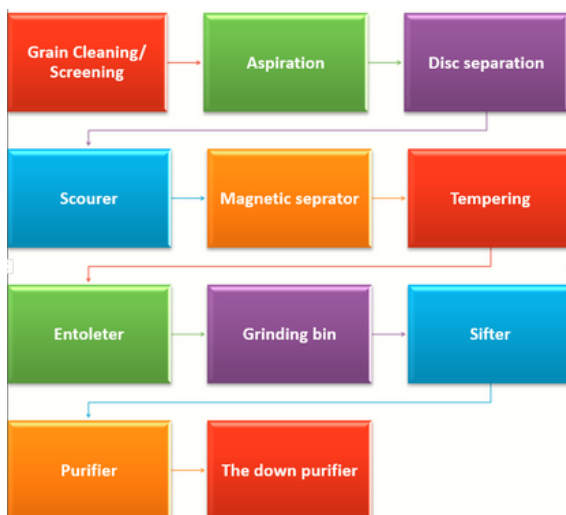
Food contact materials are an underestimated source of chemical food contamination. A major role of food packaging materials is the avoidance of risk related to microbial or chemical contamination of the food, i.e., unwanted events, which may imply serious health risks. Chemical properties of the migrant, of the packaging material, and the food (e.g., fat content); temperature, storage time, and size of the packaging material in the preparation to the food stuff volume (smaller size packaging has a larger surface to volume ratio) decides the rate of migration.

WHEAT MILLING PROCESS



Introduction

Wheat is one of the world's most consumed cereal grains. It comes from a type of grass (Triticum) that is grown in countless varieties worldwide. Bread wheat, or common wheat, is the primary species. Several other closely related species include durum, spelt, emmer, einkorn, and Khorasan wheat. White and whole-wheat flour are key ingredients in baked goods, such as bread. Other wheat-based foods include pasta, noodles, semolina, bulgur, and couscous. Wheat is highly controversial because it contains a protein called gluten, which can trigger a harmful immune response in predisposed individuals.



Following are the steps involved in wheat milling process-

Grain Cleaning / Vibrating Screen:

Grain is removed of various types of impurities together with damaged, shrunken and broken kernels which are collectively known as screenings. This removes bits of straw and other coarse materials and second screen removes foreign materials like seeds.

Aspirator:

It lifts off lighter impurities in the wheat. The stream of grain is directed across screens while air sucks off the dust and lighter.

Disc separator:

After the aspirator it moves into a disc separator consisting of discs revolving on a horizontal axis. The surface of the discs indented to catch individual grains of wheat but reject larger of smaller material.

Scourer:

The wheat then moves into the scourer, a machine in which beaters attached to a central shaft throw the wheat violently against the surrounding drum, buffing each kernel and breaking off the kernel hairs.

Magnetic Separator:

The stream of wheat next passes over a magnetic separator that pulls out iron and steel particles contaminated during harvesting.

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**Washer stoner:**

high-speed rotators spin the wheat in the water bath. Excess water is thrown out by centrifugal force. Stones drop to the bottom and are removed. Lighter material float off leaving only the clean wheat.

Tempering:

Wheat is tempered, before the start of grinding, the process in which moisture is added. Tempering aids in separation of the bran from the endosperm and helps to provide constant controlled amount of moisture and temperature throughout milling. The percentage of moisture, length of soaking, time and temperature are three important factors in tempering with different requirement in soft, medium and hard wheat.

Entoleter:

Discs revolving at high speed in the scourer aspirator hurl the wheat against finger like pins. The impact cracks down any unsound kernel which is rejected.

Grinding bin:

The "first break" rolls of a mill and are corrugated rather than smooth, break into coarse particles.

Sifter:

The broken particles of wheat and bran go into a box like sifter where they are shaken through a series of cloth or screens to separate larger from the smaller particles. Larger particles are shaken off from the top by leaving the final flour to shift towards the bottom.

**Purifier:**

The top fractions and particles of endosperm graded by size are carried to separate purifiers. In a purifier a controlled flow of air lifts off bran particles while cloth screen separates and grade coarse fractions by size and qualities.

The down purifier:

Four or five additional break rolls with successively final corrugations and each followed by a sifter are usually used to rework the coarse stock from the sifter and reduce the wheat particles granular middling's as free from bran as possible.

Sifters, purifiers and rollers reduces wheat until the maximum amount of flour (72.0%) is separated.

Conclusion

Milling is a unit operation that transforms solid particles into smaller ones by applying forces such as shear, compression, friction, collision or impact. Milling processes can be used for making flour or for extracting gluten and starch (wet milling) from grains and cereals. In the food industry, raw materials, flours and intermediate products must often undergo milling or grinding for size reduction. Wheat is one of the cheapest and most nutritious crops. It is widely grown and is produced in abundance that is why it is used as staple food in most parts of India and the world. Clean, dry grains have to be milled to flour before further processing and consumption. The whole grain can be milled to leave just the endosperm for white flour. The products of this are bran and germ. The whole grain is a concentrated source of vitamins, minerals, and protein.



INDUSTRY BUZZ

The microenterprise program of Diageo India aims to empower smallholder farmers.

One of the top alco-bev firms in the nation, Diageo India (United Spirits Ltd), has started a micro-enterprise program to empower Nashik's smallholder female farmers. Initially, the program will equip 100 smallholder female farmers with the knowledge and tools needed to address crop loss, prevent food waste, and guarantee sustainable subsistence. With S4S Technologies serving as the technical partner and Savitribai Phule Ekatma Samaj Mandal (SPMESM) as the implementing partner, Diageo India will equip smallholder women farmers with equipment, financial support, and training to sun dry surplus produce and facilitate last-mile connectivity to consumers along the food supply chain.

This program supports the development of economic and environmental resilience in local sourcing communities and is in line with Diageo's Society 2030: Spirit of Progress goal.

Kokkam: Experience the best of South India with every bite, now available in Lucknow!

Kokkam, the ultimate epicurean sanctuary, gladly welcomes you to Gomti Nagar, Lucknow—the city of Nawabs. The brand introduces vivid flavours from South India, setting a new standard for culinary excellence and providing a refined and crisp South Indian luxury dining experience. As this culinary masterpiece invites everyone to savour the joys of the coastal regions of Tamil Nadu, Kerala, Telangana, Karnataka, and Andhra Pradesh, be ready for a gourmet voyage through South India.

The menu at Kokkam creates a symphony of flavours, providing a comprehensive dining experience that delights and skillfully satisfies every craving. Every dish is a monument to excellence, beckoning you to savour a fantastic flavour adventure.





Gopizza marks 200 locations worldwide as it opens its 50th location in India.

The biggest pizza company in Korea, Gopizza, has announced the spectacular launch of its 50th location in India, marking the completion of 200 locations worldwide. Situated in the bustling Koramangala sector of Bengaluru, the new flagship store will include a cuisine that perfectly captures the essence of Korean flavours, smells, and sensations.

According to Jae-Won (Jay) Lim, CEO of Gopizza Global, "This launch marks an important milestone that commemorates three years in India and highlights the company's long-term commitment to growth with 200 stores globally and more expansion in one of Gopizza's fastest-growing markets, India." "Our menu has been thoughtfully chosen to introduce our Bengaluru customers to the rich and varied flavours of Korean cuisine."



Chinese New Year is celebrated at Pa Pa Ya with a feast worthy of the Year of the Dragon.

The renowned pan-Asian gastronomic paradise Pa Pa Ya is throwing a wild event to kick off the Year of the Dragon that you won't want to miss! Start a flavorful journey at all Mumbai locations (Palladium Mall, B.K.C. & Malad) from February 7 to February 29, every Monday through Thursday, between 12 and 11 p.m., with a special menu to ring in the Chinese New Year that combines tradition with contemporary flair.

Take a culinary trip with exquisite dishes like aromatic Baby Cabbage Rice, spicy lamb chopse, Chicken Black Pepper, and succulent chiu chou Potatoeso. Every meal is a carefully constructed symphony of flavours to satisfy even the pickiest palates.



Through Varttarambha, Atal Incubation Centre, CCRI, and CED support startups.

The goal of the Atal Incubation Centre (AIC), a technology business incubator founded at the Coffee Board headquarters in Bengaluru in partnership with the Central Coffee Research Institute (CCRI) and Atal Innovation Mission, is to promote an atmosphere conducive to entrepreneurship.

Varttarambha is an online pre-incubation program that gives prospective coffee entrepreneurs a comprehensive platform, an industry perspective, and assistance in honing their abilities so they can turn their ideas into profitable businesses. The 40-hour curriculum will start online using the WebEx platform on February 12 and run through March 4, 2024.

This Center for Entrepreneurship Development (CED) mission is to support creative new ventures in the coffee industry. To improve India's high-grade coffee quality and quantity, the goal is to create a supportive environment for entrepreneurs who will drive business innovations.

WEEKS HIGHLIGHT

NON-TECHNICAL CONTENT



6 FEBRUARY

INTERNATIONAL SAFER INTERNET DAY

International Safer Internet Day is a global initiative dedicated to promoting a safer and more responsible use of online technology, especially among children and young people. It raises awareness about the importance of cybersecurity, digital literacy, and online safety measures. Together, we strive to create a safer online environment for all users, fostering respect, kindness, and empowerment in the digital world.

FEBRUARY

DID YOU KNOW?



Grill sauce, also known as barbecue sauce, is a type of sauce used to flavor meat, poultry, seafood, and vegetables. It is typically used as a marinade or a glaze during grilling, roasting, or barbecuing.

- Contains a combination of vinegar, tomato sauce, brown sugar, spices, and other ingredients such as Worcestershire sauce, mustard, and liquid smoke.
- Different regions and cultures have their own variations of barbecue sauce, such as the sweet and smoky sauce of Kansas City, the mustard-based sauce of South Carolina, and the vinegar-based sauce of North Carolina.
- Can be purchased pre-made at grocery stores or can be made from scratch using a variety of recipes.



Commercial Production

1. Recipe development:

Based on a traditional regional recipe or maybe a unique flavor profile developed by the company.

2. Ingredient sourcing:

Includes ingredients such as tomato paste, vinegar, sweeteners, spices, and other flavorings.

3. Manufacturing:

Heated to a high temperature to ensure that the ingredients are well combined and to reduce the risk of contamination.

4. Packaging:

Packaged into bottles or jars using commercial bottling equipment.

5. Quality control:

Quality control measures to ensure that it meets the company's standards for taste, consistency, and safety.



Fact 1

Crafted to perfection, our grill sauce/barbecue sauce tantalizes taste buds with a symphony of flavors. Infused with a harmonious blend of spices, tangy tomatoes, and a hint of smokiness, it elevates every dish to culinary excellence. Whether slathered on juicy ribs, glazed over tender chicken, or used as a dipping sauce, it's the essential condiment for every grilling enthusiast's repertoire.

SALSA SAUCE

1/3

3. Flavoring:

Added to the salsa mixture to enhance the flavor, such as garlic, cilantro, cumin, or lime juice.

4. Packaging:

Transferred to containers, which can include jars, bottles, or pouches.

Major players in the Market

- | | |
|-------------------|------------------|
| 1. Frontera Foods | 5. Pace Foods |
| 2. Herdez | 6. Newman's Own |
| 3. Old El Paso | 7. Mrs. Renfro's |
| 4. Tostitos | |

2/3

Salsa sauce, commonly referred to simply as salsa, is a type of sauce that originated in Latin America and is typically made with a combination of chopped tomatoes, onions, peppers, and herbs such as cilantro.

- Used as a condiment or dip for tortilla chips or other snacks, and it is also used as a topping for tacos, burritos, and other Mexican or Tex-Mex dishes.
- Salsa can vary in heat level and flavor, depending on the type of peppers and other ingredients used.

Commercial Production

1. Ingredient preparation:

The tomatoes, onions, peppers, and other ingredients are washed, peeled, and chopped to the desired size.

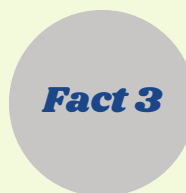
2. Mixing and cooking:

Mixed in a large pot or kettle and cooked over heat to combine the flavors and achieve the desired consistency.

3/3

Fact 2

Salsa sauce, a vibrant fusion of tomatoes, onions, peppers, and spices, tantalizes taste buds with its zesty kick and irresistible tang. With origins steeped in Latin American culinary traditions, this versatile condiment adds flair to dishes ranging from tacos to grilled meats, inviting a fiesta of flavors with every dip. Spice up your meals and elevate your dining experience with the bold essence of salsa sauce.



Dried fruit: nature's sweetness preserved, offering a burst of flavor and nutrients in every bite. From chewy raisins to tangy apricots, a convenient and wholesome snack that delights the senses and nourishes the body.



Dates are the fruit of the date palm tree (*Phoenix dactylifera*), which is native to the Middle East and North Africa but is now also cultivated in other parts of the world, including California and Arizona in the United States.

- Dates are oval-shaped with wrinkled, brownish-black skin and sweet, chewy flesh inside.
- High in natural sugars and are a good source of fiber, vitamins, and minerals, including potassium, magnesium, and vitamin B6.
- Used for their medicinal properties in traditional medicine, and recent research has shown that they may have **antioxidant and anti-inflammatory effects** and could potentially have a role in improving heart health and blood sugar control.



Fact 4

Dates, the sweet jewels of the desert, are nature's candy packed with wholesome goodness. Bursting with essential nutrients like fiber, vitamins, and minerals, these succulent fruits offer a delicious and nutritious treat. From their caramel-like flavor to their natural energy boost, dates are a versatile ingredient in both sweet and savory dishes. Embrace the rich heritage and health benefits of dates with every delightful bite.

TOMATO PASTE, CONCENTRATE AND PUREE

1/3

Tomato paste, tomato concentrate, and tomato puree are all tomato products that are made from tomatoes that have been cooked and reduced to varying degrees.

1. Tomato Paste: A concentrated tomato product that is made by cooking tomatoes for several hours and then straining them to remove the seeds and skin.

2. Tomato Concentrate: Usually made from tomatoes that have been peeled and seeded prior to cooking.

3. Tomato Puree: Made from cooked and strained tomatoes, but it is less concentrated than tomato paste or tomato concentrate.

2/3

Market Scope

The global market for tomato paste, concentrate, and puree is expected to continue to grow in the coming years, driven by changing consumer preferences, increasing demand from the food industry, and expanding markets in developing countries.

The major players in the Market for Tomato paste, concentrate, and puree are as follows:

1. ConAgra Brands Inc.
2. The Kraft Heinz Company
3. Del Monte Pacific Limited
4. Olam International
5. La Costeña
6. Dabur India Ltd

3/3

Fact 5

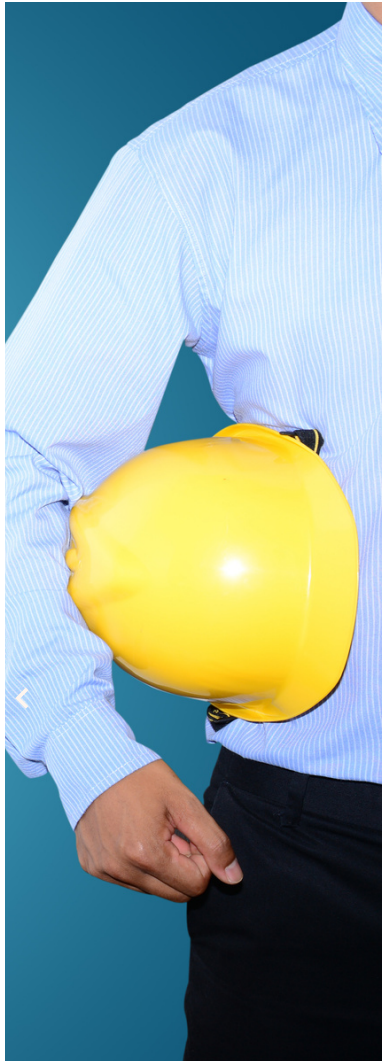
Tomato paste, concentrate, and puree offer versatile solutions for enhancing dishes with rich tomato flavor. Tomato paste, thick and concentrated, adds depth to sauces, soups, and stews. Concentrate, a condensed form of tomatoes, intensifies flavor in smaller quantities. Puree, smooth and vibrant, serves as a base for sauces, dips, and spreads. These tomato products elevate culinary creations with their bold taste and texture.



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Design & Construction Management in
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