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# **Referat**

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# CHEMICAL ENGINEERING IN FOOD INDUSTRY

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## Glossary:

1. Comprehensive – har tomonlama
2. Discipline – intizom, tartib
3. Sophisticated processe – noto'g'ri jarayonlar, buzilgan jarayonlar
4. Pasteurization - pasterizatsiya
5. Nutritional content - oziq ovqat tarkibi
6. Irradiation – yoritish, yorug'lik, nur
7. Pneumatic conveying - Pnevmatik jo'natmoq(yubormoq)
8. Quality - sifat
9. Microbiology - mikrobiologiya
10. Sterilization - mikroblardan tozalash

Food engineering is a comprehensive food technology field involving the various disciplines of food science, agriculture, microbiology, chemistry, and engineering. Using carefull research methods, high-tech equipment and sophisticated processes, food process engineering covers the entire gamut from procuring raw food materials to processing them into food products to preserving, packaging an delivering the food products to the consumer market. Producing safe and nutritious food for human and animal consumption is one of the principal aims of food engineering. High-quality raw materilas are handled and processed by special, computerized equipment in food processing plants. The processing includes extracting, separeting and remixing food ingredients to manufacture different food products.

In general, food engineering is a multidisciplinary field of applied physical sciences which combines science, microbiology, and engineering education for food and related industries. Food engineering includes, but is not limited to, the application of agricultural engineering, mechanical engineering and chemical engineering principles to food materials.

Food engineering is a very wide field of activities. Prospective major employers for food engineers include companies involved in food processing, food machinery, packaging, ingredient manufacturing, instrumentation, and control.

Techniques to improve the flavor, texture, nutritional value, safety, appearance and overall aesthetic appeal of various foods—involving cooking over fire, smoking, steaming, baking, fermenting, sun drying, or preserving with salt or spices—were already being practiced before recorded history.

Today, imaginative and effective engineered approaches—many drawn directly from the chemical engineers' toolbox—routinely add nutrients, improve aesthetic appeal (in terms of a food's flavor, texture, and appearance), enable longer distance transport (leading to multiseasonal availability), extend shelf life, and remove microorganisms that contribute to spoilage and are responsible for food-borne illnesses. Modern food processing can also improve the quality of life for people with food allergies (by removing or neutralizing the proteins and other substances that create allergic reactions in certain people) and for diabetics (by reducing sugar content and providing sugar-free alternatives).

Before modern food-packaging technologies were widely adopted, foods available to consumers were limited to what could be produced and transported locally. By devising novel packaging, chemical engineers have helped people everywhere enjoy a more bountiful selection of foods. Modern-day packaging marvels include traditional metal cans, newer multilayer packages that allow foods to be heat sterilized right in the package, and packages with oxygen and carbon dioxide levels that slow ripening and spoilage.

Sterilization is a key aspect of any food-packaging operation. The ability to sterilize foods to protect them against spoilage by oxidation, bacteria, and molds has always presented an important engineering challenge. Throughout history, people have experimented with the use of dehydration, smoking, salting, pickling, candying and the use of certain spices.

Chemical engineers have made enduring contributions to reducing spoilage and giving foods greater shelf life. They include high-temperature pasteurization and canning, refrigeration and freezing, chemical preservatives (using such compounds as sulfite, sodium nitrite, ethyl formate, propionic acid, sorbic acid, and benzoic acid), and irradiation.

The inherent safety, convenience, availability, nutritional content, aesthetic appeal, and variety that typify our food supplies are a hallmark of modern life, but this was not always the case. For the last 100 years we have been witnessing dramatic advances in the scientific understanding and engineering techniques that increase agricultural production and allow for

the commercial-scale production of countless processed foods. Through the concerted efforts of chemical engineers and others, the yields and quality of farm crops have increased exponentially, and the industry producing and packaging foods and beverages has evolved to a business worth many hundreds of billions of dollars.

Early food-related businesses usually consisted of small stores selling primarily fresh, locally grown foods with a limited shelf life. Before modern engineering advances were widely adopted by the food industry, the variety of foods available at stores were determined by what was produced locally, since transportation limitations dictated the distance that perishable foods could travel.

The 20th century, with its two World Wars, space race, immense technological advances, and rapid modernization, brought unprecedented advances in the tools and techniques to ensure food safety and improve nutritional value and aesthetic appeal. Ingenious packaging options and sterilization methods were also developed extending transportation distances and the shelf life of foods. These changes have brought a much more varied cornucopia of foods to people all over the world.

Chemical engineering know-how can be credited with improving the conversion of raw foodstuffs into safe consumer products of the highest possible quality. Chemical engineers routinely develop advanced materials and techniques used for, among other things, chemical and heat sterilization, advanced packaging, and monitoring and control, which are essential to the highly automated facilities for the high-throughput production of safe food products.

Chemical engineering unit operations and methodologies, developed for other industrial purposes, are used by the food industry, including drying, milling, extrusion, refrigeration, heat and mass transfer, membrane-based separation, concentration, centrifugation, fluid flow and blending, powder and bulk-solids mixing, pneumatic conveying, and process modeling, monitoring, and control. The food-related application of chemical engineering technology involves interdisciplinary teamwork, which, in addition to the expertise of chemical engineers, draws on that of food technologists, microbiologists, chemists, mechanical engineers, biochemists, geneticists, and others.

**Used sources:**

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