International Research Journal of Engineering Science, Technology and Innovation Vol. 7(5) pp. 1-2, May, 2021
Available online https://www.interesjournals.org/engineering-science-technologyinnovation.html

Short Communication

Food Irradiation and Sources of Food Irradiation

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INTRODUCTION

Consumers are aware of the advantages and disadvantages of eating certain foods. To match consumer expectations, the food sector is dedicating significant resources and expertise to the manufacture of healthful and safe products. Food contamination can be avoided by inspecting goods entering the food chain, storing food at a cooling temperature, and processing and preventing post-processing contamination to reduce or destroy microbial burden. The unit operation aimed at microbial destruction is of key relevance in determining the safety and stability of foods. to the detriment of its sensory and nutritional value Consumers believe that fresh meals are healthier than heat-treated foods, so the food industry is looking for new ways to keep most of the fresh qualities, as well as food safety and storage stability. Which is dependent on a reliable estimate of its activity against pathogenic and spoilage bacteria in food. However, the effectiveness of these novel technologies is contingent on advances in our understanding of microbial physiology and behaviour during and after treatment. One of the most modern food preservation technologies that can be utilised to alleviate some of these issues is food irradiation. It's a physical process that's been well investigated and is as well-understood as, if not better than, other food processing procedures. Many countries are progressively recognising the potential of food irradiation processing to reduce postharvest losses of foods, to meet quarantine regulations, to improve exports, and to assure the sanitary quality of foods.

Irradiation is the technique of sterilising or preserving a material by exposing it to low quantities of radiant energy. It is a physical method of food processing in which packed or bulk foods are exposed to gamma rays, x-rays, or electrons. Irradiation of foodstuffs is usually done with gamma radiation from a radioisotope source, or electrons or x-rays generated with an electron accelerator. For food irradiation, only gamma-rays emitted by Cobalt-60 and Cesium-137, X-rays created by a machine operating at or below 5 MeV, and electrons generated by a machine operating at or below 10 MeV can be utilised. The use of radiation at the prescribed energy levels does not cause food to become radioactive. As a result, food that has been irradiated is not radioactive, regardless of the amount of radiation absorbed. Irradiation of food is done in a shielded environment that prevents radiation from escaping throughout the process.

SOURCES

Electron beam

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X-rays

The bombardment of dense target material with high-energy accelerated electrons (known as bremsstrahlung-conversion) produces X-rays, which have a continuous energy spectrum. Tantalum and tungsten (heavy metals) are utilised due of their high atomic numbers and melting temperatures, although the former is favoured for industrial, large-area, high-power targets because it has a higher threshold energy for induced reactions and is easier to work with than tungsten. X-rays, like electron beams, do not require a radioactive source and can be switched off when not in use. 60Co or X rays) with energy up to 5 MeV or electrons from electron accelerators with energies up to 10 MeV have a good penetration depth and dose homogeneity. These forms of radiation were chosen because they create the desired effects in foods, do not cause radioactivity in foods or packaging materials, and are available in quantities and at prices that make the method commercially viable. Electron beams and X or gamma rays have various penetration depths into matter.

Gamma Rays

The radioisotopes cobalt-60 and caesium-137, which are created by neutron bombardment of cobalt-59 and as a nuclear source by-product, respectively, produce gamma irradiation. Cobalt-60 is typically used to irradiate food. It's a metal source that's been double-encased in stainless steel. When not in use, the source is kept in a shielded container or a pool of water that absorbs all radiation. It generates no waste because the decomposed source is returned to the supplier for replenishment or storage. Cobalt-60 is the most prevalent source of gamma irradiation in foods in commercial scale facilities since it is insoluble in water and so poses little risk of pollution of the environment through leakage into water systems. To avoid radiation leakage and meet the requirements of the International Atomic Energy Act's Regulations for Safe Transport of Radioactive Materials, Cobalt-60 must be transported in special trucks that must meet stringent safety requirements and undergo extensive testing before being approved to transport radiation sources. Cesium-137, unlike cobalt-60, is water soluble and poses a risk of contamination to the environment.