

Non-Thermal Preservation Processes

Processes that make the food safe for consumption and extend the shelf-life of a food using alternative technologies without heat to reduce/eliminate/inactivate microbial contamination in the food.

Food Process	Purpose	Food Use Examples	Used at Home	Benefits	Drawbacks
High Pressure Processing	A process where a food product in a sealed container is subjected to high iso-static pressure, usually via water	Fruit and vegetable juice, sauces, dips, dressings, hummus, and deli meats	No	Food safety; enables taste closer to freshly made	High cost associated with equipment and packaging; usually requires refrigerated distribution; limited product application due to high moisture requirement of the food product
Aseptic Filling	Filling and sealing a food or beverage product in a sterile environment after the product has been sterilized, usually using Ultra-High Heat Treatment	Dairy beverage products, juices, fruits, vegetables, soups, and RTE meals shipped & sold at room temperature	No	Allows perishable products to be packaged, shipped, sold, and stored at room temperature; could improve flavor; reduces loss of vitamin(s) due to a	Very complex and expensive technology to install and operate; requires specialized expertise to ensure food safety requirements are met

				shorter heat treatment	
Membrane Filtration (microfiltration)	A liquid product is passed through multiple membranes with controlled porosity to remove large pathogenic or spoilage microorganisms that cannot pass through the membranes	Beverages including juices, milk, wine, water, and beer	No	Food safety; avoids or minimizes use of heat treatment to extend product shelf-life; less burnt flavor	Requires significant redundancy in filtration system to ensure product safety; expensive technology, applicable to liquid products only with particles smaller than the microorganisms
Acidification	Organic and/or inorganic acid(s) is added to a food product to increase acidity/reduce the pH below a threshold to prevent growth of pathogenic and spoilage causing microorganisms	Beverages (e.g., fruit and vegetable juice, soda, sports & energy drinks), salad dressings, mayonnaise, salsa, canned fruits and vegetables, dips, and some types of soft cheese	Yes	Food safety; requires only low-moderate heat treatment; reduces cooked or burnt taste; and maintains food structure (e.g., salsa)	Impacts taste and appearance of the food product; high acid content may not be tolerated by some people
Fermentation	A process where non-harmful, live microorganisms (e.g., lactic acid bacteria) use	Dairy products (e.g., cheese, kefir, buttermilk, yogurt, and	Yes	Food safety; shelf-life; requires less heat treatment	Changes protein structure; could impact taste, texture, and appearance;

	sugars in the food product and generate organic acids which increases acidity/reduces pH below a threshold to prevent growth of pathogenic microorganisms	sour cream), sausages (e.g., salami), sauerkraut, pickled vegetables, tofu, kombucha, soy sauce, wine, vinegar, and beer			high acid content may not be tolerated by some people
Refrigeration	Growth of spoilage and pathogenic microorganisms is prevented or reduced by decreasing the temperature of the food product and then storing the product at a lower temperature for future use	Meat, cheese, butter & spreads, yogurt, sour cream, dips, sauces, dressings, milk, juice, eggs, fruits and vegetables, salad mixes, and prepared meals (ready to eat)	Yes	Food safety; shelf-life; prevents degradation of some vitamins; preserves flavor and texture of the food product	Causes thickening of some liquid or soft products; some spoilage microorganism can still grow, although slowly, thereby limiting the shelf-life
Brining/Marinating	Salt and/or sugar is added to a food with high water content (e.g., meat, fruit and vegetables)	Meat, seafood, fruits and vegetables, feta cheese, jams and jellies, and pie fillings	Yes	Food safety; shelf-life	Significantly changes taste and texture of the food product; increases sodium and/or sugar content of the food product

Freezing	Food temperature is lowered to below freezing. Subsequent storage at or below freezing temperature prevents spoilage by slowing or stopping microbial growth	Frozen meat, vegetables, fruits and fruit concentrates, sauces, prepared meals (e.g., pizza), desserts (cakes & ice cream), frozen potatoes, bagels, and breads	Yes	Food safety; shelf-life; preserves vitamins; maintains much of the original taste	Generally, will not destroy micro-organisms in the food. Changes food texture and sometimes taste.
Modified Atmosphere Packaging/Storage	Food product is packaged in a sealed container with minimal or no oxygen, via flushing with an inert gas (e.g., nitrogen), followed by another preservation method such as refrigeration for some food products, to inhibit growth of microorganisms.	Salad mixes, fresh dips and spreads, meat, cheese and dairy products, fresh fruits and vegetables, and some breads	No	Shelf-life; reduces deterioration of flavor, color, and vitamins caused due to exposure to oxygen	Does not inhibit growth of some pathogenic and spoilage causing microorganisms that require minimal or no oxygen; requires additional preservation method to ensure food safety
Irradiation	Application of high energy (Gamma rays, X-rays, electron beams) particles	Spices, meat, nuts, fruits and vegetables, wheat and wheat flour,	No	Food safety; inhibits sprouting	Potential loss of vitamin(s); could impact the color of some food products

	or waves to a food product	salad mixes, potatoes, and food packaging			
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