

Investigation of chemical spoilage in canned food in metal and plastic cans in Basrah city, Iraq

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Abstract:

Background: Food spoilage is one of the problems that cause great economic loss in most countries. This is due to storage and transportation conditions and the date of production, which requires investigating the causes of the resulting chemical spoilage and finding appropriate solutions. Fungi and bacteria may cause great damage to canned food, which may become dusty from the outer shape of metal and plastic cans and cause swelling or leakage of part of the food, and here it is necessary to focus on periodic examination of canned foods in a large way.

Objective: The aim of the research is to determine the chemical spoilage of canned food in local and imported products, which may cause a large economic loss, and to clarify the causes of spoilage and the treatment mechanism.

Results: The products are shown in sequence (1, 2, 3, 4 and 5).tests showed an increase in the proportion of the elements Fe, Zn in the canned foods examined & Results of analysis of heavy metal elements of canned food products estimated in units micrograms/gr.

Conclusion: The research included the detection of bacterial and fungal contaminants, which were detected using conventional detection methods, microscopic examinations, and culture of samples on food media.and show increase elements fe,zn in the canned food examined.

Keywords: Canned food , Chemical corruption , Plastic cans , Metal cans

Introduction:

Preserving canned food One of important methods of preserving food from pollution, and it is considered a means of preserving sustainable food, and it means preserving food by packaging and canning it Technologically correct, on the inside hermetically sealed packages, and then appropriately heat treated. Eliminate all forms of bacterial corruption as far as possible. Or spoilage due to microbial activity, whether or not the effect of this spoilage appears on the shape of the box from the outside It did not appear, as the natural shape of the box is that it is concave on both ends as a result of the void that is formed It occurs inside it by the effect of the initial heating process.(Abdulrahman, F. and Itodo, A. (2006). bacterial causes which facilitates The entry growth and reproduction of microorganisms, and the organic content or chemical composition plays a role in it.(Samudra, P.; Deepak, V. and Sudeshna C .(2009). Food has an important role in microorganisms, a large proportion of carbohydrates with microorganisms that ferment carbohydrates and which are subject to spoilage. (Kuan, L. Chau, C. Bih W. and (1968)). As for fatty foods, they are exposed to microorganisms that break down fats. Living organisms play some other factors such as availability of oxygen the food and water content the in activating aerobic bacteria, and low temperatures hinder the growth of most microorganisms. (TIEN, M. and Donald, W. (1997)). The spores grow in food and undergo chemical changes, including decomposition Complex carbohydrates (sugars) into simple substances, and protein into polypeptides, ammonia, and, lipids Amino acids into glycerol & fatty acids.)Itodo, U. and Itodo, U. (2010) It is produced through the oxidation process Reduction - carried out by bacteria - organic acids, alcohols, aldehydes and ketones And various gases such as hydrogen sulfur H₂S, carbon dioxide CO₂ and hydrogen H₂ and ammonia. NH₃. (Patricia Kendall. (2008). The causes of spoilage of canned food and heat treatment are due to chemical causes. It occurs as a result of the interaction of the metal of the can with the components of the food, as this may lead to metal erosion. the packaging, a change in the color of the food, or an effect on its nutritional value, Hikmate, Pilar . (2009).

Material & methods:

Twenty samples were taken from different canned food. Randomly collected from the markets of Basra city. Heavy elements are detected using an apparatus(Atomic Absorption Spectrometer). Chemical and organic contaminants were detected using a device(High Pressure Liquid Chromatography (HPLC) in private laboratories. The research included the detection of bacterial and fungal contaminants, which were detected using conventional detection methods, microscopic examinations, and culture of samples on food media.

Results and discussion:

15 random samples were taken from food cans in the city of Basra to investigate chemical and organic corruption, as most of the cans were swollen, which may indicate either chemical corruption or poor storage or due to mechanical impact during the transportation of samples and preservation of samples.

Table -1 – Show Tested food products

The type of product examined
Sardine fish, Cyblo brand
Borden beef
Baked beans
Date honey
Mushroom
Alwazah tea is green tea
Luna tomato paste
Almarai cream
Kraft cheese
Altunsa black olives
Pea/Luna
Green okra/durra
Black/light olives
Mixed fruit drink

Table 2-Results of analysis of heavy metal elements of canned food products estimated in units micrograms/gr.

Product Type	FE	ZN	CO	Hg	SU
1-Sardine fish, Cyblo brand	35.4	3.552	UDL	UDL	UDL
2-Borden beef	15.55	13.23	UDL	UDL	UDL
3-Baked beans	13.45	2.344	UDL	UDL	UDL
4-Date honey	12.4	1.7	UDL	UDL	UDL
5-Mushroom	9.5	2.4	UDL	0.042	UDL



U.D.L (Under Detection Limit)

Only in these samples were heavy metals measured in the rest of the samples It showed less than the limits that the device is sensitive to. The products are shown in sequence (1, 2, 3, 4 and 5).tests showed an increase in the proportion of the elements Fe, Zn in the canned foods examined, which may cause damage to the alimentary canal, stomach pain and a feeling of nausea if consumed in large quantities.

Table3 - Microbial test results for canned food.

Product Type	mold& yeast	Bacillus	coliform
1-Alwazah tea is green tea	Aspergillus niger	Negative	Neg
2-Luna tomato paste	Neg	Negative	Neg
3-Almarai cream	Neg	Negative	Neg
4-Kraft cheese	Neg	Negative	Neg
5-Altunsa black olives	Neg	Negative	Neg

Mold is causes of spoilage of canned food, which enters cans Through openings and cracks in the walls of cans, mold species were found. In product No. 1, it was noticed that there was a type of Aspergillus, which indicates the inefficiency of the product and its manufacture, and that it contains dust. As for the products from sequences 1, 2, 3, 4 and 5, the results were negative and did not contain any type of fungus or bacteria. The presence of these types of bacteria and the infection of canned food with them is an indicator of non-infection Cleanliness of the canning plant and the tools and machines used in food canning.

Table 4 – Show Food products that do not contain chemical spoilage and microorganisms that cause spoilage of food

Product Type	mold& yeast	Bacillus	coliform	FE	ZN	CO	Hg	SU
Pea/Luna	negative	negative	negative	UDL	UDL	UDL	UDL	UDL
Green okra/durra	negative	negative	negative	UDL	UDL	UDL	UDL	UDL
Black/light olives	negative	negative	negative	UDL	UDL	UDL	UDL	UDL
Mixed fruit drink	negative	negative	negative	UDL	UDL	UDL	UDL	UDL

Table no -4- Food products that do not contain chemical spoilage and microorganisms that cause spoilage of food Which indicates that it is free from any risks represented in the chemical spoilage of foods, as well as microscopic organisms, after conducting the tests. In addition, the extent to which health, safety and hygiene standards are adhered to while working in the products is shown in Table 4.

Recommendations

- 1- Commitment to hygiene conditions in canned food factories
- 2- Verify the date of production and expiry on the cans
- 3- The need to oblige laboratories to apply health and safety conditions.
- 4- Ensure the safety of canned food storage and temperature

Reference:

- 1- Abdulrahman, F. and Itodo, A. (2006) .Canned fish poisoning High level of some toxic metals. Medical and Pharm.Science. 2(1):10-14.
- 2- Shakuntala, G.; Samudra, P.; Deepak, V. and Sudeshna, C. (2009). Fungal biotechnology in food and feed processing. Food Research International. 16:116-127.
- 3- Chau, C.; Bih W. and Kuan, L. (1968). Spoilage bacteria in canned foods. Applied Microbiology. 16(1):45-47
- 4- TIEN, M. and Donald, W. (1997). Mathematical models for effects of PH, temperature and sodium chloride on the growth of Bacillus stearothermophilus in salty carrots. Applied and Environmental Microbiology. 63(4): 1237- 1243.
- 5- Itodo, U. and Itodo, U. (2010). Quantitative Specification of Potentially Toxic Metals in Expired Canned Tomatoes Found in Village Markets. Natural and Science. 8(4): 54-58.
- 6- Patricia Kendall. (2008). Safe Food News. 7(2):1-8
- 7- Pilar, M.; Hikmate, A. and Nabil, B. (2009). Thermal inactivation and injury of Bacillus-stearothermophilus spores. Food Microbiology. 26(3): 289- 293.

- 8- Steve, Band Wallace, T. (2003). Tin in Canned Food. Food and Chemical Toxicology. 41:1651-1662.
- 9- Rice, S.; Beuchat, L. and Worthington, R. (1977). Patulin production by *Byssochlamys* spp. In fruit juices. Applied and Environmental Microbiology. 34(6): 791-796.
- 10- Steve, Band Wallace, T. (2003). Tin in Canned Food. Food and Chemical Toxicology. 41:1651-1662.