FREQUENTLY ASKED QUESTIONS

1. **What is the principle of preservation by canning?**

Ans. Canning is a method of preservation in which spoilage can be averted by killing micro-organisms through heat. In conventional canning, the food is placed inside the container, the air is removed by vacuum and the cans are hermetically sealed. The aim of canning is to destroy microbial populations (vegetative cells and spores) and/or enzymes responsible for food deterioration.

2. **What are the advantages of canning over other methods of food preservation?**

Ans. Canning has a number of advantages when compared to other methods of preservation such as smoking, curing, drying and refrigeration. These are simpler storage conditions, considerably longer shelf life and nutritional characteristics closest to those of the unprocessed material. Canning is especially appropriate for perishable food materials marketed to tropical and subtropical conditions, where temperature and humidity are high.

3. **What are the major historical mile stones in canning?**

Ans. The canning process dates back to the late 18th century in France when the Emperor Napoleon Bonaparte, concerned about keeping his armies fed, offered a cash award of 12,000 francs to any inventor who could devise a cheap and effective method of preserving large amounts of food. The larger armies of the period required increased and regular supplies of quality food. Limited food availability was among the factors limiting military campaigns to the summer and autumn months. In 1809, Nicolas Appert, a French confectioner and brewer, observed that food cooked inside a jar did not spoil unless the seals leaked and developed a method of sealing food in glass jars. Appert was awarded the prize in 1810 by Count Montelivert, a French minister of the interior. Based on Appert's methods of food preservation, the tin can process was allegedly developed by two individuals in England, Bryan Donkin and Peter Durand. Bryan Donkin, an associate of John Hall's

at his Dartford Iron Works, realized in 1811 that iron containers could be used instead of the fragile glass, and in 1812 the factory began to produce canned food such as meat. In 1810, Peter Durand patented the use of metal containers, which were easier to make and harder to break than glass jars.

4. **What is the purpose of Syruping, brining or filling medium in canning?**

Ans. Purpose of adding syrups or brine or other medium is to improve the flavor, fill the space between the pieces of canned product and aid in the heat transfer during sterilization. The syrup, brine, hot sauce, oil or prepared gravy should be added to the can at a temperature of about 90 ^{o}C, leaving suitable headspace in the can.

5. **Define exhausting?**

Ans. Exhausting usually means heating the can and can contents before sealing. Sometimes it may also refer to the treatment of the container under a mechanically produced vacuum. In heat exhaust method, the cans are generally passed through a tank of hot water at about 92-97 ^{o}C or on a moving belt through a covered steam box. The time of exhaust varies between 5 to 25 minutes.

6. **What is the objective of exhausting in canning?**

Ans. The objective of exhausting is to remove air from the can interior and prevent corrosion. It also prevents undue strains upon the can during sterilization and prevents overfilling of can contents. Removing of air also helps in better retention of vitamins especially of vitamin C. The other advantages of the exhaust process are prevention of bulging of the can when stored at high altitudes or in hot climates.

7. **Define processing of cans?**

Ans. The term processing as used in canning technology, means heating of canned foods (fruits, vegetables and other food stuffs) to inactivate bacteria. This is also called as retorting. Processing consists of determining just the temperature and the extent of cooking that would be sufficient to

eliminate all possibilities of bacterial growth.

8. **What is D value?**

Ans. The time needed to destroy 90% of the microorganisms (to reduce their numbers by a factor of 10) is referred to as the decimal reduction time or D-value. D-values differ for different microbial species and a higher D-value indicates greater resistance. The thermal destruction of microorganisms is temperature dependent and cells die more rapidly at higher temperature.

9. **Define thermal death time or F-value?**

Ans. The thermal death time or F-value is used as a basis for comparing heat sterilization procedures. F-value is the time required to achieve a specified reduction in microbial numbers at a given temperature and it represents the total time-temperature combination received by a food.

10. **Define Z value?**

Ans. The slope of the TDT curve is termed the z-value and is defined as the number of degrees Celsius required to bring about a 10-fold change in decimal reduction time. F-value is quoted with suffixes indicating the retort temperature and the z value of the target microorganism.

11. **Name different factors that influence the rate of heat penetration during processing?**

Ans. The important factors that influence the rate of heat penetration into a food are given below:

Type of product: Liquid or particulate foods (for example peas in brine) in which natural convection currents are established heat transfers faster than in solid food in which heat is transferred by conduction (for example pastes or purees).

Size of the container: Heat penetration to the centre is faster in small containers than in large containers.

Agitation of the container: End-over-end agitation and to a lesser extent, axial agitation increases the effectiveness of natural convection currents and thereby increases the rate of heat penetration in viscous or semi-solid foods (for example beans in tomato sauce).

Temperature of the retort: A higher temperature difference between the food and the heating medium causes faster heat penetration.

Shape of the container: Tall containers promote convection currents in convective heating.

Type of container: Heat penetration is faster through metal than through glass or plastics owing to differences in their thermal conductivity.

12. **Describe briefly three-piece steel cans.**

Ans. T**hree-piece steel cans**, are composed of the **body** and **two ends** (bottom and lid). The body is made of a thin steel strip, the smaller ends of which are soldered together to a cylindrical shape. Modern cans are **induction-soldered** and the soldering area is covered inside with a **side-strip coating** for protection and coverage of the seam. The use of lead soldered food cans was stopped decades ago. Hence the risk of poisonous lead entering canned food no longer exists.

13. **Describe briefly two-piece steel cans.**

Ans. **Two-piece steel cans** have a lid similar to the three-piece cans but the bottom and body consist of one piece, which is moulded from a circular flat piece of metal into a cup. These cup-shaped parts may be **shallow-drawn** (with short side wall) or **deep-drawn** (with longer side walls). However, the length of the side walls is limited through the low moulding ability of steel (example: tuna tins 42/85mm, i.e. side wall: diameter =1:2).

14. **Discuss briefly the different types of base plates used for can manufacture?**

Ans. Following are the different types of base plates used for can manufacture:

D) Type L: It is a high purity steel with low metalloid and residual content. This kind of base plate is used for highly acidic foods.

E) Type MR: It is a low metalloid steel with no severe restriction on residual content. It is used for moderate acid foods.

F) Type MC: It is similar to MR type but has high phosphorus content to give mechanical strength or stiffness. It is usually used for low acid foods.

15. **What are the different types of lacquers used in can making?**

Ans. There are two types of lacquers: (a) acid resistant and (b) sulphur resistant. The acid-resistant lacquer is ordinary gold coloured enamel and the cans treated with it are called as R-enamel cans. The sulphur-resistant lacquer is also of golden colour and the cans coated with it are called C-enamel cans or S.R. cans. Acid-resistant cans are used for packing of fruits of the acid group with soluble colouring matter such as raspberry, strawberry, red plum, coloured grapes, etc. Sulphur-resistant cans are used for non-acid products like peas, corn, beans, meat, fish, etc.