A programed instruction course in introductory food science

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APPENDIX

A

A PROGRAMED INSTRUCTION COURSE IN INTRODUCTORY FOOD SCIENCE

BY

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Instructions to the Student
on Use of this Textbook

This textbook is different from ordinary textbooks. It is composed of separate short statements or items called frames. Each frame calls for one or more answers. All frames are numbered.

Begin with the first frame at the top of page 3. When you have filled in your answer to the first frame, turn immediately to the top of page 4 for the correct answer of the frame. Now move to the next frame at the top of the following page. Fill out also your answer and proceed to the next page for the correct answer.

Continue working at one level at a time. When you have completed the top row return to page 3 and begin with the second row. Follow the same procedure until you complete the first chapter.

Repeat the same procedure for the following chapters one after the other. Write out your answers on a separate pad or sheet of paper. Writing out the answers is very essential. It is also essential to write your answers before looking at the correct answers. You should make few, if any errors, if you read carefully.

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LIST OF ILLUSTRATIONS

UNIT ONE

FOOD CHEMISTRY

CHAPTER I

INTRODUCTION

1. We all live on food, man cannot survive without _____.

---

8. Foods may contain besides the nutrients, i.e. the part that goes to build new _____ and t_____ and repair old ones, some roughage, i.e. undigestable material that adds bulk to the diet.

---

15. Potatoes, beans, and cabbages are examples of _____, while apples, oranges and grapes are examples of f_____.

---

22. Meat is composed of the muscular, fatty and connective tissues of any edible part of an _____, like cattle, sheep, goats and horses.

---

1. food

---

8. cells

   tissues

---

15. vegetables

    fruits

---

22. animal

---

2. All plant and animal products that we _____, or drink are called foods.

---

9. These roughages which are mainly cellulose material have no nutritional value, but they add _____ to the food material, i.e. they fill the digestive _____, and thus help in regulating excretion.

---

16. Fruits and vegetables are examples of _____, foods. So are cereal grains, like corn, wheat and rice.

---

23. Poultry and fish are other examples of _____. Eggs are also an example of an animal _____.

---

2. eat

---

9. bulk

tract or canal

---

16. plant

---

23. animal food

food or product

---

3. The _____ we eat or drink is used to build our bodies, repair our tissues and furnish us with energy.

---

10. Foods are therefore plant and animal products which we eat to build and repair our b_____ and supply us with the _____ we need in our life processes. They may contain undigestable cellulose material known as _____, which adds bulk to the diet.

---

17. Bread is an example of a plant food, because it is prepared from the cereals like w_____ or c_____.

---

24. Milk and its products, like butter, cheese and cream are also kinds of animal _____. They are also known as d _____ products.

---

3. food

---

10. bodies

energy

roughage

---

17. wheat

corn

---

24. foods

dairy

---

4. The foods we consume, besides being used to build and repair our body _____ and yield energy, they also regulate body processes.

---

11. The plant products we eat include all parts of a plant namely roots, stems, leaves, flowers, fruits and _____.

---

13. Corn, wheat, and rice are examples of _____. They constitute the staple foods in many _____.

---

25. Meat, meat products, eggs and milk and its _____ are examples of animal foods. The fat, found on the flesh of _____, is another example of animal _____.

---

4. tissues

---

11. seeds

---

18. cereal grains

countries or places

---

25. products

animal

food

---

5. Foods are then the source of e _____ we need for our body processes.

---

12. Any part of a plant may act as a food if it has some nutrients stored in it. Nutrients are materials that help to build new cells repair _____ ones, and yield _____.

---

19. Vegetarians are people who consume only plant _____. Their foods are constituted of vegetables, f _____, grains and vegetable _____ such as sesame oil, corn oil, olive _____ and the like.

---

26. Animal foods include all types of _____, animal f _____, and _____ products.

---

5. energy

---

12. old

energy

---

19. foods

fruits

oils

oil

---

26. meat

fat

dairy

---

6. Therefore, foods go to build and repair body _____, and supply the energy we need in our life processes. They are thus to some extent regulators of these body _____.

---

13. Plant foods in general include vegetables, f _____ and grains. They also include oils which are extracted from the s _____ and fruits of certain plants.

---

20. Plant foods are parts of a plant or a plant product. They include mainly _____, _____, _____ and vegetable _____.

---

6. cells or tissues

processes

---

13. fruits

seeds

---

20. vegetables

fruits

grains

oils

---

7. Foods are builders of new _____, suppliers of _____, and regulators of body _____.

---

14. Sesame oil, corn oil, and olive oil are examples of these vegetable _____, extracted from the seeds and f _____ of these plants.

---

21. Animal foods are mainly meat, and meat products. Meat is the flesh of _____.

---

7. cells or tissues

energy

processes

---

14. oils

fruits

---

21. animals

CHAPTER II

CARBOHYDRATES

27. Foods, whether animal, or plant products, are made up mainly of three major constituents. These _____ are carbohydrates, fats, and proteins.

---

40. Glucose, known also as grape sugar, is one of the simple forms of sugars and is found mainly in honey, grapes and dates. The sweetness of these and other fruits _____ due mainly (is / is not) to the presence of gl _____.

---

53. Starch is an important source of carbohydrates in nature. Starch and sugars are manufactured by green _____, from water and carbon dioxide in the presence of sunlight, by the process of _____.

---

66. Cellulose is another form of carbohydrates. It is synthesized by green _____, in the process of photosynthesis. Sugars, starch and cellulose are _____, which are made up by green plants.

---

27. constituents

---

40. is

glucose

---

53. plants

photosynthesis

---

66. plants

carbohydrates

---

28. Carbohydrates, fats and proteins _____ the major components of _____.
(are / are not)

---

41. Glucose is a simple form of _____, and has the formula $C_6 H_{12} O_6$.

---

54. Starch is found in plants in the form of granules. The size and shape of the granules of a kind _____ is characteristic of its origin. Starches of different sources or origin _____ be identified by the microscopic examination of their _____.
(can / cannot)

---

67. All seed bearing plants contain varying concentrations of cellulose. The cellulose is deposited in the cell walls and is found mainly in the fibres, stems and seed coats of plants. Cellulose _____ a form of carbohydrates that _____ strength to plant tissues.
(is / is not) (gives / doesn't give)

---

28. are

foods

---

41. sugars or carbohydrates

---

54. starch

can

granules

---

67. is

gives

---

29. Included with these major constituents, are minerals, vitamins and water. All these together, i.e. carbohydrates, fats, _____, minerals, _____ and water, make up the composition of _____.

---

42. The formula of glucose is _____. It is less sweet than ordinary table sugar.

---

55. Corn starch has _____ kind of granules than those of rice and wheat.
(the same / different)

---

68. Cellulose is a compound, similar to starch, composed of a large number of glucose units but its molecule is a longer chain than that of starch. It has a _____ molecular weight than starch and its chain contains _____ number of glucose units.
(larger / smaller) (greater / smaller)

---

29. proteins
vitamins
foods

---

42. $C_6 H_{12} O_6$

---

55. different

---

68. larger
greater

---

30. Carbohydrates, in general, include sugars, starch and cellulose. They _____ composed as their name indicates of carbon, hydrogen and oxygen; whereby the hydrogen and oxygen are found in the same ratio as in water.

are / are not

---

43. Ordinary sugar, or cane sugar, known also as sucrose, is another example of sugars. Its formula is $C_{12} H_{22} O_{11}$. This is a higher form of _____. Its main sources are sugar canes, and beet r_____. These two sources are rich in _____.

---

56. Therefore all types of starch are composed of _____. Each type of _____ is made up of different forms of _____.

---

69. Cellulose and starch have then similar chemical composition but different molecular weights. Their formulas, respectively are $(C_6 H_{10} O_5)n$ and $(C_6 H_{10} O_5)x$, where x is _____ number than n.

bigger / smaller

---

30. are

---

43. sugars or carbohydrates

roots

sucrose or ordinary sugar

---

56. granules

starch

granules

---

69. bigger

---

31. Carbohydrates are then composed of three elements _____, _____, and _____. The hydrogen and exygen are found in the ratio of two to one.

---

44. Cane sugar, or sucrose, is _____ than grape sugar or glucose.
(sweeter / less sweet)

---

57. Starch can be converted into simpler c_____, i.e. maltose or glucose or other intermediate products by the action of acid and certain enzymes. This process is known as hydrolysis. Hydrolysis is the addition of water to a compound to convert it to smaller and simpler _____.

---

70. Cellulose can also be hydrolysed by the action of acids or bacteria. It breaks down into _____; similar to the hydrolysis of starch. Both starch and cellulose are forms of complex _____.

---

31. carbon

hydrogen

oxygen

---

44. sweeter

---

57. carbohydrates or compounds

compounds, products or forms

---

70. glucose

carbohydrates

---

32. The general formula of carbohydrates would then be $C_x (H_2 O)_y$; the hydrogen and oxygen are in the ratio of _____ to _____.

---

45. Another form of sugar similar to sucrose is the sugar found in milk, known as lactose. This sugar has the same chemical composition and formula as sucrose, namely; _____. They are of the same class of _____.

---

58. Starch is hydrolysed in the process of digestion to simple sugars. It _____ be similarly hydrolysed in the laboratory.
can / cannot

---

71. Cotton is cellulose mady up by plants. It is then a form of _____. The peels of many fruits and vegetables are mainly cellulose. The peels of apples and other fruits are rich, then, in _____.

---

32. two

one

---

45. $C_{12} H_{22} O_{11}$

sugars or carbohydrates

---

58. can

---

71. carbohydrates

cellulose

---

33. Green plants integrate water and carbon dioxide to make these compounds called _____.

---

46. A third example of the same class of sugars, similar to sucrose and _____, is the sugar found in malt, and is known as maltose. All these three examples of sugars, _____, lactose, and maltose, are of the same class of _____.

---

59. Sucrose, lactose and maltose can also be hydrolysed into simpler _____.

---

72. Cellulose constitutes the roughage that adds _____ to the diet. It has no nutritional value for man, because it cannot be digested in the digestive tract of man.

---

33. carbohydrates

---

46. lactose

sucrose

sugars or carbohydrates

---

59. sugars or compounds

---

72. bulk

---

34. Carbohydrates are compounds manufactured by green _____, from water and _____ by the process of photosynthesis, which takes place in daylight.

---

47. Sucrose, maltose and lactose have the same chemical _____, and the same formula, namely, _____.

---

60. Hydrolysis is a common reaction in living things; the process of digestion _____ (is / is not) mainly a series of hydrolysis r _____.

---

73. Human digestive tract _____ (does not / does) possess the necessary enzymes to act on cellulose and hydrolyse it into simpler carbohydrates.

---

34. plants

carbon dioxide

---

47. composition

$C_{12} H_{22} O_{11}$

---

60. is

reactions

---

73. does not

---

35. Green plants, only, _____ manufacture food from
can / cannot
_____ and carbon dioxide by the process of
_____.

---

48. All these examples of sugars, namely glucose, sucrose, maltose and lactose and other examples of sugars are soluble in water. All types of sugars are fairly soluble in _____.

---

61. The use of starch in the food industry is primarily as a thickening agent in the making of soups, sauces, puddings and the like. It is also used in the textile industry and laundry as a stiffening agent. Starches are then mainly used as a _____, and _____ agents.

---

74. Cellulose is a more complex form of _____ than starch. Both cellulose and starch are composed of a large number of _____ units. Cellulose is found in all seed plants; it gives strength to the _____ of plants.

---

35. can

water

photosynthesis

---

48. water

---

61. thickening

stiffening

---

74. carbohydrates

glucose

tissues

---

36. Photosynthesis is the process by which _____ _____ manufacture foods, mainly carbohydrates, from _____ and carbon dioxide by the action of light and chlorophyll, which is the green material found in _____.

---

49. Starch is another form of _____; along with cellulose, it forms a third class of carbohydrates.

---

62. Sugars, however, are used as sweetening agents in the making of syrups, jams, jellies, and candies. The main use of sugars then is as _____ agents.

---

75. Paper, cotton and the peels of fruits and vegetables are mainly composed of _____. Cellulose has no nutritional value for man, but act as _____ and adds _____ to the diet.

---

36. green
plants
water
plants

---

49. carbohydrates

---

62. sweetening

---

75. cellulose
roughage
bulk

---

37. Photosynthesis, then, takes place in the presence of sunlight and _____. Chlorophyll acts as a catalyst in this process.

---

50. A molecule of starch is really made up of a chain of several hundred molecules of glucose. A molecule of starch is _____ (smaller / bigger) than a molecule of sucrose, lactose or _____.

---

63. Starch and sugars are two forms of _____. Starch, different from sugars is _____ (more / less) soluble in water. A starch molecule is made up of hundreds molecules of _____. It can thus be hydrolysed back to _____ by the action of an acid or an _____.

---

37. chlorophyll

---

50. bigger

maltose

---

63. carbohydrates

less

glucose

glucose

enzyme

---

38. Photosynthesis which means building up by light, is the most important chemical reaction in nature. It is the _____ by which _____ is manufactured from simple chemical compounds.

---

51. Starch is slightly soluble in water, while sucrose, lactose and maltose are much _____ soluble in water.
(more / less)

---

64. Examples of plants rich in starch are _____, _____, _____, and potatoes. It is found in these plants in the form of _____. These granules can be seen under the microscope. Granules of different starches are _____.
(the same / different)

---

38. Photosynthesis which means building up by light, is the most important chemical reaction in nature. It is the _____ by which _____ is manufactured from simple chemical compounds.

---

51. Starch is slightly soluble in water, while sucrose, lactose and maltose are much _____ soluble in water.
(more / less)

---

64. Examples of plants rich in starch are _____, _____, _____, and potatoes. It is found in these plants in the form of _____. These granules can be seen under the microscope. Granules of different starches are _____.
(the same / different)

---

38. reaction or process

food or carbohydrates

---

51. more

---

64. corn

wheat

rice

granules

different

---

39. Sugars, starch, and cellulose are three different kinds of carbohydrates. All these compounds are composed of the three elements, carbon, _____ and _____.

---

52. Most common sources of starch are potatoes, rice, wheat and corn. These different sources of _____ are not the only sources of starch in nature. Starch _____ (is / is not) also found in the roots and seeds of many other plants.

---

65. The main uses of starch are as _____ and _____ agent, while sugars are mainly used as _____ agents.

---

39. hydrogen

oxygen

---

52. starch

is

---

65. thickening

stiffening

sweetening

CHAPTER III

FATS AND OILS

76. Besides carbohydrates, fats _____ another constituent of foods. _____, carbohydrates and proteins are the three main constituents of _____.
(are / are not)

---

89. Animal fats include the fat found on the meat of certain _____, the oils extracted from the liver of certain _____, and the butter fat extracted from _____.

---

102. Butyric acid, oleic acid, palmitic acid and _____ acid, are four main _____ acids that enter into the composition of edible lipids or f_____ and oils.

---

115. Fats and oils have a greasy touch. They are _____ than water and do not mix with water. Fats then are _____ in water.
(heavier / lighter)
(soluble / insoluble)

---

76. are

fats

foods

---

89. animals

sea-fish

milk

---

102. stearic

fatty

fats

---

115. lighter

insoluble

---

77. Fats include all the edible liquid oils and solid fats. These are also called lipids. Li _____ include all the edible liquid oils and solid f _____.

---

90. Fats, as said earlier, are composed of the elements, _____, _____, _____. They are mainly glycerides, i.e. units or compounds of glycerine and fatty acids.

---

103. These acids unite, as was said, with glycerol or _____ and make up the compounds known as glycerides, which are the units from which _____ are formed.

---

116. Fats are however soluble in solvents like benzene, ether and alcohol. Fats are not soluble in _____, but soluble in special solvents like benzene, ether and _____.

---

77. lipids

fats

---

90. carbon, hydrogen, oxygen

---

103. glycerine

fats or fats & oils

---

116. water

alcohol

---

78. Solid f_____ are usually of animal origin while liquid o_____ are usually of plant origin.

---

91. Glycerine is a colorless, viscous, hygroscopic l_____, with a sweet taste. It mixes with water in all proportions and is used in industry and in m_____.

---

104. Each molecule of glycerol can unite with 3 molecules of fatty _____. Each glyceride is then composed of 3 fatty acid _____ and one molecule of a _____.

---

117. Solid fats do not melt at normal room temperature. Solid fats _____ remain solid even in summer.
do / don't

---

78. fats

oils

---

91. liquid

medicine

---

104. acids

molecules

glycerol

---

117. do

---

79. Similar to carbohydrates, fats are also composed of carbon, hydrogen and exygen, but they contain more hydrogen and less oxygen. Fats and carbohydrates are composed of the same chemical e _____.

---

92. Glycerine _____ also known as glycerol, and is a kind
is / is not
of alcohol.

---

105. Four important glycerides are the glycerides of butyric acid, oleic _____, palmitic _____, and stearic acid. They are known respectively as butyrin, olein, palmitin, and s _____.

---

118. Pure fats are _____ in water, but
soluble / insoluble
_____ in ether, kerosine, benzene, and
soluble / insoluble
alcohol.

---

79. Similar to carbohydrates, fats are also composed of carbon, hydrogen and exygen, but they contain more hydrogen and less oxygen. Fats and carbohydrates are composed of the same chemical e _____.

---

92. Glycerine _____ also known as glycerol, and is a kind
is / is not
of alcohol.

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105. Four important glycerides are the glycerides of butyric acid, oleic _____, palmitic _____, and stearic acid. They are known respectively as butyrin, olein, palmitin, and s _____.

---

118. Pure fats are _____ in water, but
soluble / insoluble
_____ in ether, kerosine, benzene, and
soluble / insoluble
alcohol.

---

79. elements

---

92. is

---

105. acid

acid

stearin

---

118. insoluble

soluble

---

80. Green plants _____ manufacture fats, the way they
(can / cannot)
manufacture _____.

---

93. Glycerol or _____ is then an alcohol which is colorless viscous l _____, with a _____ taste.

---

106. Butyrin is the glyceride of _____ acid and olein is the glyceride of _____ acid, while palmitin and stearin are the glycerides of _____ and _____ acids respectively.

---

119. Fats become rancid when exposed to air, with the production of unpleasant odors. One type of rancidity is then the result of exposure to _____. Rancid fats have _____ odors.

---

80. can

carbohydrates

---

93. glycerine

liquid

, sweet

---

106. butyric

oleic

palmitic

stearic

---

119. air

unpleasant

---

81. Fat or lipids are either s_____ or l_____.
They are composed, similar to carbohydrates, of the three elements, _____, _____ and oxygen. They can be manufactured by _____ and animals.

---

94. The second component of fats and oils are fatty acids. Therefore fats and oils, in general, are made up of _____ and _____ and _____.

---

107. If the three molecules of fatty acids in a glyceride molecule are of the same acid, it is then known as simple glyceride. A simple _____, contains always _____ of fatty acids.
one kind / different kinds

---

120. One type of rancidity is, then, a form of slow oxidation. Fats are slowly _____ when exposed to _____.

---

81. solid

liquid

carbon

hydrogen

plants

---

94. glycerol

fatty acids

---

107. glyceride

one kind

---

120. oxidized

air

---

82. The seeds of certain plants contain a high concentration of oils. Corn seeds, sesame-seeds, and cotton-seeds _____ rich in their oil contents.
are / are not

---

95. Fatty acids are organic acids, i.e. acids produced by plants and animals. A common example of which is acetic acid, which is found in vinegar and gives the latter its sour taste. Fatty acids are then organic _____, produced by _____ and _____.

---

108. If the three molecules of fatty acids in a glyceride molecule are of different fatty acids, it is then known as mixed glyceride. A mixed _____ is composed of _____ fatty acids.
different / the same

---

121. Similar to carbohydrates fats undergo hydrolysis, i.e. they break by uniting with w_____. They hydrolyse to fatty acids and glycerol. By hydrolysis fats break into fatty _____, and _____. The process of digestion of fats is also a hydrolysis process.

---

82. are

---

95. acids

plants

animals

---

108. glyceride

different

---

121. water

acids

glycerol

---

83. Olives, soybeans and peanuts are also very rich in their oil _____.

---

96. Another example of a fatty acid which enters into the composition of butter is butyric acid. _____ acid is the acid found in butter. Rancid butter _____ (is / is not) sour due to the presence of free butyric _____ in it.

---

109. Most of the edible fats and oils are composed of mixed glycerides; of these four fatty acids, namely, butyric acid, _____ acid, _____ acid, and _____ acid.

---

122. The digestion of fats, similar to carbohydrates is a process of _____. In hydrolysis fats break into _____ _____ and glycerol.

---

83. contents

---

96. butyric

is

acid

---

109. palmitic

oleic

stearic

---

122. hydrolysis

fatty acids

---

84. Most edible oils are extracted from certain plant _____, which are _____ in their oil contents.
rich / poor

---

97. Butyric acid is found then in _____, and is also responsible for the particular odor of cheese. All cheeses contain variable amounts of _____ acid.

---

110. Glycerides in fats and oils usually contain more than one type of a fatty acid. Thus a glycerol molecule may be linked to one, two or three types of _____ acids. They are therefore _____ glycerides.
mixed / simple

---

123. Fats are a big source of energy to the body, more than carbohydrates and proteins. All these three products _____ give energy to the _____, but fats are
do / do not
a greater source of _____ to the body.

---

84. seeds

rich

---

97. butter

butyric

---

110. fatty

mixed

---

123. do

body

energy

---

85. Animal fats include the fat found with meat, and milk fat called _____. Butter is the solid fat extracted from _____.

---

98. Still another example of fatty acids that enters into the composition of fats and oils is oleic acid. _____ acid is found in olive oil. Rancid olive oil contains varying amounts of free _____ acid.

---

111. Olive oil, for instance, contains a large percentage of oleic acid, and a small percentage of palmitic acid. It is then composed of mixed glycerides of _____ acid and _____ acid.

---

124. Beside giving energy to the _____ in great _____, fats in meat improve its palatability and add to its flavor.

---

85. butter

milk

---

98. oleic

oleic

---

111. oleic

palmitic

---

124. body

amount

---

86. Lard, suet and tallow are examples of animal _____. Pork, mutton and beef are the common sources of _____ fat. These fats vary in flavor, consistency and somewhat in color.

---

99. Butyric acid and oleic acid are two common _____ acids. They are found in _____ and _____ _____.

---

112. Butter, however, contains butyric, oleic, palmitic and stearic acids. Butter and olive oil are both made up of _____ glycerides.
simple / mixed

---

125. Fats, then improve the flavor of _____. Fats are used sometimes as preservative of _____.

---

86. fats

animal or meat

---

99. fatty

butter

olive oil

---

112. mixed

---

125. meat

meat

---

87. Milk _____ (is / is not) the other rich source of animal fat. Butter is the animal _____ found in _____.

---

100. Other important fatty acids that enter also into the composition of fats and oils are palmitic acid and stearic acid. Palmitic _____ is found in great amounts in palm oil, and stearic _____ is found in great amounts in animal fat.

---

113. Tallow which is the fat of beef and mutton, contains stearic acid, together with palmitic and oleic acids. Tallow therefore is also made up of _____ (mixed / simple) glycerides of the three main fatty acids, _____, _____, and _____ acid.

---

126. Fats and oils, besides being used as fresh products, they are also used in frying and as shortenings in the preparation of different kinds of foods. Pastries _____ (are / are not) foods where large amount of _____ are used.

---

87. is

fat

milk

---

100. acid

acid

---

113. mixed

palmitic

oleic

stearic

---

126. are

fats

---

88. Livers of certain sea-fishes _____ contain a high
(do / do not)
concentration of edible oils. The cod, the shark and the halibut are examples of this kind of _____.

---

101. Both palmitic and stearic acids _____ other
(are / are not)
examples of _____ _____, that enter into the composition of fats and oils.

---

114. Natural fats and oils are then composed mainly of
_____ glycerides of the three main fatty acids
(mixed / simple)
_____, _____, and _____ acid.
Butyric acid is only found in butter.

---

127. Some countries use more solid fats than liquid _____, while other countries use more liquid _____ than solid _____. Fats are used as shortening, while oils are used as dressing. Both solid _____ and liquid _____ are used for frying.

---

88. do

fish

---

101. are

fatty acids

---

114. mixed

palmitic

oleic

stearic

---

127. oils

oils

fats

fats

oils

CHAPTER IV

PROTEINS

128. Another important constituent of foods are proteins. _____ , fats and carbohydrates are the three major constituents of _____.

---

140. Peas, beans and lentils are examples of seeds rich in _____. These kinds of seeds are known as legumes. _____ are seeds rich in proteins.

---

152. Meat, cheese and eggs are animal foods _____ (rich / poor) in proteins, while nuts and legumes are plant foods also _____ (rich / poor) in proteins.

---

164. In a similar manner to carbohydrates and fats, proteins also are hydrolysed when boiled with mineral acids. They decompose into their respective amino a_____. By hydrolysis proteins break into a mixture of amino a_____.

---

128. proteins

foods

---

140. proteins

legumes

---

152. rich

rich

---

164. acids

acids

---

129. Carbohydrates, _____ and proteins are, then, the three _____ constituents of foods.

---

141. Nuts are also protein-rich foods. Legumes and nuts are protein _____ foods.
rich / poor

---

153. Plant proteins differ from animal proteins in their amino acid composition. Plant proteins, then, have _____ pattern and proportion of amino acids as animal proteins.
different / the same

---

165. The digestion of proteins is a process of hydrolysis. In digestion, proteins _____ or split into their constituent amino _____.

---

129. fats

major

---

141. rich

---

153. different

---

165. hydrolyse

acids

---

130. Similar to carbohydrates and fats, _____ are also composed of the three elements carbon, _____ and _____. They also contain the elements nitrogen and sulfur.

---

142. Cereals, however, are foods which are not rich in proteins. Wheat, corn, and rice, then, are foods rather _____ (rich / poor) in proteins. They contain _____ (smaller / larger) amount of proteins than legumes such as peas, beans, and lentils.

---

154. Each particular protein has a different composition from any other _____. They differ in the kind and number and arrangement of amino _____, from which they are made.

---

166. Carbohydrates, fats and proteins are all hydrolysed during the process of digestion. Carbohydrates hydrolyse into simple _____; fats into glycerol and _____ acids, while proteins hydrolyse into _____ acids.

---

130. proteins

hydrogen

oxygen

---

142. poor

smaller

---

154. protein

acids

---

166. sugars

fatty

amino

---

131. Proteins, then, are chemical compounds composed of five main elements, carbon, _____, _____, _____ and sulfur.

---

143. Peas, beans and lentils are protein _____ foods, while rice corn and wheat are protein _____ foods.
(rich / poor) (rich / poor)

---

155. Proteins may appear as solid or liquid, soluble or insoluble in water. Albumins are proteins soluble in water. Egg albumin is then _____ in water.
(soluble / insoluble)

---

167. Proteins are mainly used in the body to build new cells and repair old ones. They also produce calories but in smaller amount than fats. Their function is mainly to make new _____ and repair old ones.

---

131. hydrogen

oxygen

nitrogen

---

143. rich

poor

---

155. soluble

---

167. cells or tissues

ones

---

132. Proteins are composed mainly of the elements _____,
_____, _____, _____ and
_____.

---

144. Animal proteins are mainly stored in the form of meat. All
forms of meat _____ examples of animal _____.
are / are not

---

156. Soluble proteins dissolve in _____, but their
solutions in water are not similar to that of sugar in water.
They disperse in _____ and are known as colloidal
solutions.

---

168. Proteins then _____ body builders. Milk proteins and
are / are not
egg proteins are the best body builders. They are the best
_____ for the growth of the human b_____.

---

132. carbon

hydrogen

oxygen

nitrogen

sulfur

---

144. are

proteins

---

156. water

water

---

168. are

proteins

body

---

133. The percentage of nitrogen in proteins ranges between 16 and 18% of the weight of _____.

---

145. Meat of all kinds, including fish and poultry are protein _____ foods.
rich / poor

---

157. Egg white or egg albumin is an example of a soluble _____. When it is mixed with water, forms a solution, known as a colloidal s_____.

---

169. Animal proteins in general are better body b_____ than plant proteins. They are more useful for human nutrition than p_____ _____.

---

133. protein

---

145. rich

---

157. protein

solution

---

169. builders

plant proteins

---

134. Proteins are large and complex organic compounds composed of the elements _____, _____, _____, _____ and _____. The percentage of nitrogen ranges between _____ and _____% of the weight of _____.

---

146. Cheese is another form of food rich in animal protein. All types of meat and cheeses are foods _____ (rich / poor) in animal _____.

---

158. Skimmed milk is milk with the fat removed; thus it _____ (would / would not) contain mainly carbohydrates and proteins. The carbohydrates in milk is lactose and the main protein is called casein.

---

170. Meat, eggs and milk are thus the best sources of proteins for the growth of the human b_____.

---

134. carbon
hydrogen
oxygen
nitrogen
sulfur
16 18
a protein

---

146. rich
proteins

---

158. would

---

170. body

---

135. As was stated earlier, green plants manufacture carbohydrates by the process of _____. They build these compounds, by the action of sunlight from the two simple compounds, carbon dioxide and _____.

---

147. Eggs, both the white and yellow parts, are also examples of animal foods rich in protein. Meat, cheese and eggs are foods _____ (rich / poor) in _____ protein.

---

159. Skimmed milk powder mixed with water forms also a solution known as a colloidal _____. Skimmed milk contains mainly the protein _____. Casein is another example of soluble p_____. Casein disperses in water to form a c_____ solution.

---

171. Human beings are also animals. Our organs and tissues are _____ (similar to / different from) animal organs and tissues. Hence our proteins are also similar in structure and composition to animal _____.

---

135. photosynthesis

water

---

147. rich

animal

---

159. solution

casein

protein

colloidal

---

171. similar to

proteins

---

136. By a similar process called protein synthesis, they _____ also manufacture proteins by adding nitrogen to the carbon dioxide and _____. Plants take the nitrogen they need from the soil, and some can fix nitrogen from the air.

(can / cannot)

---

148. Animals build their proteins from the foods they eat, while plants build their p_____ by the process of p_____ _____, similar to their manufacture of fats and _____.

---

160. Egg albumin and milk casein are examples of soluble p_____.

---

172. Therefore, animal proteins are better body builders for us than _____ proteins, because animal proteins have similar _____ and _____ to our own proteins.

---

136. can

water

---

148. proteins

protein-synthesis

carbohydrates

---

160. proteins

---

172. plant

structure

composition

---

137. Plants therefore build their own proteins, the way they make their carbohydrates and _____. They take the nitrogen they need from the _____ in the form of mineral salts.

---

149. Proteins are very complex and large compounds; their molecules are built up of smaller and simpler building blocks, or compounds known as amino acids. Amino acids _____ (are / are not) the small units from which _____ molecules are built up.

---

161. Proteins are very sensitive to the action of heat, acids, bases and organic solvents. When treated with one of these agents, they change their properties and are then said to be DENATURED. Denaturation of p_____ is the losing of their original _____ by the action of certain agents.

---

173. Proteins, then are one of the three major components of foods. The other two components are _____ and _____.

---

137. fats

soil

---

149. are

proteins

---

161. proteins

properties

---

173. carbohydrates

fats

---

138. Animals also build their own proteins. They synthesize their proteins from the foods they eat. Proteins are built by both _____ and animals. Both plant and animal tissues _____ proteins in varying amounts.
contain / do not contain

---

150. Protein molecules are giant molecules made up of a very large number of these smaller units, the amino _____. The number of _____ acids found in one molecule of a protein ranges from less than a hundred to several thousands.

---

162. Heating, then, would _____ proteins, as in the case with boiled eggs. Both the egg white and egg yolk _____ denatured and are solidified when they are heated.
are / are not

---

174. Proteins are composed of five main elements _____, _____, _____, _____ and sulfur. Protein molecules are _____.
huge & complex / small & simple
Each molecule is composed of a large number of small units known as _____ _____.

---

138. plants
contain

---

150. acids
amino

---

162. denature
are

---

174. carbon
hydrogen
oxygen
nitrogen
huge & complex
amino acids

---

139. All plants store proteins in their seeds, in varying amounts. Some seeds contain larger amounts of _____ than others.

---

151. The bigger the molecule of a protein the _____ (smaller / larger) is the number of amino acids found in _____.

---

163. Acids, b_____ or _____ solvents and heat change the nature of p_____. They are said to be denatured. D_____ is the changing of _____ of proteins by the action of certain agents.

---

175. The function of proteins is mainly to build new _____ and _____, but they can also act as energy producers when the amount of carbohydrates and fats in the body is deficient.

---

139. proteins

---

151. bigger

it

---

163. bases

organic

proteins

denaturation

properties

---

175. cells

tissues

CHAPTER V

MINERALS

176. The fourth group of substances that constitute our food are minerals. These _____ as we said earlier, together with carbohydrates, _____, proteins, vitamins and water are the main components of foods.

---

194. These minerals found in f_____ and water are not always available to the human body. They may be found in insoluble form and therefore cannot be utilized by the human _____.

---

212. Persons that do not have enough hemoglobin in their _____, will develop a disease called anemia. Anemia is a _____, due to the lack of h_____ in the blood of the body.

---

230. Sea-animals and sea-weeds, onion, water cress and iodized salt are _____ very _____ in iodine.
rich / poor

---

176. minerals

fats

---

194. foods

body

---

212. blood

disease

hemoglobin

---

230. foods

much

---

177. Minerals or mineral elements are the elements found in foods, other than carbon, hydrogen, oxygen and nitrogen that constitute the three major groups, carbohydrates fats and _____.

---

195. Minerals found in _____ and _____ should be in a form soluble in water to be useful to the _____ body.

---

213. Anemic people are usually people whose food is _____ (rich / poor) in iron.

---

231. Common salt is another important m_____ food. Common salt is made up of the elements sodium and chlorine (NaCl). All people use common salt in cooking their f_____.

---

177. proteins

---

195. foods

water

human

---

213. poor

---

231. mineral

foods

---

178. Minerals constitute the ash that is left when a food is burnt. They _____ (are / are not) then the mineral or inorganic part of the f_____.

---

196. Insoluble minerals found in _____ and _____ have no great importance to the human _____.

---

214. Rich sources of iron are livers, kidneys and egg-yolks. Liver is a food _____ (rich / poor) in iron.

---

232. Sodium chloride or common salt is also found in foods like cheese, ham, canned meat, bacon, bread, biscuits, margarine and butter. All these foods _____ (do / do not) contain good amounts of common _____ added to them during their preparation.

---

178. are

food

---

196. foods

water

body

---

214. rich

---

232. do

salt

---

179. These minerals are essential nutrients similar to carbohydrates, fats and _____. They, therefore, constitute an essential part of our _____.

---

197. Calcium and Phosphorus are usually found together in foods. The richest source of these two _____, is milk. Milk is the food richest in _____ and _____.

---

215. Liver, kidney and egg-yolk are foods _____ (rich / poor) in _____. Green vegetables contain variable amounts of iron which may or may not be available to the human body.

---

233. Hams, bacon, cheese, butter and b_____ contain good amounts of common _____.

---

179. proteins

foods

---

197. elements

calcium

phosphorus

---

215. rich

iron

---

233. bread or biscuits

salt

---

180. They are one of the _____ nutrients and thus they form an _____ part of our food.

---

198. Cheese is another food rich also in calcium and _____. These two foods, milk and cheese are very _____ in _____ and phosphorus.

---

216. Dried fruits _____ contain small proportion of iron.
(do / do not)
Peaches have a large percentage of i_____.

---

234. Common salt is _____ part of our
(an essential / a nonessential)
f_____. We eat it as salt and as part of other foods.

---

180. essential

essential

---

198. phosphorus

rich

calcium

---

216. do

iron

---

234. an essential

food

---

181. They are not found free in foods, but _____ found
(are / are not)
mixed with the other constituents of _____. They
are also found in water.

---

199. "Laban" is still another example of a f_____ rich in
calcium and _____. All milk products, except that
part derived from the fat such as butter and cream, are
foods _____ in _____ and phosphorus.
(rich / poor)

---

217. Black treacle (molasses) is also rich in iron. Liver,
kidneys, egg _____ and black _____ are foods
_____ in iron.
(rich / poor)

---

235. Common salt is used for the seasoning and flavoring of our
f_____. We season our meats and pickles by common
_____.

---

181. are

food

---

199. food

phosphorus

rich

calcium

---

217. yolk

treacle

rich

---

235. foods

salt

---

182. Most natural waters contain varying amounts of _____.

---

200. Not all foods contain calcium and phosphorus together. Milk is the _____ (richest / poorest) food in _____ and phosphorus.

---

218. Liver and liver extract are perhaps the _____ (richest / poorest) source of iron in foods.

---

236. A number of our foods are preserved by the use of c_____ salt. Common salt is one of the preservative of our _____.

---

182. minerals

---

200. richest

calcium (Ca)

---

218. richest

---

236. common

foods

---

183. Minerals are found in most foods in varying quantities. Most _____ contain different amounts of these _____.

---

201. Some green vegetables and some cereal flours _____ (do / do not) contain small quantities of calcium.

---

219. Iodine is the fourth important m_____ element in f_____. The other important _____ in food are calcium, phosphorus, iron, sodium, chlorine and _____.

---

237. Without the addition of common salt to our foods, they will be tasteless, and lose their flavor. Salt adds f_____ to our _____ and increases our appetite.

---

183. foods

minerals

---

201. do

---

219. mineral

food

elements

iodine (I)

---

237. flavor

foods

---

184. Some of these minerals are found in f_____, in trace amounts, others are found in substantial amounts: Not all m_____ are found in the same quantities in different _____.

---

202. Water containing calcium and magnesium salts dissolved in it is called hard water. Hard water is a _____ source of calcium.
rich / poor

---

220. Iodine is necessary for the physical and mental growth of the body. Iodine is _____ element for the growth of the b_____.
an essential / a nonessential

---

238. Common salt is _____ for the human body. It supplies the acid in the stomach and is necessary for the maintenance of the acid-base balance in the body.
necessary / not necessary

---

184. foods

minerals

foods

---

202. rich

---

220. essential

body

---

238. necessary

---

185. These minerals or mineral e_____ are sometimes referred to as mineral salts, though they are not always present in foods as salts.

---

203. Hard water, then, is another important source of calcium. Most natural fresh waters contain varying amounts of _____ _____ dissolved in them.

---

221. Iodine is needed by the two thyroid glands, which are found at the base of the neck. These two thyroid g_____, secrete the hormone thyroxine. This hormone is rich in i_____, and is necessary for the mental and physical growth of the body.

---

239. We lose large amounts of common _____, from our body through sweating and urine. These amounts which we lose through the s_____ and urine, we should replace by the amounts of _____ _____ we consume.

---

185. elements

---

203. calcium salts

---

221. glands

iodine

---

239. salt

sweat

common salt

---

186. Not all these _____ elements, which are found in our food, are essential to the body. The essential ones are about sixteen in number, other than carbon, hydrogen, oxygen and _____, which constitute the major nutrients, namely carbohydrates, _____ and _____.

---

204. Soft bones of fish and other animals like sardines and canned salmons and small birds, which we eat as a whole are another rich source of calcium and phosphorus in f_____. These bones contain a _____ amount of _____ and phosphorus.
large / small

---

222. People who have deficiency of thyroxin develop a swelling of the thyroid glands, a disease known as goiter. Goiter is a swelling of the _____ glands due mostly to the _____ of iodine in the f_____.
lack / excess

---

240. Most foods in their natural state contain some minerals in varying _____.

---

186. mineral

nitrogen

fats

proteins

---

204. foods

large

calcium

---

222. thyroid

lack

food

---

240. quantities or amounts

---

187. Of the e _____ s needed in relatively appreciable _____ are calcium, sodium, magnesium, potassium, phosphorus, sulfur, chlorine and iron.

---

205. Milk, cheese, sour milk or "laban", bones and hard water are the _____ sources of calcium in f_____.
richest / poorest

---

223. The richest foods in iodine are sea-weeds, sea-fish and shell-fish like oyster, mussels, clams and lobsters. All animals and plants that grow in the sea are foods _____ in iodine.
rich / poor

---

241. Milk, cheese, eggs, liver, kidneys, bread, green vegetables, fish and other sea-animals _____ among the foods _____ in minerals.
are / are not
rich / poor

---

187. elements

amounts or quantities

---

205. richest

foods

---

223. rich

---

241. are

rich

---

188. Some of these essential mineral elements are needed in _____ amounts. Others are only needed in relatively minute amounts or traces or some times in mere traces.

---

206. Some flours to which calcium carbonate is added are another source of calcium in _____. Enriched flours are also foods _____ (rich / poor) in calcium.

---

224. Sea-animals and sea-weeds are the _____ (richest / poorest) foods in i_____.

---

242. Natural waters also contain varying amounts of m_____, especially calcium and _____.

---

188. appreciable

---

206. foods

rich

---

224. richest

iodine

---

242. minerals

iodine

---

189. Among these trace elements, i.e. elements that are needed in _____ amounts are iodine, fluorine, copper, zinc, cobalt, manganese, molybdenum, and selenium.
appreciable / minute

---

207. Enriched flours, milk, "laban", cheese and bones are foods very _____ in calcium.
rich / poor

---

225. Drinking water contains usually varying amounts of iodine. All drinking w_____ contains some amounts of _____.

---

243. Minerals similar to carbohydrates, f_____ and p_____ are necessary for the growth and functioning of the b_____.

---

189. minute

---

207. rich

---

225. water

iodine

---

243. fats

proteins

body

---

190. All these essential elements whether needed in appreciable amounts or in traces or in mere traces _____ of the same importance to the body.
(are / are not)

---

208. These two elements, calcium and phosphorus are used to build the bones and teeth of the human b_____. Hence their presence in the food is _____.
(essential / nonessential)

---

226. Onion and water cress are examples of vegetables rich in iodine. Sea-animals, onions and water cress are foods _____ in iodine.
(rich / poor)

---

244. Minerals, however, do not produce any energy like carbohydrates, _____ and _____ but are involved in the different body functions.

---

190. are

---

208. body

essential

---

226. rich

---

244. fats

proteins

---

191. The body needs of these mineral _____ vary. Some are needed in substantial _____, others are only needed in traces or mere traces.

---

209. The lack of calcium and phosphorus in foods will lead to _____ bones and teeth.
(good / poor)

---

227. Common salt to which an iodate, potassium or sodium iodate (KIO_3, $NaIO_3$), has been added is called iodized salt. Iodized salt is another source rich in _____.

---

245. They _____ producers of energy, but they take part
(are / are not)
in the different body _____.

---

191. elements

amount or quantity

---

209. poor

---

227. iodine

---

245. are not

processes or functions

---

192. Among these important _____ _____ are calcium, phosphorus, chlorine, sodium, iodine and iron.

---

210. Another important mineral element is iron. _____ is the vital element in the hemoglobin of the blood. The hemoglobin of the _____ is a compound containing _____. If there is a deficiency of iron in the body, an insufficient amount of _____ will be formed.

---

228. People in many countries including Lebanon suffer from goiter, due to iodine deficiency in their food. Iodized salt is the easiest and best way to treat goiter which is due to iodine _____ in the food.

---

246. Minerals are _____ part of our diet. They
(an essential / a nonessential)
are needed in _____ amounts; sometimes, only in traces
(small / large)
or mere traces.

---

192. mineral elements

---

210. iron

blood

iron

hemoglobin

---

228. deficiency

---

246. an essential

small

---

193. Most foods whether plants or animal products

_____ different amounts of these m_____.
contain / do not contain

Drinking water does also contain varying _____ of these minerals.

---

211. Iron in the food is _____ for the formation
essential / nonessential

of the hemoglobin in the _____.

---

229. The use of iodized salt will in the long run cure and eradicate goiter which is due to _____ deficiency in f_____.

---

247. They are found in _____ quantities in drinking
varying / the same

water and in most of the common foods.

---

193. contain

minerals

quantities

---

211. essential

blood

---

229. iodine

food

---

247. varying

CHAPTER VI

VITAMINS

248. You have learned so far about four important constituents of foods, namely carbohydrates, _____, proteins and minerals. The fifth important constituent of f_____ are vitamins. _____, then, are another important constituent of food.

---

278. All these foods, fish _____ oils, kidneys, livers, most dairy _____ and eggs_____ are animal foods _____ in vitamin A. They are mainly fats or fat _____. Yellow fruits and vegetables on the other hand, such as _____ and _____ are rich in _____.

(rich / poor)

---

308. The B complex are not a simple v_____. They are made up of 13 different vitamins. The _____ complex are _____ simple vitamin, but a group of 13 different _____.

(one / not one)

---

338. Niacin _____ an essential substance to the body. Its absence will retard growth and the normal functioning of the skin and the digestive tract. In severe cases pellagra develops.

(is / is not)

---

248. fats
foods
vitamins

---

278. liver
products
yolk
rich
products
apricots
carrots
carotene

---

308. vitamin
B
not one
vitamins

---

338. ~~an essential~~
is

---

249. Vitamins are _____ chemical compounds,
essential / nonessential
which are needed in small amounts to take part in the different chemical reactions of the body.

---

279. Vitamin A is not much affected by heat. Cooking, canning and drying do not destroy it. Carotene which is found in yellow _____ and _____ is not also lost by cooking. On the contrary cooking of these f_____ and v_____ makes the _____ more available.

---

309. Vitamins B complex number about _____ different vitamins, all of which are _____ soluble vitamins.
water / fat

---

339. Pellagra appears in corn consuming populations with severe niacin deficiency. _____ is a skin disease characterized by general weakness and loss of appetite and weight. In later stages sore mouth, digestive and nervous disturbances, and skin eruptions develop.

---

249. essential

---

279. fruits

vegetables

fruits

vegetables

carotene

---

309. water

---

339. pellagra

---

250. Vitamins, therefore are an essential part of our _____, and are found in small amounts in foods. They are needed also in _____ amounts in the different chemical reactions of the body.
(small / large)

---

280. In general therefore cooking and other methods of foods processing _____ destroy or affect vitamin _____ or its precursor _____.
(do / do not)

---

310. Thiamine or vitamin B_1 as was known before, is the first of the B complex _____. It occurs greatly in whole grain cereals, meat, especially pork, potatoes and legumes. All these foods are greatly _____ in thiamine.
(rich / poor)

---

340. Pellagra is a _____ deficiency disease, the symptoms of which are digestive and mental disturbances accompanied with skin eruptions and ultimately death.

---

250. food

small

---

280. do not

A

carotene

---

310. vitamins

rich

---

340. niacin

---

251. Some vitamins act as coenzymes, i.e. cocatalysts in certain chemical reactions in the body. They are found in foods in _____ (small / large) amounts, and are needed by the body in _____ (small / large) amounts also.

---

281. Vitamin _____ prevents night blindness; hence it is called antiophthalmic vitamin. Severe deficiency of vitamin can produce absolute blindness.

---

311. B_1 or t_____ is then mainly found in whole grain _____, pork meat, potatoes and legumes. Whole grain cereals, legumes and potatoes contain _____ (large / small) amounts of thiamine.

---

341. Thiamine, riboflavin and _____ are three important members of the B _____ group. They are all water s_____ and have important roles in the metabolism of _____.

---

251. small

small

---

281. A

---

311. thiamine

cereals

large

---

341. niacin

complex

soluble

carbohydrates

---

252. Vitamins, then, are _____ part of
(an essential / a nonessential)
our food. They are needed by the body in _____
amounts, and are found in foods in _____ amounts also.
Some vitamins act as _____ in certain chemical reactions
in the body.

---

282. Vitamin A is known as anti_____ vitamin because it
_____ night blindness. It also promotes
(prevents / induces)
growth and prevents infection. Thus it is also called
antiinfection vitamin.

---

312. Whole grain cereals, legumes and potatoes and m_____
are foods _____ in t_____. Yeast extract
(rich / poor)
and dry brewer's yeast are, however, the richest source of
thiamine.

---

342. The other important members of the B _____ group
are pyroxidine, or vitamin B_6, pantothenic acid, folic acid
or folacin, biotin and vitamin B_{12}. All these _____
are members of the B _____ _____.

---

252. an essential

small

small

coenzymes

---

282. antiophthalmic

prevents

---

312. meat

rich

thiamine

---

342. complex

vitamins

complex

group or vitamins

---

253. Our body cannot manufacture any of these vitamins; thus, it has to depend on foods to supply these _____. No human being can live on foods free from _____.

---

283. Vitamin A is thus known as _____ _____, because it protects the eyes from night _____. It is also known as _____ because it promotes the growth of the body and helps to prevent infection.

---

313. White bread, that is, bread made from wheat from which the bran is removed, and polished rice are foods _____ (rich / poor) in thiamine contents. Bran, however, is rich in thiamine. Brown bread therefore, is _____ (richer / poorer) than white bread in its _____ content.

---

343. All these vitamins are _____ soluble. While vitamins A and D are _____ soluble. Vitamin B_{12} is of particular importance. Its absence in food will cause pernicious anemia. It is used then in the treatment of this d_____ and other forms of anemia.

---

253. vitamins

vitamins

---

283. antiophthalmic

vitamin

blindness

antiinfection

vitamin

---

313. poor

richer

thiamine

---

343. water

fat

disease

---

254. Some of these vitamins are found in f_____, in the form of preformed vitamins, i.e., vitamins, which are ready for use by the human _____. Others _____ found as pro-
(are / are not)
vitamins, i.e., as substances which will be converted into vitamins in the human _____.

---

284. Vitamin D is another member of the fat soluble vitamins. Both vitamin A and D _____ of the same class of v_____.
(are / are not)

---

314. Thiamine is a _____ soluble vitamin. It is destroyed by
(water / fat)
high temperature, alkali and sulfites. Canning and preservation by sulfites would _____ the thiamine contents
(destroy / preserve)
of foods.

---

344. The other important water soluble vitamin is ascorbic acid or vitamin C. _____ _____ is _____ soluble
(water / fat)
vitamin.

---

254. foods

body

are

body

---

284. are

vitamins

---

314. water

destroy

---

344. ascorbic acid

water

---

255. Provitamins are precursors of v_____. They cannot be used directly by the human _____, while preformed vitamins are real _____ that the body _____ (can / cannot) use directly.

---

285. Very few foods contain vitamin D and with a few exceptions they are mainly animal f_____. Fish liver oils are the richest sources of vitamin D, as they _____ (are / are not) also for vitamin A.

---

315. Canned meat and preserved cereals contain _____ (little / large) amounts of _____. Sausage of pork meat preserved by sulfites contain little or no thiamine.

---

345. Ascorbic acid is found mainly in fruits, vegetables and liver. Citrous fruits are especially _____ (rich / poor) in ascorbic a_____.

---

255. vitamins

body

vitamins

can

---

285. foods

are

---

315. little

thiamine

---

245. rich

acid

---

256. These vitamins are divided into two classes according to their solubility. Fat soluble v_____ and water _____ vitamins.

---

286. Hence halibut liver oil and cod liver oil are both the _____ foods in vitamin D and A.
richest / poorest

---

316. Fortified bread is bread to which thiamine has been added. Bread to which thiamine is added is called _____ _____.

---

346. Citrous fruits, cabbage, tomatoe and cauliflower are foods that contain _____ quantities of _____ acid.
large / small

---

256. vitamins

soluble

---

286. richest

---

316. fortified bread

---

346. large

ascorbic

---

257. Fat soluble vitamins are soluble only in fats and fat solvents while water soluble _____ are _____ only in w_____.

---

287. Liver is again a food rich in vitamin D as it is _____ (rich / poor) also in vitamin A.

---

317. Thiamine is thus susceptible to high temperatures. It is also _____ (destroyed / preserved) by sulphites. Canning would also _____ (destroy / preserve) thiamine in the food.

---

347. Salad vegetables are also rich in ascorbic _____. Citrous fruits, cabbage, t_____, cauliflower and salad v_____ are the best sources of _____ acid or vitamin C.

---

257. vitamins

soluble

water

---

287. rich

---

317. destroyed

destroy

---

347. acid

tomatoes

vegetables

ascorbic

---

258. Fat soluble vitamins are then soluble only in _____ and fat _____, while water soluble vitamins are _____ in _____ and water solutions.
soluble / insoluble

---

288. It is also found in herrings, sardines, and salmons. Fat fish contains also considerable _____ of vitamin D.

---

318. Thiamine is essential for the complete oxidation of glucose and the liberation of energy in the body. Without it the metabolism of carbohydrates in the body will be _____.
incomplete / complete

---

348. Among all these foods, citrous fruits such as oranges, lemons, limes and grapefruits are the _____ source of ascorbic acid or vitamin _____.
richest / poorest

---

258. fats

solvents

soluble

water

---

288. quantities or amounts

---

318. incomplete

---

348. richest

C

---

259. Before their composition was known, vitamins were disignated by letter. However after the discovery of their composition, they are now known also by their chemical names. Today v_____ are either known by l_____s or by their chemical _____.

---

289. Fortified milk is milk to which vitamin D has been added. Fortified milk is thus a food _____ in vitamin D.
rich / poor

---

319. Thiamine, which is found in whole cereal grains, such as _____ and _____ is essential for the complete o_____ of carbohydrates in the body. Its absence will cause loss of appetite and nervousness, and in children will retard their growth. Because of these symptoms, it is known as anti-neuritic _____.

---

349. Liver is another food which contains a good quantity of _____ acid or _____ C.

---

259. vitamins
letters
names

---

289. rich

---

319. rice
wheat
oxidation
vitamin

---

349. ascorbic
vitamin

---

260. Most of the vitamins are now known by their chemical _____. Some as we shall see are more known by their designated _____.

---

290. Dairy products such as eggs, butter, cheese and milk also contain good q_____ of vitamin D. They are thus _____ in both vitamin D and A.
rich / poor

---

320. Thiamine is also known as anti _____ vitamin, because its absence in food will cause nervousness, loss of _____. It is also known as anti-beri-beri vitamin.

---

350. L_____, citrous fruits and certain vegetables like cab_____, tomatoes and c_____ are foods _____ in ascorbic _____.
rich / poor

---

260. names

letters

---

290. quantities

rich

---

320. antineuritic

appetite

---

350. liver

cabbages

cauliflowers

rich

acid

---

261. The fat soluble _____ include vitamins A, D, E and K, while the water soluble _____ include the B complex group and vitamin C.

---

291. Fortified milk and margarine are particularly _____ (rich / poor) in vitamin D. Both of these two are foods _____ in vitamin D.

---

321. In severe cases of thiamine deficiency, beri-beri is produced. Beri-beri _____ (is /is not) a form of nervous di_____, which produces some type of paralysis. Beri _____ is characterized by numbness of the legs, arm paralysis and heart malfunction.

---

351. Storage and marketing of these fruits and vegetables lower their content of _____ acid. Cooking also tends to destroy the _____ _____ content of these fruits and _____.

---

261. vitamins

vitamins

---

291. rich

rich

---

321. is

disease

beri-beri

---

351. ascorbic

ascorbic acid

vegetables

---

262. Vitamins A, D, E and K are _____ soluble vitamins and vitamins C and the B complex _____ are _____ soluble vitamins.

---

292. Vitamin A is also added to margarine. It is thus enriched with both vitamin A and D. Fortified margarine is therefore an _____ food in both _____ _____ and _____.

---

322. Thiamine is then known as antineuritic and anti-beri-beri v_____ because it _____ the body
protects / does not protect
against beri _____ and other nervous disturbances.

---

352. The water used in cooking dissolves most of the _____ acid found in the food. Ascorbic _____ is then, like other water soluble vitamins, lost by cooking and st_____ and in throwing away the cooking water or gravy.

---

262. fat

group

water

---

292. enriched

vitamin

A

D

---

322. vitamin

protects

beri-beri

---

352. ascorbic

acid

storage

---

263. The absence of one or more of these _____ in the f_____ we eat, may lead to one or more diseases. These d_____ are known as deficiency diseases.

---

293. Liver, dairy products and fish-liver oils are the main sources of v_____ D in nature. Fish-liver oils are the _____ foods in vitamin D content.
richest / poorest

---

323. Riboflavin or B_2 is the second member of the B _____ group. The _____ complex vitamins are all _____ soluble vitamins.
water / fat

---

353. Ascorbic acid is lost by c_____ and storage. Cooking and _____ destroy most of the ascorbic acid found in foods.

---

263. vitamins

food

diseases

---

293. vitamin

richest

---

323. complex

B

water

---

353. cooking

storage

---

264. Deficiency diseases are _____ caused by the

_____ of one or more v_____ in the
presence / absence
foods we eat.

---

294. Enriched milk and margarine have also a _____ content of
high / low
vitamin D.

---

324. Dairy foods such as milk, cheese and eggs are good sources of ribo_____. Meat and meat extract are also rich in riboflavin. Riboflavin is then found in _____ amounts
large / small
in dairy food, m_____ and meat extracts.

---

354. In canning, however, only a little amount of the acid is lost. Canning _____ most of the _____
preserves/ does not preserve
acid, in the food.

---

264. diseases

absence

vitamins

---

294. high

---

324. riboflavin

large

meat

---

354. preserves

ascorbic

---

265. Sailors in old days used to suffer greatly from some of these _____ diseases, due to lack of fresh foods in their diets and due to the _____ (absence / presence) of one or more _____.

---

295. Vitamin D is not lost during cooking in water or destroyed by heat. Thus cooking, canning and other methods of food preserving will _____ (destroy / not destroy) vitamin D in f_____.

---

325. Similar to thiamine, ribo_____ is also found in large amounts in brewers' dry yeast. Brewers' dry _____ is a _____ (rich / poor) food for both thiamine and _____.

---

355. Sun drying also causes most of the _____ acid to be lost, while dehydration or mechanical drying preserves most of the vitamin. S_____ drying then _____ (destroys / preserves) most of the vitamin.

---

265. deficiency

absence

vitamins

---

295. not destroy

foods

---

325. riboflavin

yeast

rich

riboflavin

---

355. ascorbic

sun

destroys

---

266. Vitamin A is a fat _____ vitamin. It is found in foods in two forms as a provitamin in certain fruits and vegetables and as preformed vitamin in animal f_____.

---

296. Both vitamin A and D are _____ soluble . Both usually
fat / water
occur together in _____ and both are
the same food / different foods
_____ much affected by cooking and other food processing.
not / very

---

326. Riboflavin is another member of the B _____ group. It is available mainly in brewers' dr____ _____ and dairy _____. Milk, cheese and e_____ are rich in ribo_____.

---

356. Mechanical drying or _____ similar to canning _____ most of the acid.
destroys/ preserves

---

266. soluble

foods

---

296. fat

the same food

not

---

326. complex

dry yeast

products

eggs

riboflavin

---

356. dehydration

preserves

---

267. Yellow fruits and vegetables and certain green vegetables are rich in carotene, which is the provitamin or the precursor of v_____ _____.

---

297. Vitamin D is also known as sunshine v_____ because it can be made from the fat-like substance, ergosterol, which is found underneath the skin, when the body is exposed to sunlight.

---

327. Riboflavin being a _____ soluble vitamin, is not
water / fat
destroyed by ordinary boiling. Higher temperature in frying, roasting and canning causes a great loss of the vitamin. Ribo_____ is greatly _____ by higher
destroyed / preserved
temperature.

---

357. Sun _____ destroys most of the a_____ acid in the food, while c_____ and d_____ preserve most of the vitamin in the food.

---

267. vitamin A

---

297. vitamin

---

327. water
riboflavin
destroyed

---

357. drying
ascorbic
canning
dehydration

---

268. Carotene is the yellow substance found in carrots, from which it derives its name. Carotene is the precursor of _____ _____. It is found in large amounts in all yellow f_____ and v_____, and in small amounts in some green v_____.

---

298. Ergosterol is a provitamin, when this p_____ is exposed to the sun, the ultraviolet rays of the sun light will act on it and convert it to vitamin _____.

---

328. Frying, roasting and c_____ will _____ the
damage / preserve
riboflavin content of foods, due to the higher t_____ reached during these processes.

---

358. Ascorbic acid is therefore the _____ stable of the
least / most
vitamins. It is _____ by heat and oxygen.
destroyed / not destroyed

---

268. vitamin A
fruits
vegetables
vegetables

---

298. provitamin
D

---

328. canning
damage
temperature

---

358. least
destroyed

---

269. Carrots, tomatoes, apricots and peaches are examples of these vegetables and _____, which _____ rich in carotene or the pro_____ _____.
(are / are not)

---

299. When people are exposed to the sun they manufacture vitamin _____ in their bodies.

---

329. Similar to thiamine, ribo_____ plays an important role in the metabolism of carbo_____. It also plays a role in the utilization of fats and amino acids. It is therefore _____ to the body to promote growth and help in the production of energy.
(necessary / unnecessary)

---

359. Heat and Oxygen _____ destroy most of the ascorbic acid in foods.
(will / will not)

---

269. fruits

are

provitamin A

---

299. D

---

329. riboflavin

carbohydrates

necessary

---

359. will

---

270. Carrots are one of these vegetables rich in their content of c_____ or pro_____ _____.

---

300. Vitamin D plays a role in the calcification of bones and teeth. It regulates the use of calcium and phosphorus in the body. If vitamin D is absent from the body, bones and t_____ are _____ developed.
not well / well

---

330. The absence of ribo_____ in the diet will _____ the metabolic processes in the body
disturb / not disturb
and energy production and will retard g_____.

---

360. Ascorbic acid is important for the general health of the body, its vitality and endurance. It ensures a clear skin, a fresh complexion and healthy gums and teeth. _____ acid is necessary therefore for the general _____ of the body.

---

270. carotene

provitamin A

---

300. teeth

not well

---

330. riboflavin

disturb

growth

---

360. ascorbic

health

---

271. Vitamin A itself is found in large quantities in some animal foods especially animal fats and oils. Some animal fats and oils are _____ (rich / poor) in vitamin _____.

---

301. When children lack vitamin D in their foods, they develop a disease called rickets. In this disease the bones _____ (do / do not) grow normally. Rickets is thus a deficiency d_____.

---

331. The third member of the B _____ vitamins is niacin, known also as nicotinic acid. Thiamine, _____ and niacin are three v_____ from the _____ complex group.

---

361. Ascorbic _____ is responsible in particular for the development of healthy gums and teeth. Without it g_____ and t_____ are easily infected.

---

271. rich

A

---

301. do not

disease

---

331. complex

riboflavin

vitamins

B

---

361. acid

gums

teeth

---

272. Fish liver oils i.e. oils extracted from the liver of sea-fish, kidney and liver are f_____ rich in vitamin A. Cod liver oil and halibut liver oil are both very _____ (rich / poor) in vitamin _____.

---

302. For the development of good b_____ and teeth, calcium, phosphorus and vitamin _____ should be available.

---

332. Similar to thiamine & riboflavin, niacin is also a _____ (water / fat) soluble vitamin. It is found in the same foods as thiamine, however fish and meat contain a considerable am_____ of nia_____, while their thiamine content is low.

---

362. In severe cases of ascorbic _____ deficiency the disease scurvy develops. Scurvy is characterized by soreness of the gums; the teeth become loose, the skin shows bruise like patches with severe pain in the joints. _____ is a deficiency disease of _____ acid.

---

272. foods

rich

A

---

302. bones

D

---

332. water

amount

niacin

---

362. acid

scurvy

ascorbic

---

273. Halibut liver oil, cod liver oil, kidneys and livers are foods very _____ (rich / poor) in _____ _____. So is butter, cheese and cream.

---

303. The same way night blindness is a deficiency d_____ of vitamin _____; rickets is a d_____ disease of vitamin _____.

---

333. Ni_____ is also found in yeast and yeast extract. Whole cereals are also _____ (rich / poor) in ni_____. Even polished rice contains a small amount of niacin.

---

363. Lack of vitamin C in sufficient amounts in the diet leads to _____ (poor / healthy) teeth. In severe cases the disease _____ develops.

---

273. Halibut liver oil, cod liver oil, kidneys and livers are foods very _____ (rich / poor) in _____ _____. So is butter, cheese and cream.

---

303. The same way night blindness is a deficiency d_____ of vitamin _____; rickets is a d_____ disease of vitamin _____.

---

333. Ni_____ is also found in yeast and yeast extract. Whole cereals are also _____ (rich / poor) in ni_____. Even polished rice contains a small amount of niacin.

---

363. Lack of vitamin C in sufficient amounts in the diet leads to _____ (poor / healthy) teeth. In severe cases the disease _____ develops.

---

273. rich

vitamin

A

---

303. disease

A

deficiency

D

---

333. niacin

rich

niacin

---

363. poor

scurvy

---

274. Butter, and milk products containing butter _____
(are / are not)
rich in _____ _____, c_____ cheese and butter
are foods _____ in v_____ _____.
(rich / poor)

---

304. Vitamin D is also known as anti-rachitic v_____,
because it _____ the development of r_____
(enhances / prevents)
in children.

---

334. Meat, cereals, except corn, and legumes _____ good
(are / are not)
sources of niacin. Niacin is also found in large quantities
in yeast and yeast extracts, similar to thiamine and
ri_____.

---

364. Ascorbic acid, then, _____ vital to the general health
(is / is not)
of the body and in particular to the health of g_____,
t_____ and the skin. The total absence from the diet
will lead to the appearance of the disease _____.

---

274. are
vitamin
A
cream
rich
vitamin A

---

304. vitamin
prevents
rickets

---

334. are
riboflavin

---

364. is
gums
teeth
scurvy

---

275. Egg-yolk is another f_____ rich in v_____ A. So are fish liver _____, livers and k_____, butter, _____ and _____. All these foods are rich in _____ _____.

---

305. We have learned then that vitamin D is a _____ (fat / water) soluble vitamin. It is usually associated with vitamin _____ and is found in _____ (the same / different) foods. It is known as sunshine vitamin and anti_____ vitamin.

---

335. Niacin is a very stable substance. It is not oxidized or destroyed by cooking, exposure to light or sterilization. Nia_____ is _____ (not destroyed / destroyed) then by exposure to light or h_____.

---

365. Vitamin C, then, is also known as _____ _____, and is a _____ soluble vitamin.

---

275. food
vitamin
oils
kidneys
cheese
cream
vitamin A

---

305. fat
A
same
anti-rachitic

---

335. niacin
not destroyed
heat

---

365. ascorbic
acid
water

---

276. Fish-liver _____, _____, kidneys and most dairy products are foods _____ (rich / poor) in _____ _____.

---

306. The second class of vitamins are the water soluble v_____. Water soluble vitamins include the B complex vitamins and ascorbic acid. The B c_____ vitamins and ascorbic a_____ are _____ (water / fat) soluble vitamins.

---

336. Niacin resists heat and l_____ and is _____ (not lost / lost) during cooking and food pro_____.

---

366. It is easily destroyed by _____ and _____. The best sources of it are fruits especially _____ fruits.

---

276. oils

liver

rich

vitamin A

---

306. vitamins

complex

acid

water

---

336. light

not [illegible]

processing

---

366. heat

oxidation

citrous

---

277. Egg-yolk especially contains a considerable amount of _____ _____.

---

307. Vitamins B _____ were thought originally to be one vitamin only. However, they were, later, discovered to be composed of several vitamins; hence the name _____ _____.

---

337. Niacin is also known as anti-pellagra vitamin. It has similar functions to th_____ and ribo_____ in the metabolism of carbohydrates in the body.

---

367. Its absence in the food will retard _____ and expose the _____ and _____ to infection. In severe cases, a disease called _____ may develop.

---

277. vitamin A

---

307. complex

B complex

---

337. thiamine

riboflavine

---

367. growth

teeth

gum

scurvy

CHAPTER VII

WATER

368. The last important constituent of foods is water. W_____ plays an important role in the nutrition of the human _____ and in the preservation of foods.

---

376. Fruits such as oranges and grapes contain around 80% _____, while apples and apricots contain around 84% water. Fresh f_____, similar to green leafy _____, are mainly composed of _____.

---

384. Though water is not a real nutrient as stated earlier, yet it is essential to the human _____ for its many processes. All the body fluids, juices and secretions _____ (are / are not) _____ solutions.

---

392. Water plays an important _____ in our body _____. It constitutes the main components of our body fluids. Our body itself, more than half of its weight, is _____.

---

368. water

body

---

376. water

fruits

vegetables

water

---

384. body

are

water

---

392. role

processes or functions

water

---

369. Foods that contain large amounts of water are beverages such as milk, tea and coffee, fruits and vegetables. All beverages, fruits and vegetables are mainly composed of _____. More than 80% of these foods is _____.

---

377. Pulses, seeds and grains contain much less water than fresh _____ and green _____ _____. Dry beans, lentils and chick peas contain around 10 to 12% water. Rice and corn contain also around the same _____ of water.

---

385. All the body f_____ are water _____. Water is then necessary to build up these body _____. So do all cell processes, which take place in water solutions.

---

393. The preservation of foods depends on their water _____. The smaller the amount of _____ in a food, the _____ it will last.
longer / shorter

---

369. water

water

---

377. fruits

leafy

vegetables

amount or percentage

---

385. fluids

solutions

fluids

---

393. content or percentage or amount

water

longer

---

370. Tea, c_____ and lemonade are examples of fluid _____ or beverages. So is milk and soups. All these foods are large sources of water for the body.

---

378. Grains, s_____ and pulses contain then _____ (greater / smaller) amount of water than _____ leafy _____ and fresh _____.

---

386. Water _____ (is / is not) an essential medium for all the body processes. Digestion, circulation, secretion and all the other body _____ _____ (would / would not) take place without the presence of _____.

---

394. The water content in a food is determined by a number of ways. One way is to heat the _____ at 105 degree Centigrade, to a constant weight. The food is thus heated until all the _____ in it is driven out.

---

370. coffee

foods

---

378. seeds

smaller

green

vegetables

fruits

---

386. is

processes

would not

water

---

394. food

water

---

371. Soups, t_____, c_____, l_____ and m_____ are all examples of beverages or _____ foods. So are alcoholic drinks and soft drinks.

---

379. Even meat contains a large percentage of _____. Cooked meat contains between 50 to 65% water. Half of the weight of meat, then, is _____.

---

387. Water then is _____ for the digestion of
necessary / not necessary
food, for the circulation of food and blood and the elimination of waste products. The body fluids such as blood, digestive juices, sweat and urine are all water _____.

---

395. Foods that decompose when heated at this temperature are heated to constant _____ under a vacuum, at low temperature.

---

371. tea

coffee

lemonade

milk

fluid

---

379. water

water

---

387. necessary.

solutions

---

395. weight

---

372. Alcoholic drinks then and _____ drinks are other examples of beverages consisting mainly of _____. So is mineral water. S_____, m_____, t_____ and coffee are the most common fluid _____.

---

380. All types of meat contain a _____ percentage of water. (large / small) So are eggs which contain around 75% of their contents as _____.

---

388. Food preservation depends upon the quantity of water in the food. Large _____ of water outside the cells would lead to the growth of bacteria and other microorganisms and to food spoilage. Spoilage of _____ is due mainly to the growth of these _____ when the amount of water in the food is _____. (large / small)

---

396. Another way of determining the water _____ of a food that will decompose by heat is by drying the _____ to constant _____ in a vacuum dessicator, containing strong drying agent such as concentrated sulfuric acid.

---

372. soft
water
soups
milk
tea
foods

---

380. large
water

---

388. amounts or quantities
food
microorganisms or bacteria
large

---

396. content
food
weight

---

373. Fluid foods or _____ are the _____ source
greatest / smallest
of water in foods. Milk for instance contains about 87% water, as compared to the other ingredients which all together make up about 13% only. Milk is mainly composed of _____.

---

381. Eggs, then, contain around _____% water. Butter and margarine, however, contain about 15% _____. Vegetable oils contain little or no_____. Fats in general contain little or _____ water.

---

389. Bacteria and other microorganisms cannot grow when the amount of water in the food is small. Therefore dry foods keep
_____ than wet foods.
longer / shorter

---

397. The water _____ of a _____ is _____ either by heating the food to a _____ weight at _____ degree Centigrade.

---

373. beverages

greatest

water

---

381. 70 or 75

water

water

no

---

389. longer

---

397. content

food

determined

constant

105

---

374. Solid foods _____ contain a large percentage of
(may also / do not)
water. Fresh leafy vegetables and fruits are largely composed
of _____. Between 70 and 90% of their contents
is _____.

---

382. Butter and margarine contain a _____ _____
(smaller / greater)
of water than meats and eggs. Vegetable oils are mostly
_____ of water.
(free / full)

---

390. Wet fruits keep _____ than dry fruits. The
(longer / shorter)
_____ the _____ of water in a food the longer
(smaller / bigger)
it will be preserved.

---

398. Or if the food is decomposed by heating to 105 degree
Centigrade, the _____ is then dried to _____
_____ under vacuum or in a vacuum _____.

---

374. may also ~~contain~~

water

water

---

382. smaller

amount or percentage

free

---

390. shorter

smaller

amount or quantity

---

398. food

constant

weight

dessicator

---

375. Potatoes, for example, contain about 80% _____, while tomatoes may contain as much as 94% _____. Sweet and water melons contain around 92% _____. Carrots contain around 90% of water. Water then makes the _____ component of green vegetables.
greatest / smallest

---

383. Bread contains between 25 and 40% _____. Even crystallized solids, such as sugar, contains a small amount of _____ adverbed on them i.e. condensed on the surface. Water, hence, constitutes the commonest and the biggest component of our _____. It is found in almost _____ foods.
all / few

---

391. Foods are then preserved by _____ their water content to a certain limit.
reducing / increasing

---

399. Other special methods are used for the _____ of the _____ content of certain _____.

---

375. water

water

water

the greatest

---

383. water

water

foods

all

---

391. reducing

---

399. detetermination

water

foods

CHAPTER VIII

ORGANOLEPTIC PROPERTIES OF FOODS

400. We have now discussed the different nutrients of foods, namely carbohydrates, _____, _____, _____, _____ and water. Besides these nutrients foods also contain other substances that have little or no nutritional value.

---

415. Particular flavors are usually associated with particular foods. These fl_____ are due in part to the _____ in foods of certain compounds known as essential oils.
presence / absence

---

430. Different tastes can influence each other when used together or _____.

---

445. To enrich the flavor of foods or give them a particular flavor, certain substances are added to these foods. These substances are known as condiments. _____ are substances with a pronounced spicy flavor. They are added to foods _____ their flavor.
to enrich / to impoverish

---

400. fats, proteins, minerals and vitamins

---

415. flavors

presence

---

430. successively

---

445. condiments

to enrich

---

401. These additional _____ have little or no nutritional value, but they contribute to the palatability and attractiveness of f_____s. They are known as the organoleptic factors in foods.

---

416. These _____ oils are volatile liquids, usually insoluble in water, but soluble in organic solvents such as ether and alcohol.

---

431. After taste is another phenomenon in flavor. It is particularly common with foods that leave a residue in the mouth after swallowing. After _____ is the sensation that _____ in our mouth after we have eaten a certain _____.

---

446. Con_____ include salt, herbs, spices, vinegar, flavoring extracts and coloring matter. Condiments are also refered to as food accessories or food adjuncts.

---

401. substances

foods

---

416. essential

---

431. taste

lingers or remains

food

---

446. condiments

---

402. These organoleptic factors include those substances that give foods their texture, flavor and color. The texture, color and flavor of f_____ are known then as the or_____ properties of _____.

---

417. Flavors are then due to the presence of a number of compounds, some of which are known as _____ oils. Flavors of a particular food are due to the presence of particular flavoring com_____ in that f_____.

---

432. Smell or _____ is the other factor of _____. For any chemical substance to possess an odor or aroma, it must vaporize and pass into the nasal cavity.

---

447. These food a_____ or food _____ are added to the diet in _____ amounts, to add much to the
small / large
enjoyment of meals and thus promote appetite and nutrition.

---

402. foods

organoleptic

foods

---

417. essential

compounds

food

---

432. odor or aroma

flavor

---

447. accessories

adjuncts

small

---

403. Most foods are naturally colored. Fruits and vegetables are all colored f_____. So is meat, egg-yolk, nuts, brown bread and brown sugar. These foods owe their c_____ to natural coloring substances found in them.

---

418. These _____ compounds are mostly volatile _____ and are easily destroyed when exposed to air. Some foods lose their particular _____ on storage.

---

433. No _____ or aroma of food is felt unless it can be changed to a gas or v_____, which diffuses through the pharynx into the nose. As we raise the food to our mouth we inhale its odor.

---

448. Herbs are one factor of these food a_____ or food _____. Herbs are plants whose fruits, seeds, leaves or stems have culinary or medicinal value. Herbs are one kind of c_____.

---

403. foods

color

---

418. flavoring

compounds

flavor

---

433. odor

vapor

---

448. accessories

adjuncts

condiments

---

404. These natural c_____ materials found in foods are themselves animal and plant products. The green color in vegetables and fruits is due mainly to the presence of the green _____ found in plants - namely chlorophyll.

---

419. These flavoring _____ contributing to the odor of food and hence to its flavor are large in number. Different foods contain _____ of these flavoring compounds.
different kinds / the same kind

---

434. The sense of smell or _____ varies from one person to another. Thus people _____ in their recognition of a certain smell or odor.
differ / are the same

---

449. Herbs are used in foods because of their fragrance. They give flavor to soups, stews, salads and the like. Herbs are _____ flavoring materials added to foods
natural / artificial
_____ their flavor and _____
to enrich / to impoverish
increase / decrease

---

404. coloring

material or substance

---

419. compounds

different kinds

---

434. odor or aroma

differ

---

449. natural

enrich

increase

---

405. Yellow and orange colors in plant foods are usually due to other substances known as carotenoids, in relation to carotene which is the yellow coloring _____ in carrots and is the precursor of vitamin A. Carotene is an example of these c_____ds.

---

420. Tea has at least fifteen of these fl_____ c_____, while coffee has over twenty of them. The property of a smell in food has a greater effect on the flavor of food than the property of taste.

---

435. _____ people can detect the same smell at the same amount.
All / not all

---

450. Examples of common herbs are parsley, mint, sage leaves and thyme. All these plants are h_____. We add them to soups, st_____ and salads to add to their f_____.

---

405. substance

carotenoids

---

420. flavoring compounds

---

435. not all

---

450. herbs

stews

flavor

---

406. Red and blue colors are, however, due to other substances known as anthocyanins. _____ are compounds related to the group of compounds known as flavonoids.

---

421. The combination of these _____ compounds in certain proportions give each food its particular fl_____.

---

436. Our sensation of a particular odor decreases very rapidly. This phenomenon is known as fatigue for odor. When we enter a kitchen or a place where coffee or meat for example is being prepared, our sensation of the smell dies out very _____. We
slowly / quickly
no more feel the strong odor that we felt on our arrival.

---

451. Spices also are other forms of c_____. They are extracted either from the bark, roots, seed or leaves of plants. Spices, similar to herbs, are also _____ flavoring
natural / artificial
materials.

---

406. anthocyanin

---

421. flavoring

flavor

---

436. quickly

---

451. condiments

natural

---

407. The color of a plant food is usually due to a mixture of these different pigments or coloring _____, namely chlorophyll, _____ and _____; depending upon the compound which is dominant in that particular food.

---

422. Freshness, ripeness and maturity are measures of flavoring quality. Foods attain their _____ flavor when (full / incomplete) they are fresh, _____ and mature.

---

437. Our smell of a particular odor lasts only very shortly. This phenomenon is known as _____ for odor.

---

452. Spices which are natural _____ materials are either used alone or with herbs to produce a combination of flavors especially suitable for pickles, stews and the like.

---

407. compounds or substances

carotenoids

anthocyanins

---

422. full

ripe

---

437. fatigue

---

452. flavoring

---

408. The most important of these natural c_____ are yellow, red, blue, green, orange, brown and purple. Foods that contain all these seven natural c_____ constitute an excellent diet.

---

423. Taste is one factor of f_____. Taste itself is composed of four dimensions. These are sourness, sweetness, bitterness and saltiness. We can distinguish then only these four different kinds of _____ namely sourness, _____, _____ and _____.

---

438. To enjoy flavors in food it _____ (is / is not) important to use the right flavorings for the right food. An onion flavor may be delectable or pleasant in a stew or soup but is objectionable in a custard. This phenomenon is known as appropriateness. _____ is the using of the right flavoring for the right _____.

---

453. Spices divide according to the parts of plant from which they are derived. S_____ divide into fruit spices such as pepper and paprika; seed _____ such as nutmeg and mustard; flower _____ such as cloves and saffron; bark _____ such as cinnamon and cassia; and root spices such as ginger and turmeric.

---

408. colors

colors

---

423. flavor

taste

sweetness, bitterness and saltiness

---

438. is

appropriateness

food

---

453. spices

spices

spices

spices

---

409. Foods, therefore that are rich in these natural _____ make up a _____ (good / poor) diet, while foods which are deficient in these n_____ colors constitute a _____ (good / poor) diet.

---

424. Any particular taste in food is detectable when it is in solution. It should be either soluble in the saliva of the _____ or in the juice of the food. No taste can be detected if it _____ (is / is not) in solution.

---

439. Appropriateness determines the kind of _____ to be used in a particular f_____ or meal.

---

454. Spices are _____ (natural / artificial) flavoring materials. They differ according to the part of _____ from which they are _____. They are used either alone or together with herbs to produce a combination of fl_____.

---

409. colors

good

natural

poor

---

424. mouth

is not

---

439. flavoring

food

---

454. natural

plant

derived

flavor

---

410. Beside these natural colors, other artificial colors are sometimes added to f_____. Coloring materials are widely used in food processing. Ice cream, cake icing, gelatin desserts, candies and beverages are foods which are frequently / rarely colored.

---

425. We feel the different tastes of foods by the special taste buds found on the tongue in the m_____. Each group of these buds _____ one kind of these four categories of t_____. Hotness and coldness are sensations of touch and contacts and not of taste.

---

440. The flavoring materials found in foods which are mainly due to essential _____ found in these f_____ can be extracted from their sources in the form of alcoholic solutions. The alcoholic solutions of these natural flavorings are known as flavoring extracts.

---

455. Vinegar is another member of c_____. _____ is an acid solution produced by the fermentation of wine and other weak alcoholic liquors.

---

410. foods

frequently

---

425. mouth

detect or tell

taste

---

440. oils

foods

---

455. condiments

vinegar

---

411. These artificial c_____ add little or no flavor to foods, but they make them more attractive to the eye.

---

426. Each one of these primary tastes tends either to decrease or to intensify one another when used together. Thus one taste can either add to the effect of another _____ or _____ it. This phenomenon is known as compensation.

---

441. Examples of genuine flavoring essences or extracts are the extracts of lemons, oranges, almonds and vanillas. These essences or _____ are al_____ _____ of the flavoring _____ of these fruits. These four extracts are almost the only real natural flavorings that can be extracted in sufficient quantities and strength from fruits.

---

456. Vinegar is a _____ solution, due to the presence of 5% acetic acid in it. The special flavor of vinegar depends upon the kind of _____ or liquors from which the vinegar is prepared.

sour / sweet

---

411. colors

---

426. taste

decrease

---

441. extracts

alcoholic extracts

material

---

456. sour

wine

---

412. Color adds greatly to the attractiveness of f_____, and thus increases their appetizing power. Artificial c_____ are themselves either natural products or artificial dyes. They are either extracts of vegetables and fruits or coal-tar dyes.

---

427. Salt tends to decrease the sweetness of sugar. So does sugar on salt. While sour lemon tends to enrich the sweetness of sugar. Any food which is quite sour and yet quite sweet has a _____ flavor than if either sourness or sweetness is present alone.
richer / poorer

---

442. Flavoring extracts are usually alcoholic _____ of the essential _____ found in odorous fruits or other parts of the plant that have special flavor, with or without its coloring matter.

---

457. Vinegar is used mainly in salads and as a preservative in the preparation of pickles. Pickles are preserved mainly by the use of _____. Vinegar imparts to the food its sour _____ and its special fragrance.

---

412. foods

colors

---

427. richer

---

442. solutions

oils

---

457. vinegar

taste

---

413. Artificial colors added to foods are either extracts of v_____ and f_____ or coal-tar _____.

---

428. By compensation, then, we can either _____ the taste of food or _____ it.

---

443. Other flavoring _____ used in foods are synthetic essences known also as artificial essences. These are chemical compounds which have _____ flavor to the natural _____, which they imitate.
similar / dissimilar

---

458. Vinegar is either colored pink or colorless depending upon the color of the wine or other _____ from which the vinegar is _____.

---

413. vegetables

fruits

dyes

---

428. enrich

impoverish

---

443. materials

similar

ones, substances or materials

---

458. liquors

prepared or made

---

414. The second organoleptic factor of foods is flavor. Flavor is defined as that subtle complex sensation that is the source of much delight in food. It comprises both taste and odor or aroma. _____ then is a complex factor of food, it includes both _____ and _____.

---

429. Similarly successive contrasts tend to sharpen the sensation of one taste. Grape fruits for instance, taste more sour if eaten immediately after a sweet cereal. A plum tastes _____ sour if eaten after a candy but quite sweet if _____ after a grape fruit.
quite / less

---

444. These artificial essences are seldom as delicate or as fragrant as the natural products, which they try to imitate. Artificial essences _____ then give the same delicate flavor and fragrance as the natural _____.
can /cannot

---

459. The color of vinegar may be _____ or _____. Vinegar and other condiments are added to foods to _____ their flavor and in turn enhance appetite.
enrich / impoverish

---

414. flavor

odor

taste

---

429. quite

eaten or taken

---

444. cannot

products

---

459. pink

colorless

enrich

UNIT II

FOOD SPOILAGE

CHAPTER I

INTRODUCTION

460. We all know that if a piece of meat is left outside the refrigerator for some time, especially in summer, the piece of meat starts to give a _____ smell. We say that the meat is spoiled.
bad / pleasant

---

468. The spoilage of food is the physical and chemical changes that take place in the _____ and make it unpleasant, unsuitable and in many cases dangerous to _____ or consume.

---

476. Perishable foods spoil _____, semi-perishable foods spoil _____ and non-perishable foods _____ spoil at all.

---

484. Other kinds of _____ of foods are due to oxidation or other kinds of chemical reactions taking place in the food or between the _____ and its container, or environment.

---

460. bad

---

468. food

eat

---

476. quickly

slowly

do not

---

484. spoilage

food

---

461. Milk also _____ quickly if left outside the refrigerator.
spoils / does not spoil

---

469. Most spoiled foods are usually foods which are considered lost and _____ be eaten. They are also _____ to eat.
cannot / can

---

477. We can tell spoilage of a food from its appearance odor, taste or texture. All these properties, _____ help to tell if a food is _____ or not.
can / cannot

---

485. A fourth kind of food _____ is due to physical action. When fruits and vegetables are left in the open air they will wilt and dry. This drying causes them usually to _____ and makes them _____ to eat.
suitable / unsuitable

---

461. spoils

---

469. cannot

dangerous

---

477. can

spoiled

---

485. spoilage

spoil

unsuitable

---

462. When fresh butter is left in a hot place, it starts to smell; it gives off a _____ odor and develops an unpleasant taste. We say that the butter has turned rancid, and the butter is s_____.
stinking / pleasant

---

470. Milk and meat are examples of foods which spoil _____.
quickly / slowly
Such types of foods that spoil quickly are called perishable foods.

---

478. Some spoilage of food, may produce toxins in the food and if eaten will cause poisoning. Food poisoning is another sign of food _____.

---

486. A fifth form of food _____ is caused by the action of insects. Certain _____ may feed on the food and cause it to spoil.

---

462. bad

spoiled

---

470. quickly

---

478. spoilage

---

486. spoilage

insects

---

463. If an apple falls from a tree to the ground and the ground is moist or the apple is bruised or wounded, the apple starts to rot or _____. We say that the apple is s_____.

---

471. Potatoes however may last longer and do not spoil quickly. Such types of foods are called semiperishable _____.

---

479. Bad s_____ and change of taste are very common indications of food _____. While change of _____ and texture are other _____ of food spoilage.

---

487. Fruits and cereals like apples and wheat may be attacked by certain insects which will grow on them and cause them to _____.

---

463. decay

spoiled

---

471. foods

---

479. smell

spoilage

appearance or color

indications or signs

---

487. spoil or decay

---

464. When a piece of bread is left in a warm and damp place, it becomes covered with a white grayish cotton-like layer, we call it a mold. The bread will _____ be eaten. The bread _____ when mold grows on it.
(no more / still) (spoils / does not spoil)

---

472. Semi_____ foods, are foods that keep longer than perishable foods.

---

480. Food spoilage can be told then by the change of _____, _____ and _____ of the food, and by its bad s_____.

---

488. Micro_____, enz_____ and insects can cause spoilage of _____. So do some chemical reactions and physical factors. All these agents may cause the _____ of foods in various ways.

---

464. no more

spoils

---

472. semiperishable

---

480. taste, appearance and texture or color

smell

---

488. microorganisms, enzymes

foods

spoilage

---

465. Bread spoils when it is left in a hot and damp place, due mostly to the growth of _____ on it. We should then keep bread in a cool and dry place.

---

473. On the other hand, ordinary sugar is a food that _____ spoil and can last almost indefinitely. Such foods are classified as _____ foods.
does not / does
non-perishable / perishable

---

481. Poisoning from a food when eaten is another definite sign of its _____.

---

489. Chemical _____ and physical _____ together with m_____ including bacteria, _____ and molds; en_____ and _____ are the five agents of food spoilage.

---

465. mold

---

473. does not

non-perishable

---

481. spoilage

---

489. reactions

factors or agents

microorganisms

yeasts

enzymes

insects

---

466. Oranges and other citrous fruits may rot or _____ and a bluish-white mold grows on them. This mold may grow even when these fruits are kept in a refrigerator. Oranges and other citrous fruits spoil when _____ grows on them.

---

474. Non-perishable foods are foods that _____ (do not spoil / do spoil) quickly. _____ foods last almost indefinitely.

---

482. Spoilage of _____ may be due to a number of causes among which is the growth of micro-organisms, namely bacteria, yeasts and molds. The growth of these micro_____ such as _____, yeasts and molds on foods will cause them to _____.

---

466. spoil

mold

---

474. do not spoil

non-perishable

---

482. foods

microorganisms

bacteria

spoil or rot

---

467. Most fresh fruits and vegetables if left unprotected by some way or another will rot or _____. Fresh fruits and vegetables are foods that usually _____ quickly if left unprotected.
spoil / do not spoil

---

475. Foods, therefore, are classified according to their ability to resist spoilage and _____ to _____ foods, semi_____ foods, and _____ foods.

---

483. Spoilage may also be due to the action of certain enzymes found in foods. Enzymatic action is another cause of food _____. Fruits spoilage is mainly caused by the action of en_____.

---

467. spoil

spoil

---

475. decay

perishable

semiperishable

non-perishable

---

483. spoilage

enzymes

CHAPTER II

BIOLOGICAL SPOILAGE

490. Microorganisms causing spoilage of _____, divide into three main classes, bacteria, yeast, and molds. The bacteria are smaller than yeasts; and yeasts are _____ than bacteria, but smaller than molds. The molds are then _____ than both bacteria and yeasts.
bigger / smaller
bigger / smaller

---

512. Aerobic living is living in the presence of _____ oxygen while anaerobic living is living in the absence of _____ _____.

---

534. Bacteria multiply by the process of _____. Fission takes place every 20-30 minutes. This shows how bacteria can increase greatly in number in a very short time.

---

556. The growth of bacteria is also affected by the acidity of the food or its pH. Most bacteria cannot grow well in acid foods. Acid foods are _____ media for the growth of bacteria.
suitable / unsuitable

---

490. food

bigger

bigger

---

512. free

free oxygen

---

534. fission

---

556. unsuitable

---

491. Both bacteria and yeasts are non-green unicellular plants. They are microscopic organisms, and _____ be seen, by the naked eye. They live either on living bodies as parasites or on dead living materials as saprophytes.

cannot / can

---

513. Yeasts can live under _____ or _____ environment i.e. they can live in the presence of free oxygen or in the absence of free _____.

---

535. Bacteria can reproduce every _____ to _____ minutes. Thus in 12 hours time one cell will multiply to millions of _____.

---

557. Bacteria _____ thrive well in acid foods. Food technologist refer to foods whose pH is less than 4.5 as acid foods; and those whose pH is more than 4.5 as non-acid foods.

will / will not

---

491. cannot

---

513. aerobic anaerobic

---

535. 20 30 minutes

cells

---

557. will not

---

492. Molds are also non-green plants that grow like a web on other living organisms or dead living materials. That is they live as _____ or _____. They are _____ than bigger / smaller bacteria and yeasts. They can be seen by the naked _____.

---

514. Aerobic microorganisms are called aerobes and anaerobic microorganisms are called _____.

---

536. We mentioned earlier that microorganisms are found everywhere. Bacteria, therefore, are also found _____, in the _____, in the _____, in _____ and in and on our food, and in and on our bodies.

---

558. _____ foods, have their pH more than 4.5 while _____ foods have their pH less than 4.5.

---

492. parasites

saprophytes

bigger

eye

---

514. anaerobes

---

536. everywhere

air

soil

water

---

558. non-acid

acid

---

493. All these three groups of micro _____, namely _____ , _____, and _____ can produce spoilage of foods when they grow on them.

---

515. Yeasts are usually associated with fermentation of sugars. They f_____ sugars or sugar juices to alcohol and liberate carbon dioxide. We call this reaction alcoholic _____tion.

---

537. Bacteria may exist in two forms. A growing and active form called vegetative form and a resting, inactive form called spore form. The _____ form is the active growing form of bacteria and the _____ form is the resting inactive form.

---

559. The higher the pH the _____ (lower / higher) the acidity and the higher the acidity, the _____ (lower / higher) the pH of food. Foods that have a pH below 3.7 are called high acid foods.

---

493. microorganisms

bacteria yeasts molds

---

515. ferment

fermentation

---

537. vegetative

spore

---

559. lower

lower

---

494. Some micro _____ prefer certain types of foods to grow on. Thus the types of spoilage of a particular _____ depend on: the composition of the f_____, its structure, types of micro _____ involved, and the way the food is stored.

---

516. This is the way by which we ferment grapes and grape juices to alcohol. Alcoholic _____ is a reaction by which glucose is converted by the action of y_____ into _____ and carbon _____.

---

538. Vegetative forms of bacteria have their regular shape. They are either as _____, _____, or _____. Spores however are usually round in shape and are surrounded by a hard resistant wall.

---

560. High _____ foods have their pH less than 3.7. Berries, pickle products and fermented foods are examples of this class of foods.

---

494. microorganisms

food

food

microorganisms

---

516. fermentation

yeast

alcohol

dioxide

---

538. bacilli cocci spirilla

---

560. acid

---

495. These microorganisms, namely _____, _____, and _____ are found almost every where, in the air, in the soil, in water, on utensils, on foods themselves, and in and on our bodies.

---

517. Yeasts are also associated with the making of bread. Yeast and sugar are added to flour before it is made into a dough. The yeast by the process of fer_____ produces carbon _____ which causes the b_____ to swell and become spongy.

---

539. Vegetative bacteria are _____ form of bacteria while spore are _____ form of bacteria.

active growing / inactive growing

inactive resting / growing active

---

561. Acid _____ have their pH lower than _____. It ranges from 4.5 to 3.7. Fruits such as peaches, pears, oranges and tomatoes fall under this class of _____.

---

495. bacteria yeasts molds

---

517. fermentation

dioxide

bread

---

539. active growing

inactive resting

---

561. foods

4.5

foods

---

496. They are then prevalent every _____, in the a_____, s_____ and water. We carry them ourselves on our b_____ and in our _____.

---

518. Yeasts are then agents of f_____. They ferment s_____ to form _____ and _____ dioxide. They are active destroyers of sugars, and are responsible for considerable spoilage of fruits and fruit products.

---

540. Vegetative forms of bacteria are more easily destroyed by heat than spore forms. Spores, therefore, are _____ resistant to heat than the vegetative form.
more / less

---

562. Examples of non-acid foods are: meat, fish poultry, dairy products and vegetables except tomatoes. All these foods are _____ foods or better refered to as low acid foods.

---

496. where

air soil

bodies

bodies

---

518. fermentation

sugars

alcohol

carbon

---

540. more

---

562. non-acid

---

497. The growth and reproduction of these mi_____ depend on a number of factors. These f_____s include the presence of nutrients, i.e. foods suitable for microorganisms to feed on, the amount of moisture, suitable temperature, the amount of acidity, the presence of oxygen, and the presence of other micro_____.

---

519. Many fruits such as peaches, pears, cherries and the like which contain a large amount of sugar, are sp_____ by the action of y_____s. Yeasts may also spoil fruits when they are packed in syrups.

---

541. The vegetative forms of bacteria are _____ _____ forms of bacteria while spores are _____ _____ forms of bacteria. The former are _____ (more / less) resistant to heat, while the latter are _____ (more / less) resistant to heat.

---

563. Other examples of non-acid or _____ foods are soups and spaghetti, corn as well as figs. pH 4.5 is a dividing line between _____ foods and _____ or low acid foods.

---

497. microorganisms

factors

microorganisms

---

519. spoiled

yeasts

---

541. active growing

inactive resting

less

more

---

563. low acid

acid

non-acid

---

498. Of the factors that determine the kind and number of micro_____ that can grow on a particular f_____ are, then, the kind of food itself, the amount of _____ and acidity.

---

520. Yeasts are therefore agents of _____ fermentation. They are responsible for the spoilage of many _____ which are _____ (rich / poor) in their sugar content. They also cause the spoilage of many fruits when they are preserved in sugar s_____.

---

542. Bacteria vary widely as to their need of oxygen. They divide into aerobic _____ or aerobes i.e. bacteria that live only in presence of atmospheric oxygen and anaerobic bacteria or anaerobes i.e. _____ which can not grow in the presence of air or free oxygen.

---

564. Bacteria living on non-acid foods are more resistant to heat than bacteria living on acid or high-acid foods. Non-acid foods, then, need _____ (higher / lower) heat treatment to destroy the pathogenic bacteria that grow on them.

---

498. microorganisms

food

moisture

---

520. alcoholic

fruits

rich

syrup

---

542. bacteria

bacteria

---

564. higher

---

499. The other factors include the temperature, the presence or absence of _____, and the presence or absence of other micro_____. All these factors are known as the environmental factors of the growth of microorganisms.

---

521. Yeasts are easily killed by high temperature. When heated to around 60 to 65 degree Centigrade, they will be killed in a few minutes. Yeasts are then _____ (very resistant / not resistant) to heat and high t_____.

---

543. _____ bacteria must have free oxygen for their growth, while _____ bacteria seem to be poisoned by free oxygen.

---

565. Bacteria living on acid or high-acid foods are less heat resistant and are _____ (easily / not easily) destroyed by heat. Non-acid food then need _____ (stronger / weaker) heat treatment to destroy the bacteria that grow on them.

---

499. oxygen

microorganisms

---

521. not resistant

temperature

---

543. aerobic

anaerobic

---

565. easily

stronger

---

500. The environmental factors namely, the kind of _____, the amount of _____ and _____, the presence or absence of _____ or other micro_____ and the t_____, all these determine the kind and the number of micro_____ that may grow on a particular food.

---

522. Yeasts are easily killed by _____ temperature. They cause spoilage of _____ which are rich in their _____ content.

---

544. Aerobic bacteria _____ (thrive / die) in the presence of free oxygen while anaerobic bacteria will _____ (grow / die) in absence of free oxygen.

---

566. Besides molds, yeasts and bacteria, insects _____ (are / are not) also an important agent in food spoilage. Many cereal grains, fruits and vegetables _____ (are / are not) attacked by different kinds of insects.

---

500. food

moisture acidity

oxygen

microorganisms

temperature

microorganisms

---

522. high

fruits

sugar

---

544. thrive

grow

---

566. are

are

---

501. Molds usually grow on jams and jellies. They also grow on fresh fruits and vegetables, especially citrous f_____. They grow also on bread, and even on refrigerated f_____, such as meat and cheese. _____ grow usually on foods when they are kept in a warm and wet place.

---

523. The third major biological agents of spoilage are bacteria. _____ are another factor in food spoilage.

---

545. Many bacteria can adapt themselves to live as aerobes or anaerobes; i.e. to live and grow in the presence of oxygen or in the _____ of _____. They are then called facultative anaerobe.

---

567. Insects are the fourth _____ agent of food
chemical / biological
_____. Every one has seen a number of fruits, vegetables or cereal _____ damaged by the action of _____.

---

501. fruits

foods

molds

---

523. bacteria

---

545. absence

oxygen

---

567. biological

spoilage

grains

insects

---

502. Molds _____ grow at low temperature. They are spread
can / cannot
by small form of "seeds" called spores. Molds propogate then
by _____.

---

524. Bacteria, similar to yeasts, are unicellular microorganisms.
Bacteria are _____ microorganisms. They are however
smaller than yeasts.

---

546. _____ anaerobes can live as aerobes or as anaerobes.
They can thus adapt themselves to live and grow _____
in the
absence of oxygen only / in the presence or absence of oxygen.

---

568. You have now learnt the meaning of spoilage of food; that most
foods _____ spoil; and that spoiled foods are usually
may / may not
_____ for human consumption.
suitable / unsuitable

---

502. can

spores

---

524. unicellular

---

546. facultative

in the presence or absence of oxygen

---

568. may

unsuitable

---

503. These _____, by which molds propogate, are found in the air. They are found, therefore, every_____. When they grow on a particular _____, they feed on it and spoil it.

---

525. Bacteria are unicellular _____. They are microscopic, i.e. they can be seen _____.
only by the microscope / by the naked eye
Their size ranges between o.5 to 5 μ. (μ i.e. micron = $\frac{1}{1000}$ of a millimeter)

---

547. Most bacteria which are responsible for the spoilage of proteins with the production of offensive odors are anaerobic bacteria. Meat and similar products spoil by the action of _____
aerobic /
_____ bacteria.
anaerobic

---

569. You also have learned that these spoiled foods may be dangerous to _____, and that foods are thus divided into perishable _____, _____ foods and non-_____ foods.

---

503. spores

where

food

---

525. microorganisms

only by the microscope

---

547. anaerobic

---

569. eat or consume

foods

semiperishable

non-perishable

---

504. Molds are killed easily by high temperature. At the boiling temperature of water, they are killed in few minutes. They are therefore easily _____ by _____ temperature.

---

526. The size of bacteria is _____. They are
too small / not very small
either rod-shaped and are known as bacilli (singular bacillus).
_____ are bacteria which have a rod shape.

---

548. Most protein spoilage is caused by the action of _____ bacteria. Vegetables with low acidity and canned meat may also spoil by the action of anaerobic _____.

---

570. Moreover, you have learned that there are indications or _____ which are indicative of food _____. Bad offensive odor is a very good _____ of food spoilage.

---

504. killed

high

---

526. too small

bacilli

---

548. anaerobic

bacteria

---

570. signs

spoilage

indication or sign

---

505. Yeasts are _____ forms of mi_____ than molds.
(smaller / bigger)
They are unicellular _____ i.e. their bodies are made up of one single cell.

---

527. Bacteria can be rod-shaped and are known as _____. They can also be spherical or ball-shaped and are known as cocci, (singular coccus).

---

549. Bacteria vary also as to the range of temperature under which they can thrive and multiply. Those that can grow and multiply at a rather high temperature are called thermophiles or thermophilic bacteria. _____ bacteria can stand heat at a high temperature.

---

571. You have learned, still more, that spoilage may be due to a number of causes among which are microorganisms, namely, _____, _____ and _____.

---

505. smaller

microorganisms

microorganisms

---

527. bacilli

---

549. thermophilic

---

571. molds yeasts bacteria

---

506. Yeasts are then _____ than molds, they are made up of _____ single _____. They usually reproduce by a process called budding, i.e. one cell gives rise to two new cells but remain attached to the mother cell and so form a branch-like body.

---

528. Rod-shaped bacteria are called _____ and round or ball-shaped bacteria are called _____. Bacilli and cocci are two forms of bacteria.

---

550. Thermophilic bacteria _____ at high
(will grow only / will not live)
temperatures. Those that thrive best at around room temperature are called mesophiles or mesophilic bacteria. They will grow best between 20°C and 45°C.

---

572. These microorganisms _____ in their way of life
(differ / are the same)
and in the kind of foods on which they may feed.

---

506. smaller

one or a

cell

---

528. bacilli

cocci

---

550. will grow only

---

572. differ

---

507. Yeasts then reproduce by the process of b_____ i.e. each cell gives rise to two new cells, but remain attached to the mother cell in a way similar to the branching of a tree.

---

529. A third form of bacteria are spiral in shape and are known as spirilla (singular spirillum), or spirochaetes. _____ or spirochaetes are bacteria that have a _____ shape.

---

551. Mesophilic _____ are bacteria that grow and multiply at room temperature. While those that can live only at a low temperature are called psychrophiles or psychrophilic bacteria.

---

573. And finally that besides molds, yeasts and bacteria, insects also _____ an important agent of food spoilage.
are / are not

---

507. budding

---

529. spirilla

spiral

---

551. bacteria

---

573. are

---

508. Yeasts are also found everywhere, in water, in the soil, in air, and on f_____ . They are uni_____ organisms, which reproduce by _____.

---

530. These three forms of bacteria namely _____, _____ and _____ are the three common forms of _____.

---

552. _____ bacteria can live even at refrigeration temperature, while mesophiles and thermophiles _____ grow at refrigeration temperature.
would / would not

---

574. In addition that insects may attack and spoil a _____ number of fruits, vegetables and cereal grains and cause a great damage to our foods.
large / small

---

508. food

unicellular

budding

---

530. bacilli cocci spirilla

bacteria

---

552. psychrophilic

would not

---

574. large

---

509. Yeasts as molds are found _____; in water, in the soil, and in air. They are also found on _____.

---

531. A few types of bacteria especially the bacilli and spirilla can grow hairlike organs called flagella (singular flagellum), by which they can swim about. _____ are hairlike projections by which bacteria can _____ about.

---

553. Bacteria divide then with regard to temperature to _____, _____ and _____. Heating will destroy mainly the mesophilic and psychrophilic bacteria, while refrigeration and freezing will inhibit mainly the thermophilic and mesophilic bacteria.

---

509. everywhere

foods

---

531. flagella

swim

---

553. thermophiles mesophiles psychrophiles

---

510. Yeasts need slightly more water to grow than molds. Yeasts grow better in _____ media.
humid / dry

---

532. Bacteria with flagella grown on them at one end or both ends of the cell are called flagellates. _____ are bacteria that have flagella by which they can swim _____.

---

554. The thermophilic bacteria will be killed then by _____. While the psychrophilic bacteria will be destroyed by _____. The mesophiles _____ be destroyed by both methods.
heating / refrigeration
heating / refrigeration
could / could not

---

510. humid

---

532. flagellates

about

---

554. refrigeration

heating

could

---

511. Yeasts can live in the presence of air or free oxygen or in the absence of air or free _____. The first type is called aerobic living and the second type is called anaerobic living.

---

533. Yeast as we said earlier reproduce by the process of _____. Bacteria however reproduce by the process of fission. Fission means the cell divides into two parts, each one of which is a new cell or sister cell.

---

555. However, all bacteria including thermophiles will be destroyed by high temperature around 121°C. _____ bacteria, whether
No / all
the vegetative form or spore form will resist a temperature of 121°C.

---

511. oxygen

---

533. budding

---

555. no

CHAPTER III

CHEMICAL SPOILAGE

575. You will now study spoilage of food due to chemical reactions. This kind of food _____ is called chemical spoilage.

---

597. Some fats and oils are more susceptible to this type of rancidity than others. Fats and oils _____ in their resistance to this type of rancidity.
differ / are the same

---

619. By immersing the fruit or vegetable in boiling water for a few minutes or in steam for a few seconds, we destroy the active _____ and arrest the browning _____.

---

641. The same thing happens to strawberry juices and others when they are concentrated or processed. Their color _____, with the development of an off-flavor.
darkens / remains unaffected

---

575. spoilage

---

597. differ

---

619. enzymes

reaction or action

---

641. darkens

---

576. _____ _____ is spoilage of food due to chemical _____ that take place in the food.

---

598. The presence of unsaturated fatty acids in the composition of oils or _____ is essential for this type of rancidity to take place.

---

620. This operation, i.e. immersing the fruit or vegetable in _____ _____ or _____ for a while to destroy the enzymes is called "Blanching" or "Scalding".

---

642. Similarly when tomato juice is boiled to a paste in an open kettle, we note that the paste _____ its color.
darkens / conserves

---

576. chemical spoilage

reactions

---

598. fats

---

620. boiling water

steam

---

642. darkens

---

577. You have learned earlier that when fresh butter is left in a hot place, it starts to smell, or to give _____ odor and unpleasant taste, i.e. it turns rancid.
an offensive / a pleasant

---

599. Unsaturated _____ _____ are fatty acids whose molecules do not contain the full number of hydrogen atoms that they can hold.

---

621. Scalding or _____ means to treat the food with boiling water or steam. Enzymes are protein compounds which are easily denatured and destroyed by heat.

---

643. The tomato juice then turns _____ when heated in the presence of oxygen. It also loses some of its nutrient value.

---

577. an offensive

---

599. fatty acids

---

621. blanching

---

643. brown

---

578. You learned also under the chapter of fats and oils that not only butter but also olive oil _____ turn rancid.
may / may not

---

600. Therefore fats and oils, which are partly composed of unsaturated fatty acids _____ exposed to auto_____ _____.
are / are not

---

622. Blanching or _____ therefore will destroy all enzymes in fruits and vegetables, ~~and~~ including the browning enzymes, the phenolases, and hence arrest the _____ reaction.

---

644. This is rather a _____ form of browning. The fruit juice _____ in flavor, appearance and nutritional value.
harmful / useful
loses / gains

---

578. may

---

600. are

oxidative rancidity

---

622. scalding

browning

---

644. harmful

loses

---

579. _____ fats and oils have a sharp and _____ odor and taste. This phenomenon is called rancidity.
an unpleasant / a pleasant

---

601. Unsaturated _____ _____ are fatty acids that _____ the full number of hydrogen atoms in their molecules.
contain / do not contain

---

623. Browning reaction can also be controlled by sulfuring. _____ means exposing the food to the vapors of sulfur dioxide or dipping it in a solution of sulfur dioxide.

---

645. This kind of browning of fruits juices when they are heated in the presence of oxygen may be _____ to the oxidation of the ascorbic acid i.e. vitamin _____ contained in the juice.

---

579. rancid

an unpleasant

---

601. fatty acids

do not contain

---

623. sulfuring

---

645. due

C

---

580. Rancidity then is one form of _____ spoilage of foods. _____ may be either due to enzymatic action or to chemical reaction without the presence of an en_____.

---

602. High temperature favors this type of _____. _____ temperature together with the presence of _____ fatty acids in the composition of fats and oils _____ this type of rancidity.
favor / disfavor

---

624. Sulfuring means immersing the food in a solution of _____ _____ or exposing the food to the _____ or fumes of _____ _____.

---

646. The _____ _____ or vitamin C is thought to undergo oxidation with the formation of a compound which produces the brown pigment and hence the browning of the juice.

---

580. chemical

rancidity

enzyme

---

602. rancidity

high

unsaturated

favor

---

624. [illegible]

sulfur dioxide

vapors

sulfur dioxide

---

646. ascorbic acid

---

581. Therefore _____ is that chemical change that takes place in many fats and oils when they turn rancid and give an _____ and sharp odor.

---

603. Light is another factor that favors this type of rancidity. Fats and oils are then _____ preserved when stored in dark containers or a darkroom.
better / not well

---

625. Both blanching and _____ _____ then prevent or arrest the enzymatic _____ of fruits and vegetables.
will / will not

---

647. Fruit juices, such as orange, strawberry, tomato and the like _____ darken when they are heated, concentrated or canned.
often / rarely

---

581. rancidity

offensive

---

603. better

---

625. sulfuring

will

browning

---

647. often

---

582. Rancidity is two types. One type is called hydrolytic rancidity. _____ rancidity is due to the hydrolysis of the fat or oil.

---

604. Thus the presence of unsaturated fatty acids is _____ (essential / unessential) to initiate this type of rancidity. Moreover high _____ and _____ are both factors that _____ (favor / disfavor) this kind of rancidity.

---

626. There is a second form of browning which is not undesirable but may sometimes decrease the nutritional value of f_____. This type of _____ is however, often desirable.

---

648. This darkening or _____ is believed to be caused by the oxidation of _____ _____ or vitamin C. The ascorbic acid is _____ (oxidized / reduced) to a compound which gives the browning effect.

---

582. hydrolytic

---

604. essential

temperature

light

favor

---

626. food

browning

---

648. browning

ascorbic acid

oxidized

---

583. In _____ rancidity, the fat or oil is hydrolysed to fatty acids and glycerol by the addition of water.

---

605. Rancidity then is a form of chemical s_____ of fats and _____. It may be caused by either the action of an enzyme or without the action of an _____.

---

627. Bread and other bakery products form a brown crust when baked. This _____ crust adds flavor and attractiveness to these products.

---

649. When sugar is heated to a relatively high temperature, it _____. This phenomenon is called caramelization.
turns also brown / remains unchanged

---

583. hydrolytic

---

605. spoilage

oils

enzyme

---

627. brown

---

649. turns also brown

---

584. Hydrolytic _____ is then a hydrolysis reaction and is caused by the action of a certain enzyme called lipase.

---

606. Rancidity itself is of three types: hydrolytic rancidity, enzymatic-oxidative rancidity and oxidative non-enzymatic rancidity. The latter is known as _____ or self-oxidation.

---

628. Potato chips, roasted coffee, roasted nuts and others are other examples of browned foods which _____ desirable and acceptable by consumers.
(are / are not)

---

650. This type of browning or _____ of sugars is not a harmful or objectionable form of browning. We make use of caramelization in the confection industry.

---

584. rancidity

---

606. autooxidation

---

628. are

---

650. caramelization

---

585. The enzyme _____ acts on the fat or oil and hydrolyses it to _____ _____ and glycerol. Lipase, as mentioned earlier, is an enzyme that acts on fats and oils.

---

607. The three types of rancidity of fats and oils are _____ rancidity; _____ _____ rancidity and _____ non _____ rancidity.

---

629. This type of browning may add to the flavor and attractiveness of food. The brown crust of bread is a _____ (more / less) desirable food than pale crust.

---

651. Caramelization is a form of _____ reaction which takes place when sugars are heated to a rather high _____ and is independent of oxygen.

---

585. lipase

fatty acids

---

607. hydrolytic

enzymatic oxidative

oxidative non-enzymatic

---

629. more

---

651. browning

temperature

---

586. Hydrolytic rancidity is produced then by the action of the enzyme _____ on fats and oils, the latter break into _____ _____ and _____.

---

608. Hydrolytic rancidity takes place by the action of the enzyme _____, while the oxidative enzymatic rancidity takes place by the action of the enzyme _____.

---

630. This type of _____ is due to the Maillard Reaction. It is assumed to be caused by the reaction between certain carbohydrates and the amino acids of the proteins in that particular food.

---

652. Browning of food, then, is of _____ (different / same) categories; some of which are harmful and lead to the spoilage of _____. This includes the browning due to the action of the enzymes the _____.

---

586. lipase

fatty acids

glycerol

---

608. lipase

lipoxidase

---

630. browning

---

652. different

food

phenolases

---

587. The unpleasant smell and taste of rancid fats and _____ is due to one or more of these fatty acids produced by the action of lipase on the _____ and oils.

---

609. Self-oxidation or _____ is favored by high _____ and _____. The presence of _____ fatty acids in the composition of fats and oils is _____ to initiate this type of rancidity.

---

631. The M_____ reaction is the reaction that takes place between the amino acids in protein compounds and _____, which enter into the composition of a particular food.

---

653. The phenolases act when fruits or vegetables are bruised, _____ or _____ and the tissues are exposed to _____. This leads to the oxidation of the fruit or vegetable and the darkening of its color and the deterioration of the nutrients.

---

587. oils

fats

---

609. autooxidation

temperature

light

unsaturated

essential

---

631. Maillard

carbohydrates

---

653. cut

peeled

air

---

588. The second type of rancidity is called oxidative rancidity. _____ _____ is due to the action of oxygen on fats and oils.

---

610. A second class of chemical spoilage is called browning. _____ is another form of food spoilage.

---

632. By the Maillard _____, brown products are formed which give that particular food a more attractive _____ and a more pleasant _____.

---

654. This type of enzymatic browning can be controlled by either _____ or _____ or by both.

---

588. oxidative rancidity

---

610. browning

---

632. reaction

appearance

flavor

---

654. blanching sulfuring

---

589. Oxygen of the air may react with the fat or oil and cause it to turn rancid. Oxidative _____ is the result of an oxidation reaction of fats and oils.

---

611. If an apple or a banana is cut, peeled or bruised, we see that it _____ turns brown. The apple or banana
soon / very slowly
_____ its fresh and pleasant flavor.
also loses / does not lose

---

633. This reaction may inhibit, however, the utilization of some of these nutrients, namely the amino acids and carbohydrates, and thus _____ the nutritive value of that food.
lower / raise

---

655. The browning of fruit juices when heated or concentrated in the presence of oxygen is also a _____ form of
harmful / useful
browning and is a form of food spoilage.

---

589. rancidity

---

611. soon

also loses

---

633. lower

---

655. harmful

---

590. This type of rancidity, _____ _____ is more common in oils than in fats.

---

612. Peaches _____ brown if they are cut, peeled
(also turn / do not turn)
or bruised. Potatoes _____ this same
(also undergo / do not undergo)
change. This phenomenon is another form of chemical spoilage.

---

634. Also in certain cases this type of non-enzymatic browning is undesirable. For example, the browning of fruits during their dehydration is _____.
(desirable / undesirable)

---

656. The Maillard reaction and caramelization are other forms of browning. The former is caused by the reaction between the carbohydrates and _____ _____ constituents of the food, and the latter takes place when sugar is heated.

---

590. oxidative rancidity

---

612. also turn

also undergo

---

634. undesirable

---

656. amino acids

---

591. Oxidative _____ may take place by the action of an enzyme called lipoxidase which is found in vegetable oils.

---

613. This type of b_____ is due to the action of oxygen or air on the food in the presence of certain enzymes.

---

635. However, this type of browning i.e. the _____ reaction can also be controlled by sulfuring. _____ can also then arrest the Maillard _____ and prevent the browning of foods due to this reaction.

---

657. The latter, i.e. caramelization is produced when sugars are _____ heated. Caramels are used in _____ amounts in the manufacture of confectioneries.
highly / slightly
large / small

---

591. rancidity

---

613. browning

---

635. Maillard
sulfuring
reaction

---

657. highly
large

---

592. In oxidative rancidity the enzyme _____ acts on oils, especially vegetable oils and oxidize them.

---

614. The _____ of most fruits and vegetables when bruised, cut or _____ is an oxidation reaction which leads to the formation of colored compounds in the fruit or vegetable.

---

636. It _____ be controlled by minimizing, i.e. decreasing
can also / cannot
the quantity of certain carbohydrates in the food and thus lessen the possibility of the browning reaction.

---

658. The Maillard reaction similar to the enzymatic browning, _____ be retarded or controlled by the use of _____
can / cannot
_____, by minimizing the carbohydrates content of the food, and by controlling or lowering the _____.

---

592. lipoxidase

---

614. browning

peeled

---

636. can also

---

658. can

sulfur dioxide

temperature

---

593. One type, then, of oxidative rancidity is the result of the oxidation of fats or oils by the action of the enzyme _____.

---

615. Browning of fruits is then an _____ _____ which takes place by the action of certain enzymes known as phenolases.

---

637. By _____ the quantity of carbohydrates and
minimizing / increasing
lowering the temperature we can control or reduce the Maillard _____.

---

659. There are still other forms of food _____ the cause of which is not yet well understood. Many a time browning is the result of the action of _____ agent.
more than one / one

---

593. lipoxidase

---

615. oxidation reaction

---

637. minimizing

reaction

---

659. browning

more than one

---

594. The products of this oxidative reaction give the oil or _____ its rancid character.

---

616. _____ are enzymes that act on certain fruits and vegetables when they are peeled, _____ or _____ and the tissues are exposed to air.

---

638. The Maillard reaction can then be controlled by s_____, _____ the amount of carbohydrates, and by _____ the temperature. All these three factors lowering / raising _____ to control the Maillard reaction. help / do not help

---

594. fat

---

616. phenolases

cut

bruised

---

638. sulfuring

minimizing

lowering

help

---

595. Oxidative _____ could take place also by the direct action of oxygen on the fat or _____. This type of _____ is called autooxidation or self-oxidation rancidity.

---

617. Phenolases act on certain _____ and _____ when their tissues are exposed to _____. By oxidation, colored compounds are formed which give the fruit or _____ the brown coloration or pigments.

---

639. Many fruit juices turn brown when they are heated in the presence of air. This is another form of browning which is _____ the Maillard reaction, and the phenolases browning.
different from / similar to

---

595. rancidity

oil

rancidity

---

617. fruits

vegetables

air

vegetable

---

639. different from

---

596. Autooxidation or _____ rancidity is a second type of oxidative _____. The fat or oil is oxidized by the direct action of _____ without the presence of an enzyme.

---

618. This kind of _____ can be controlled or prevented by destroying the active enzymes, the _____ by heat or sulfuring.

---

640. When orange juice is concentrated, it _____ darkens, with a deleterious effect on its appearance and flavor.
often / rarely

---

596. self-oxidation

rancidity

oxygen

---

618. browning

phenolases

---

640. often

CHAPTER I

PRINCIPLES, METHODS, ADVANTAGES AND DISADVANTAGES

UNIT III

FOOD PRESERVATION

CHAPTER I

PRINCIPLES, METHODS, ADVANTAGES AND DISADVANTAGES

660. So far you have learnt about the composition of food and the different components from which _____ is composed.

---

675. Cold temperatures will chiefly _____ (inhibit / encourage) growth of microorganism while hot temperature will _____ (destroy / preserve) the microorganism.

---

690. Canning is the main form of thermal processing. In canning we make use of both high temperature and exclusion of air. By high temperature, we try to _____ spoilage _____ and enzymes, and by exclusion of air we prevent the regeneration of all aerobic microorganisms.

---

705. Through preservation, perishable foods _____ (can / cannot) be safely transported or stored. Moreover, seasonal foods such as fruits and vegetables can be made available all year round.

---

660. food

---

675. inhibit

destroy

---

690. destroy or kill

microorganisms

---

705. can

---

661. These different components of food include carbohydrates, _____, _____, _____, _____ and water.

---

676. The use of both low and high temperatures or cold and hot temperatures will control the growth of _____ and hence will _____ the food.
preserve / destroy

---

691. In canning or thermal processing we destroy _____ microorganisms and enzymes and exclude air to prevent the _____ of all aerobic organisms.

---

706. Through preservation, then, foods such as fruits and vegetables will be made available _____. Much of
all year round / only seasonal
the food wastage _____ be avoided.
can also / cannot

---

661. fats, proteins, minerals, vitamins

---

676. microorganism

preserve

---

691. spoilage

regeneration

---

706. all year round

can also

---

662. You have learnt also about the composition of these different _____ of food, their properties and their importance.

---

677. Very cold temperature and very high temperature, besides, _____ (destroying / preserving) microorganisms or inhibiting their growth, also inactivate enzymes responsible for spoilage.

---

692. The other method of food _____ is refrigeration and freezing. Both _____ and freezing make use of low temperatures to either restrict the growth of _____ or destroy them and inactivate enzymes.

---

707. Fresh fruits and vegetables and other perishable foods if they are not preserved will _____ (spoil / keep) and thus become unsuitable for consumption. Perished foods are a _____ (loss / gain) to both producer and consumer.

---

662. components

---

677. destroying

---

692. preservation

refrigeration

microorganisms

---

707. spoil

loss

---

663. You learnt, moreover, that foods in general are either of plant origin or _____ origin and that among the common plant foods are cereals, pulses or legumes, vegetables and _____.

---

678. Very cold temperatures and very high temperatures also _____ spoilage enzymes as well as _____ spoilage microorganisms.
(inactivate / activate)

---

693. By refrigeration and freezing we _____ or destroy spoilage microorganism and _____ also enzymes.
(restrict / encourage) (inactivate / activate)

---

708. By food preservation we, thus, _____ spoilage of foods and _____ their loss, and hence preserve the nutrients in them.
(prevent / enhance) (avoid / insure)

---

663. animal

fruits

---

678. inactivate

destroy

---

693. restrict

inactivate

---

708. prevent

avoid

---

663. animal

fruits

---

678. inactivate

destroy

---

693. restrict

inactivate

---

708. prevent

avoid

---

664. Meat on the other hand, be it red meat, poultry or fish, and dairy products are the most common _____ foods.
animal / plant

---

679. Another principle of food preservation is reducing the amount of moisture in the food. _____ the amount of moisture in the food will _____ to preserve the food.
help / not help

---

694. Drying is still another _____ of food _____.
By drying we make use of reducing the moisture content of food and thus _____ the growth of spoilage microorganisms
limit / enhance
and enzymatic chemical reactions.

---

709. Foods are the source of nutrients; by their preservation, we also _____ the nutrients in them. Preservation of
preserve / destroy
food is thus of great economic _____ to both the
advantage / loss
community and the individuals.

---

664. animal

---

679. reducing

will help

---

694. method

preservation

limit

---

709. preserve

advantage

---

665. You have learnt also about food spoilage. Food _____ is the result of chemical and physical changes which the food undergoes and which make it inedible and hazardous.

---

680. Reducing the amount of moisture in the food will also inhibit the growth of microorganisms and hence _____ spoilage of food.
prevent / enhance

---

695. Drying _____ the amount of water content of food and thus _____ the growth of spoilage microorganism.
decreases / increases

---

710. Besides these different advantages of food preservation, preserved foods are more convenient to handle and easier to consume. They are _____ to transport, _____ to store and _____ to prepare and consume.
easier / more difficult
easier / more difficult
easier / more difficult

---

665. spoilage

---

680. prevent

---

695. decreases

inhibit or limit

---

710. easier

easier

easier

---

666. And that the two chief causes of food spoilage are the growth of microorganisms including _____, _____, _____ and the action of enzymes which occur naturally in the food.

---

681. A third principle of food preservation is by excluding the air or oxygen. _____ the air or _____ will also help to _____ the food.
preserve / destroy

---

696. Preservation by chemicals is a fourth method of _____ _____. By this method we inhibit the growth of spoilage _____ or destroy them. We also sometimes inhibit the action of enzymes and thus _____ spoilage of food.
arrest / speed up

---

711. In general, therefore, preserved foods are _____ economic, to both society and individuals, and _____ convenient to consumers and producers.
more / less

---

666. bacteria

yeast

molds

---

681. excluding

oxygen

preserve

---

696. food preservation

microorganism

arrest

---

711. more

more

---

667. We shall now turn to another field of food science, namely, food preservation. Food _____ includes all actions or operations which will lead to the end of keeping in wholesome condition, food required for consumption at some later date.

---

682. Air or oxygen is necessary for the growth of most microorganism. Hence excluding air _____ tend to protect food from spoilage.
will / will not

---

697. The method of chemical preservation tries to _____ growth of spoilage microorganism and sometime inactivate, _____ or arrest their action.

---

712. Side by side to these advantages, food _____ has also its own disadvantages. These _____ include the loss of certain nutrients especially vitamins, during the processes of preservation.

---

667. preservation

---

682. will

---

697. inhibit

enzymes

---

712. preservation

disadvantages

---

668. Food _____ includes then all the operations and actions by which we can protect _____ from spoilage.

---

683. Another principle of food preservation is the use of preservatives. _____ are chemical substances which inhibit the growth of microorganisms and thus _____ foods from spoilage.
protect / do not protect

---

698. Irradiation or the use of radiations is a new method of food preservation. This and the other methods are based on the general principle of providing an environment which is _____ for the growth of _____.
unfavorable / favorable

---

713. A number of vitamins, as was mentioned earlier, are partly or completely destroyed by heat, hence preservation _____ lead to the _____ of these nutrients.
will sometimes / will not
loss / gain

---

668. preservation

food

---

683. preservatives

protect

---

698. unfavorable

microorganisms

---

713. will sometimes

loss

---

669. Most foods _____ perishable. Therefore any process or
are / are not
operation which will prevent the perishing or _____ of
food is part of food preservation.

---

684. Preservatives are chemical substances which _____
inhibit / enchance
the growth of microorganisms. They are added during the
processing of food to protect it from _____.

---

699. Besides the conventional methods of food preservation namely
_____ processing, refrigeration, _____ and
_____; irradiation adds new vast possibilities for
a greater progress in the field of food preservation.

---

714. Besides the loss of certain _____, foods may develop
during processing, especially by the action of heat, an off-
flavor or a change in color, both of which will make food
_____ acceptable to consumers.
more / less

---

669. are

spoilage

---

684. inhibit

spoilage

---

699. thermal

freezing

drying

---

714. nutrients

less

---

670. By food preservation we aim then at _____
destroying / protecting
the chief agents of food spoilage namely microorganisms and enzymes.

---

685. Still another principle of food preservation is the use of radiations. _____ would destroy most agents of spoilage and thus preserve food from d_____.

---

700. Under certain circumstances, preservation is only temporary, because the growth of microorganisms is only inhibited. While under other conditions the spoilage organisms are actually destroyed and the preservation is _____.
permanent / temporary

---

715. Milk, for example _____, develops an unpleasant off-
often / rarely
flavor during processing. This off _____ is shown by a change in both its taste and odor.

---

670. destroying

---

685. radiations

decay

---

700. permanent

---

715. often

off-flavor

---

671. Food preservation tends then to protect foods from _____ or deterioration by either destroying these agents of spoilage, namely, _____ and _____ or preventing their development.

---

686. These radiations which are known also as ionizing radiations, are either in the form of electrical particles or a form of electro-magnetic waves. They are rays that tend to _____ (preserve / destroy) food by _____ (destroying / preserving) the agents of spoilage.

---

701. Some methods of food processing, however, make use of certain microorganisms, which are not harmful, but rather are useful. Cheese manufacture, bread making, and the preparation of pickles and other such food products make use of some of these useful _____.

---

716. On the other hand, dried fruits and vegetables show often a change in color and sometimes in taste also. Dried fruits often _____ (do not / do) retain their original color and taste.

---

671. spoilage

microorganisms

enzymes

---

686. preserve

destroying

---

701. microorganisms

---

716. do not

---

672. These principal agents of food _____ are normally present in food; destroying them or preventing their development is then the chief problem of food _____.

---

687. Food preservation _____ (can / cannot) be accomplished by a number of methods based on the use of one or more of these principles. All these _____ tend to _____ (destroy / protect) the spoilage microorganisms or both the microorganism and enzymes in foods.

---

702. These _____ microorganisms are used in a number of food industries such as bread, pickles, cheese, fermented milk and the like.

---

717. These two factors, namely, loss of certain _____ and a change in _____ and sometimes, in color also, are two important disadvantages that may result from food preservation.

---

672. spoilage

preservation

---

687. can

principles or methods

destroy

---

702. useful

---

717. nutrients

flavor

---

673. The different methods of food preservation are based in part on temperature control. _____ control means to produce temperatures which are unfavorable for the growth of microorganisms.

---

688. These principles of food preservation include then control of _____, reduction of the _____ _____ of foods, exclusion of _____ or oxygen, the use of a _____ and radiation.

---

703. Food preservation has a number of advantages and benefits. Most foods _____ perishable, hence they have to be preserved if they cannot be consumed immediately.
(are / are not)

---

718. However, these possible disadvantages are _____ compared with the _____ advantages which we _____ by food preservation.
(few / many) (many / few) (gain / lose)

---

673. temperature

---

688. temperature

moisture content

air

preservative

---

703. are

---

718. few

many

gain

---

674. By temperature _____, we mean to produce low or high temperatures which are _____ for the growth of microorganism.
favorable / unfavorable

---

689. One of the different methods used in food preservation is thermal processing. In _____ processing we make use of high temperature by which we tend to _____ spoilage microorganisms and enzymes also.
destroy / protect

---

704. _____ foods cannot be easily transported or stored as such. They have to be preserved before they can be transported or stored without danger of being spoiled or damaged.
Perishable / nonperishable

---

674. control

unfavorable

---

689. thermal

destroy

---

704. perishable

CHAPTER II

THERMAL PROCESSING

719. Amongst the most common methods of food preservation is thermal processing. _____ processing or canning involves as stated before the use of high temperature to _____ spoilage microorganisms and enzymes.
destroy / protect

---

753. The shortest time needed to kill a microorganism when heated to a certain temperature is called the thermal death time (T.D.T.). The thermal death time for different bacteria is _____ _____.
the same / different

---

787. Can size is then refered to by _____. These symbols denote the can _____ and height which are given in inches and fraction of inches. Present day trend is towards _____ size cans.
smaller / bigger

---

821. The pressure given in the table is called the gauge pressure. This _____ pressure plus the atmospheric pressure give the total pressure of the steam inside a retort.

---

719. thermal

destroy

---

753. different

---

787. symbols

diameter

smaller

---

821. gauge

---

720. _____ involves also the exhaustion of air and the sealing of the containers to prevent entrance of new mic_____ and their regeneration.

---

754. The _____(T.D.T.) is the number of minutes or seconds needed to completely destroy a microorganism when heated at a certain temperature.

---

788. Foods, before being filled into the can, undergo a number of preparatory operations; these _____ differ with different foods.

---

822. Ten pounds of gauge pressure, would mean, then, 10 + 15 = 25 pounds of _____ pressure.

---

720. canning

microorganisms

---

754. thermal death time

---

788. operations

---

822. total

---

721. Canning, then, involves the use of high _____,
and the sealing of _____ after exhausting the _____
from them.

---

755. The thermal death time has a great importance in the canning of food. Each microorganism has a different _____ (T.D.T.).

---

789. Cleansing is the first important step in commercial canning. _____ involves the thorough cleaning of the food material.

---

823. The total pressure of the steam inside a retort is equal then, to the _____ pressure plus the _____ pressure, which is equal to about 15 pounds per square inch.

---

721. temperature

containers

air

---

755. thermal death time

---

789. cleansing

---

823. gauge

atmospheric

---

722. The use of heat to process food dates back to early history. Man, since the discovery of fire, began to use heat to cook and process his _____.

---

756. The higher the temperature, the _____ will be the thermal death time of a particular microorganism. The T.D.T. of clostridium botulinum at 116°C (240°F) is equal to 10 minutes.
shorter / longer

---

790. _____ aims at removing all extraneous materials and by this, removing the greater amount of spoilage organisms which are found in the food product.

---

824. The time we need to heat - process or (cook) a canned food to attain complete sterilization is called the thermal processing _____.

---

722. food

---

756. shorter

---

790. cleansing

---

824. time

---

723. However, the use of heat for the preservation of food dates only back to the beginning of the nineteenth century. By the _____ of the nineteenth century, man started to apply heat to _____ his food.

beginning / end

---

757. The _____ (T.D.T.) of Clostridium botulinum. (Cl. botulinum) is _____ minutes at 116°C (240°F) and 2.45 minutes at 121°C (250°F).

---

791. By cleansing we tend, then, to _____ the number of spoilage organisms in the food product. Commercial cleansing is effected by several methods, depending upon the kind of food product.

reduce / increase

---

825. The _____ _____ time is equal to the number of minutes of heating at a certain temperature needed to completely sterilize a canned food.

---

723. beginning

preserve

---

757. thermal death time

10

---

791. reduce

---

825. thermal processing

---

724. In heat treatment, depending upon the temperature and time of heating, we may destroy all microorganisms; this is called sterilization. Sterilization, then, involves the destruction of _____ microorganisms.
(all / part of the)

---

758. Thus at a higher temperature Cl.botulinum needs _____ period to be killed then at a lower temperature. The T.D.T. (shorter / longer)
of Cl.botulinum at 116°C (240°F) is equal to _____ minutes and at 121°C (250°F) is equal to _____ minutes.

---

792. Cleansing is a basic step in the _____ operations. Cleansing helps _____ sanitation of the plant and (maintain / avert)
equipment and remove spoilage microorganisms.

---

826. The thermal processing time is equal to the number of _____ of heating needed to _____ sterilize a certain (completely / partially)
canned food at a certain _____.

---

724. all

---

758. shorter

10

2.45

---

792. canning

maintain

---

826. minutes

completely

temperature

---

725. In _____ we destroy all microorganisms, whether harmful or useful; while if we destroy only the major part of them, we call the process pasteurization.

---

759. Different types of containers are used in the canning of food. Some _____ are made of glass, others of aluminum and others of iron plated with tin.

---

793. Besides cleansing, most fruits and vegetables are also blanched. _____ is another basic operation for many vegetables and fruits.

---

827. We measure the thermal or heat _____ _____ by the time we turn on the steam in the retort, until the time we turn it off.

---

725. sterilization

---

759. containers

---

793. blanching

---

827. processing time

---

726. In pasteurization we destroy _____ of the microorganisms
only part / all
that are found in food, namely the disease producing or pathogenic ones; while in sterilization we destroy _____ of the microorganisms.
all / only part

---

760. Of these three kinds of _____ glass jar and tin cans are the more common. Tin cans are however, the most common.

---

794. _____ you have learned, is done by immersing the raw food material in hot or boiling water or exposing it to live steam.

---

828. Therefore the time that lapses between _____ the steam and _____ in the retort is called the _____ _____ time.

---

726. only part

all

---

760. containers

---

794. blanching

---

828. turning on

turning it off

thermal processing

---

727. Pasteurization, then, is a _____ heat
less severe / more severe
treatment than sterilization. In pasteurization a _____
lower /
_____ temperature is applied than in sterilization.
higher
Pasteurization intends only to prolong the shelf-life of foods,
while sterilization intends to preserve them _____
indefinitely /
_____.
temporarily

---

761. Glass jars, _____ cans and _____ cans are the three kinds of containers used in the canning industry. But the most extensively used are _____ _____.

---

795. In blanching then, we immerse the food material in either hot or boiling _____ or expose it to live _____.

---

829. The thermal processing _____ of a certain canned food depends upon the rate of heating i.e. the rate of heat transfer inside the can.

---

727. less severe

lower

indefinitely

---

761. aluminum

tin

tin cans

---

795. water

steam

---

829. time

---

728. In pasteurization we tend to kill _____ pathogenic
all / only
microorganisms that may cause serious illnesses. Milk and milk products are usually preserved by pasteurization.

---

762. Glass jars have a number of advantages. _____ _____ are more attractive than metallic cans.

---

796. Blanching has a number of advantages but its main purpose is to _____ enzymes which may cause spoilage of the food.
destroy / preserve

---

830. This _____ of heating or heat _____ is refered to by canners as the rate of heat penetration.

---

728. only pathogenic

---

762. glass jars

---

796. destroy

---

830. rate

transfer

---

729. Milk and milk products are usually _____ to kill all _____ microorganisms that may exist in them. About 90% of all market milk is pasteurized.

---

763. Glass jars besides being _____ attractive than metallic (more / less) cans, they can also be reused. Moreover, glass itself is inert material and would not react with the food.

---

797. By blanching we tend mainly to _____ or inactivate the spoilage enzymes, in the food. High temperature will _____ (activate / inactivate) the spoilage _____ in food.

---

831. The _____ of _____ _____ or heat transfer is measured by the rate at which temperature rises at the slowest heating point in the food, while the sealed can is being subjected to the processing temperature.

---

729. pasteurized

pathogenic

---

763. more

---

797. destroy

inactivate

enzymes

---

831. rate

heat penetration

---

730. The _____ of milk is carried out by heating the milk to 62.7°C (145°F) and holding it at that temperature for 30 minutes. This process is called the holding method.

---

764. Glass, therefore, has a number of advantages. Glass itself is inert i.e. it _____ react with the food. Glass jars
would / would not
also are more a _____ than metallic cans and can be _____.

---

798. Cleansing and blanching are two _____ preparatory operations in the canning procedure. The latter
important / unimportant
aims at _____ the spoilage enzymes in food.

---

832. This rate of heat penetration measures the _____ of
rise / fall
temperature per minute at the _____ heating point
slowest / quickest
in the canned food.

---

730. pasteurization

---

764. would not

attractive

reused

---

798. important

inactivating or destroying

---

832. rise

slowest

---

731. The _____ method for the pasteurization of milk involves, then, the heating of every particle of milk to _____ ($145^{o}F$) for _____ minutes.

---

765. Opposite to their advantages, glass _____ have a number of disadvantages. They are more expensive than metallic cans.

---

799. After these preparatory _____, the food product is filled into the can to be sealed and heat-processed.

---

833. This slowest heating point in the can is the last point in the food to which outside heat reaches. It is also the _____ (most / least) difficult to sterilize.

---

731. holding

62.7°C

30

---

765. jars

---

799. operations

---

833. most

---

732. Milk may also be pasteurized by heating it to 71.6°C (161°F) for at least 15 seconds. This method of _____ is known as the short-time, high-temperature method. (S.T.H.T.)

---

766. Glass jars are _____ expensive than metallic cans. They
more / less
are also breakable. Foods canned in glass jars will sell
_____ than foods canned in metallic cans.
dearer / cheaper

---

800. Brine is usually added to vegetables and syrup to fruits before they are sealed and heated. The _____ and _____ are added to insure better heating and better heat penetration.

---

834. The rate of heat penetration i.e. the rate of rise of _____ at the _____ heating point in a canned food is affected by a number of factors.

---

732. pasteurization

---

766. more

dearer

---

800. brine

syrup

---

834. temperature

slowest

---

733. By the short-time, high-temperature (S.T.H.T.) method of _____, milk is heated to _____ C (161°F) for at leäst _____ seconds.

---

767. Glass jars, besides being _____ and _____ (more / less) expensive than metallic cans, they are also transparent, i.e. allow light to pass through. This in turn may cause discoloration of the food canned.

---

801. The purpose of adding brine or syrup to vegetables and fruits, prior to sealing is to _____ (promote / retard) the heating and heat penetration of the food product.

---

835. These _____ that affect the rate of heat penetration in a canned food include the physical character of the food, whether in solid, liquid or in solution.

---

733. pasteurization

71.6° C

15

---

767. breakable

more

---

801. promote

---

835. factors

---

734. Milk pasteurized, by either the _____ method or the _____ (S.T.H.T.) method, is cooled immediately to 10°C (50°F) or lower and stored at this temperature.

---

768. Many kinds of foods especially fruits juices will be decolored if exposed to light. Such foods _____, then, preserved
(are / are not)
in glass jars.

---

802. The next step after filling is sealing. Cans, before being sealed, are exhausted of air and other gases that may be present in the food material. _____ of _____ and other _____ is a necessary step to insure the success of the canning operation.

---

836. The _____ character of the food means its physical state or condition. Liquid foods have quicker heat penetration rate than solid foods.

---

734. holding

short-time, high-temperature

---

768. are not

---

802. exhaustion

air

gases

---

836. physical

---

735. After pasteurization milk is cooled _____ to
immediately / slowly
_____C and stored at this temperature or lower. Also it is important that pasteurized foods are stored at low temperature or under refrigeration.

---

769. Glass jars _____ then be used in preserving food which
can / cannot
are decolorized by light.

---

803. By _____ we not only expel _____ from the food but also exclude air from the can.

---

837. Liquid foods heat _____ than solid foods. Therefore
quicker / slower
heat penetration in liquid foods is _____ than in
faster / slower
solid foods.

---

735. immediately

$10^{o}C$

---

769. cannot

---

803. exhaustion

gases

---

837. quicker

faster

---

736. By pasteurization, then, we destroy _____ microorganisms, ~~and especially the pathogenic bacteria that may cause serious illnesses~~.
all / only the pathogenic

---

770. Other than glass jars, tin cans are the _____ extensively used in the canning industry. Tin cans are made of steel sheets plated with tin.
most / least

---

804. After exhausting, the can is immediately and hermetically sealed. By exhaustion we _____ all gases from the food material and the _____ at the same time.

---

838. Besides the _____ _____ of the food, the size of the can also determines the rate of heat penetration in a canned food.

---

736. only the pathogenic

---

770. most

---

804. expel

can

---

838. physical character

---

737. However, in sterilization, the food is subjected to a much _____ temperature, depending upon the kind of food. At 121°C (250°F), all types of microorganisms, whether in vegetative or spore form, will be destroyed.

(higher / lower)

---

771. Tin cans are made of _____ sheets plated with _____. Tin cans are _____ than glass jars, and are _____.

(cheaper / dearer) (breakable / unbreakable)

---

805. The cans after being hermetically _____, are heat-processed and cooled. On cooling the contents of the can contract and a partial vacuum is created inside the can.

---

839. The physical _____ of the food and the _____ of the can are two factors that affect the rate of heat penetration. The smaller the can, the quicker will be the rate of heating.

---

737. higher

---

771. steel

tin

cheaper

unbreakable

---

805. sealed

---

839. character

size

---

738. In sterilization _____ the organisms are destroyed, whether they be in the vegetative or spore form. The food is heated between 100°C (212°F) and 121°C (250°F), depending upon the kind of food.

all / part of

---

772. Tin and steel are both metals which are rather active and may react with the food product. Tin cans, therefore, _____ glass may react with food canned in them.

different from / similar to

---

806. This partial _____ is normally present in commercially canned foods. This vacuum is essential for the success of the canning process.

---

840. Smaller cans heat quicker than large cans. The _____ is the size of the can, the faster will be the rate of the heat penetration.

smaller / larger

---

738. all

---

772. different from

---

806. vacuum

---

840. smaller

---

739. At these temperatures all microorganisms will be _____. The time of heating and the temperature depend on the kind of _____ and microorganisms present.

---

773. Tin cans _____ (could / could not), then, react with the food preserved in them. Their inside is then coated with a lacquer to prevent any possible reaction with the food preserved.

---

807. Canning then involves subjecting food in a permanently sealed container to a heat process. The heat _____ (destroys / preserves) all spoilage microorganisms present in the food.

---

841. Another factor of importance that affects the _____ _____ _____, if the containers are other than tin cans, is the material from which the containers are made.

---

739. destroyed

food

---

773. could

---

807. destroys

---

841. rate of heat penetration

---

740. The time of heating and the temperature _____ (differ with / are) _____ (the same for) different foods. Acid foods are processed at or near the boiling point of water, while non-acid foods need higher temperature.

---

774. The inside of most tin cans is coated with _____ to _____ (prevent / allow) possible reactions of the can with the food product. The lacquer used is also called enamel.

---

808. And the seal on the container prevents reinfection of the food by spoilage microorganisms. The sealing operation is then one of the _____ (most / least) important in the canning process.

---

842. Metals are better conductors of heat than glass therefore tin cans have _____ (better / poorer) rate of heat penetration than glass jars.

---

740. differ with

---

774. lacquer

prevent

---

808. most

---

842. better

---

741. Acid foods, i.e. foods with a _____ pH, such as fruits, tomatoes and the like, are processed at around _____C ($212^{o}F$), which is the boiling temperature of water.

low / high

---

775. The _____ or enamel used differs for different food product. Different _____ or lacquers are used depending on the food product to be preserved.

---

809. The sealed cans are heat-processed to a certain temperature to insure the _____ destruction of all _____ microorganisms.

partial / total

---

843. Glass jars on the other hand have a _____ rate of heat penetration than tin or other metallic cans.

---

741. low

100°C

---

775. lacquer

enamels

---

809. total

spoilage

---

843. poorer

---

742. Non-acid foods or low acid foods need _____ heat
higher / lower
treatment, to destroy all microorganisms. These foods have a
_____ pH than acid foods.
higher / lower

---

776. Tin cans are then usually coated on the inside with a lacquer or an _____ to prevent any possible _____ between the food product and the can.

---

810. The heat-processing or thermal processing is the operation by which we expose the sealed cans to hot or boiling water or to steam under pressure to _____ all microorganisms
destroy / preserve
existing in the food.

---

844. A fourth factor that affects the rate of _____ is the difference between the temperature of the retort and that of the canned food. The smaller the difference, the slower will be the rate of heat penetration.

---

742. higher

higher

---

776. enamel

reaction

---

810. destroy

---

844. heat penetration

---

743. Non-acid foods such as vegetables, grains, legumes and meat need a _____ temperature than the boiling temperature of water to sterilize them.
higher / lower

---

777. The coating of the can with _____ or lacquer tends to prevent any possible reaction between the _____ and the can. It thus prevents also any possible deterioration or discoloration of the food product.

---

811. The sealing operation is referred to by food canners as doubleseaming. _____, then, means that the seam is made of several folds of metal, to insure a hermetical seal.

---

845. Therefore the _____ is the difference between the temperature of the food and that of the retort, the faster will be the rate of heat penetration.
greater / smaller

---

743. higher

---

777. enamel

food or food product

---

811. doubleseaming

---

845. greater

---

744. Non-acid foods are treated from 116°C (240°F) to 121°C (250°F) to destroy all microorganisms. This kind of treatment is called _____ (sterilization / pasteurization).

---

778. Tin cans used in the canning industry are usually coated, or _____. The kind of _____ or lacquer used to coat the cans differ with different foods.

---

812. This double seaming produces a _____ seal which will _____ (prevent / allow) reinfection of the food by spoilage organisms.

---

846. As the center of the can or the slowest heating point reaches a temperature, nearer the retort temperature the rate of heat penetration will _____ (decrease / increase).

---

744. sterilization

---

778. enameled

enamel

---

812. hermetical

prevent

---

846. decrease

---

745. Acid foods need a _____ heat treatment to be sterilized, while low acid or non-acid foods need _____ heat treatment to be sterilized.
lower / higher
higher / lower

---

779. The purpose of the enamel is to _____ possible reactions of the food product with the can, and in turn prevent any possible _____ or deterioration of the food product.
prevent / allow

---

813. The heat processing or thermal processing (or cooking) follows the sealing step in the canning procedure. The purpose of this step is to _____ all microorganisms inside the sealed can.
destroy / preserve

---

847. The _____ character of the food, the _____ of the can and the _____ between the food temperature and that of the retort are three important factors that affect the rate of heat penetration of a canned food.

---

745. lower

higher

---

779. prevent

spoilage

---

813. destroy

---

847. physical

size

difference

---

746. The temperatures used in canning to sterilize food are either _____ ($212^{o}F$), _____ ($240^{o}F$), or _____ ($250^{o}F$), depending upon the type of food to be canned and the duration of heating.

---

780. Cylindrical cans can also be tall or short or flat, according to trade customs rather than to the need of consumers. Cylindrical cans themselves vary in _____ or _____.

---

814. The _____ processing, then, aims at _____ all microorganisms inside the sealed can. The heating is usually done in a form of a large steam pressure cooker called retort.

---

848. Another factor of importance is the _____ from which the container is made and its heat conductivity. Metallic cans have _____ heat conductivity than glass jars.
better / poorer

---

746. 100°C

116°C

121°C

---

780. size

shape

---

814. thermal

destroying

---

848. material

better

---

747. For the same microorganism, at higher temperature a shorter period of heating is needed, while lower temperature needs a longer period of heating. Therefore for the same microorganism the higher the temperature, the _____ will be the period of heat treatment.
shorter / longer

---

781. Tin cans are made in a great variety of sizes or shapes. The cans most extensively used in food _____ are cylindrical in shape. Cans then vary in _____ and _____.

---

815. The _____ is a large steal tank, heated with steam. It is fitted with a cover or a door which can be fastened or closed to give an airtight seal.

---

849. After the sealed cans are heat-processed (or cooked), they are cooled and labeled. _____ and labeling follow the thermal processing step in the canning procedure.

---

747. shorter

---

781. preservation

size

shape

---

815. retort

---

849. cooling

---

748. Some microorganisms are more resistant to heat than others. The most heat resistant pathogenic microorganisms is called Clostridium botulinum. _____ _____ is the _____ heat resistant pathogenic microorganism.
least / most

---

782. The size of a can is given in symbols. A _____ gives the size of a can in inches. For instance 211 x 400 means that the can is 2,11/16 inches in diameter and four inches in height.

---

816. The retort is then a large steam _____ cooker, fitted with an _____ cover or a door. It is either horizontal or vertical in shape.

---

850. _____ and _____ are the last two steps in the canning of food.

---

748. clostridium botulinum

most

---

782. symbol

---

816. pressure

airtight

---

850. cooling

labeling

---

749. _____ _____ is the _____ heat resistant, (most / least)
pathogenic microorganism. It is an anaerobic bacterium and a spore former.

---

783. The symbols of a can refer to its _____ and _____ in inches and fractions of an inch. The first digit is in inches and the last two digits denote the numbers of 16th.

---

817. Retorts are either _____ or _____ in shape, but both types are almost identical in operation.

---

851. The main steps, then, in the canning of foods include preparatory operations like _____ and _____.

---

749. clostridium botulinum

most

---

783. diameter

height

---

817. vertical

horizontal

---

851. washing or cleansing

blanching

---

750. Clostridium botulinum is then a _____ (pathogenic / harmless) bacterium. It is an anaerobe, that is, it lives in the _____ (presence / absence) of free air or oxygen. It is also a spore _____.

---

784. A can whose size is 307 x 409 denotes that it measures 3 7/16 inches in _____ and 4 9/16 inches in _____.

---

818. The temperature attained by the steam, inside a _____, depends upon the pressure that the steam builds up. The higher the pressure, the higher will be the temperature.

---

852. These preparatory operations are followed by the filling operation, _____ and _____. Sealing is then followed by the heat or _____ processing.

---

750. pathogenic

absence

former

---

784. diameter

height

---

818. retort

---

852. exhausting

sealing

thermal

---

751. All bacteria of the genus (group) Clostridia are anaerobes, i.e. they only live in the _____ of free air or oxygen. They are also spore former.

---

785. Can sizes are also numbered. The _____ most commonly used are No. 2 and 10. The following are a few examples of common standard cans.

Number	Symbol or dimensions
1	211 x 400
2	307 x 400
3	404 x 414
10	603 x 700

---

819. The greater the steam pressure in the retort, the _____ will be the temperature inside the retort. See table No. 1 of temperatures obtainable in a retort, at different pressures.

higher / lower

---

853. The thermal processing operation is followed by _____ and _____. After cooling and labeling. The canned food goes to the warehouse for inspection, packing and storage.

---

751. absence

---

785. sizes or numbers

---

819. higher

---

853. cooling

labeling

Table No. 1

Temperatures Obtainable in a Retort at Different Pressures

	Temperature	
Pounds Gauge Pressure	Degrees C	Degrees F
5	109	228
10	116	240
15	121	250
20	126	259
25	131	267

752. All Clostridia are _____ bacteria which can only
anaerobic / aerobic
live in the _____ of free air and are spore
absence / presence
_____.

---

786. The present trend is towards smaller container sizes. Can sizes of _____ dimensions are used for small families
smaller / bigger
and single dwellers. The No. 10 can is mainly used for hotels, restaurants and similar institutions.

---

820. It is seen from the table that the temperature of the steam in a retort and its pressure are _____
directly / inversely
proportional. The pressure given is in pounds per square inch.

---

752. anaerobic

absence

former

---

786. smaller

---

820. directly

CHAPTER III

SPOILAGE OF CANNED FOOD

854. The purpose of thermal processing is, as sta t ed earlier, to produce a palatable, nutritive, sterile and wholesome food. Canned food should, then, keep _____ . (indefinitely / only for a time)

---

861. Flat sour spoilage is then characterized by the formation of large amount of _____ _____ the formation of gas. (with / without) This may happen, for example, in canned tomato products.

---

868. This other form of spoilage known as b_____ spoilage is a very dangerous form of spoilage of canned food.

---

875. This _____ is very poisonous. It attacks the central nervous system, and in turn, affects the respiratory system and causes heart failure.

---

854. indefinitely

---

861. acids

without

---

868. botulinus

---

875. exotoxin

---

855. In the canning procedure both spoilage microorganisms and enzymes are destroyed. Therefore canned food should be _____ from any kind of spoilage.
free / not free

---

862. Another example or type of spoilage of canned food is known as "swell". _____ is another form of spoilage where gases are produced inside the can.

---

869. Botulinus spoilage is a very _____ form of
dangerous / harmless
food spoilage. It is caused by the bacterium Clostridium botulinum.

---

876. The poisoning caused by the exotoxin of Cl.botulinum is called botulism. _____ is a very _____ form of food
dangerous / mild
poisoning which often leads to death.

---

855. free

---

862. "swell"

---

869. dangerous

---

876. botulism

dangerous

---

856. Foods that are commercially canned under sanitary conditions are then free from spoilage and are _____ to consume.
safe / unsafe

---

863. The term "swell" indicates the swelling or bulging of the can due to the formation of one or more _____ inside the _____.

---

870. Clostridium botulinum, as you have learned earlier, is a very _____ bacterium.
pathogenic / harmless

---

877. Fortunately the toxin, similar to the vegetative form of the bacterium, is easy to be destroyed by a few minutes heating at the boiling temperature of water. The boiling temperature would _____ destroy the toxin in a few minutes.
quickly / slowly

---

856. safe

---

863. gases

can

---

870. pathogenic

---

877. quickly

---

857. However, improper canning or under-processing will often lead to _____ of the canned food.
spoilage / preservation

---

864. "Swell" or "swells" are a form of spoilage accompanied with _____ of a gas or gases inside the canned food.
formation / absence

---

871. It is also an _____ and a _____ _____. Cl.botulinum can live mostly in non-acid or low acid foods and in the _____ of free air.
anaerobe / aerobe
spore-former / non spore-former
absence / presence

---

878. Thus it is easy to destroy the toxin by _____ if the nature of the food allows repeated boiling. In the case of doubt vegetables plus the like can be reboiled while a product such as tuna would not be reboiled for safety.

---

857. spoilage

---

864. formation

---

871. anaerobe

spore-former

absence

---

878. boiling

---

858. Some of these kinds of spoilage of _____ _____ is due to the action of microorganisms. Others may be due to the reaction of the food product with the metal of the can.

---

865. The gas or _____ formed in a _____ are either produced by the action of certain microorganisms on the food or by the action of the acids in the food on the metal of the can.

---

872. The spore forms of Cl.botulinum are very resistant to heat. They may survive in meat and other non-acid foods if they are _____ sterilized.
properly / improperly

---

879. Flat sour, swells and botulinus spoilage are three important forms of spoilage of canned foods. Flat sour is accompanied by _____ formation, _____ the formation of a gas
with / without
or gases; while a swell is usually due to the formation of _____ inside the can.

---

858. canned food

---

865. gases

"swell"

---

872. improperly

---

879. acid

without

gases

---

859. One example of the spoilage of canned foods is flat sour. _____ is a type of spoilage in which the food becomes highly acid.

---

866. "Swells" are the result then of action of _____ on the food, or the action of the food on the _____ of the container.

---

873. Cl. _____ may survive in certain canned foods such as meat vegetables and the like which are home-canned, due to _____ heat treatment.
insufficient / sufficient

---

880. Botulism is the _____ dangerous form of food poisoning.
most / least
It may occur when eating meat and vegetables and the like, which are _____ heat processed.
incompletely / completely

---

859. flat sour

---

866. microorganisms

metal

---

873. botulinum

insufficient

---

880. most

incompletely

---

860. In flat sour spoilage, the food becomes _____ acid due
highly / slightly
to the attack of certain microorganisms on carbohydrates in the food. No gas and thus no swelling is formed in this spoilage, hence the team flat.

---

867. Flat _____ and _____ are two common types of spoilage of canned foods. Another example of spoilage is known as botulinus spoilage.

---

874. When the germ _____ _____ grows in a favorable food material, it produces a potent soluble exotoxin.

---

881. The safest way of avoiding botulism is to _____
boil / slightly heat
for a few minutes all home-canned meat and vegetables and the like before consumption to _____ the exotoxin that
destroy / preserve
may exist in the food.

---

860. highly

---

867. sour

"swell"

---

874. Cl.botulinum

---

881. boil

destroy

CHAPTER IV

REFRIGERATION AND FREEZING

882. You have learnt in the first chapter of this unit that controlling the temperature is one of the principles of food _____.

---

910. The _____ heat of _____ of ice is the number of _____ needed for every _____ of ice at $0^{o}C$ to melt to water at the same temperature.

---

938. The refrigerant passes through a cycle of two consecutive phases. From the liquid phase to the _____ phase back to the _____ phase and so on.

---

966. Food frozen by this _____ method are usually
indirect / direct
packaged in tins, films or other containers before they are frozen.

---

882. preservation

---

910. latent

fusion

calories

gram

---

938. gaseous

liquid

---

966. indirect

---

883. By controlling the temperature we _____ also control the growth of microorganisms and the activity of enzymes.
can / cannot

---

911. Ice has a high latent _____ of fusion. It is equal to 80 calories. _____ calories of heat will be _____ by every gram of ice when it melts at 0°C.
absorbed / given up

---

939. The rate of this cycle is regulated according to the temperature to be maintained inside the refrigerator. This _____ determines the speed of the condensation-evaporation cycle.

---

967. A third method of freezing is by a blast of cold air. Freezing by a _____ of _____ _____ is done by passing very cold air in a rapid stream over the food to be frozen.

---

883. can

---

911. heat

80

absorbed

---

939. temperature

---

967. blast

cold air

---

884. Controlling the _____, whether high or low is a basis for food _____.

---

912. 80 _____ of heat will be absorbed by every gram of _____ when it changes from ice at $0^{o}C$ to liquid water at the same temperature.

---

940. The temperature to be maintained inside the refrigerator will determine the _____ of this condensation-evaporation _____.

---

968. In this method of _____, the food passes on a moving belt through a tunnel containing cold air stream in a counter flow to the motion of the food.

---

884. temperature

preservation

---

912. calories

ice

---

940. speed

cycle

---

968. freezing

---

885. You have learnt also that microorganisms can be _____ (destroyed / preserved) by very high temperatures and sometimes by very cold temperatures.

---

913. Ice, therefore, acts as a refrigerant when it melts to water because of the _____ (great / small) amount of heat that it _____ from its environment.

---

941. The basis, then, of the cooling operation inside a closed mechanical refrigerator is this cycle of _____ - _____.

---

969. The food passes through the tunnel at the _____ (opposite / same) end from the one where the air enters.

---

885. destroyed

---

913. great

absorbs

---

941. condensation-evaporation

---

969. opposite

---

886. Besides destroying microorganisms, very high and very cold temperatures do also _____ enzymes responsible for spoilage.
(inactivate / activate)

---

914. Because of its high latent _____ ___ _____, melting ice is then a _____ refrigerant.
(good / bad)

---

942. Freezing is the other form of cold temperature treatment used in food preservation. In freezing the temperature we attain is _____ the freezing point of water.
(below / above)

---

970. In air blast freezing, then, a current of very cold air flows through a tunnel at a _____ direction to the moving food. The speed at which the food moves depends upon the food itself and the time it takes to freeze.
(counter / parallel)

---

886. inactivate

---

914. heat of fusion

good

---

942. below

---

970. counter

---

887. Therefore, the use of cold temperature is one of the methods of food _____ .
preservation / spoilage

---

915. Another example of a refrigerant is salt. _____ and _____, commonly known as freezing mixture, produces a greater lowering of temperature than ice alone.

---

943. At the temperature of freezing most microorganisms are _____ . Spoilage enzymes are also _____ .
preserved / inhibited
inactivated/ activated

---

971. The _____ by which the food moves into the tunnel depends upon the food itself and the time it needs to freeze, which in turn depends on the temperature of the cold air.

---

887. preservation

---

915. ice salt

---

943. inhibited

inactivated

---

971. speed

---

888. Cold _____ can be either in the form of refrigeration or in the form of freezing.

---

916. This mixture of _____ and _____ may attain a temperature of about -21°C (-6°F). A freezing mixture is a _____ effective refrigerant than ice alone.
more / less

---

944. The most common type of freezing is quick freezing. In _____ _____ the food is frozen in a short time, i.e. in less than five hours.

---

972. The temperature of the cold air, the _____ of food and the _____ the food needs to freeze, all these determine the speed by which the food moves through the freezing tunnel.

---

888. temperature

---

916. ice

salt

more

---

944. quick freezing

---

972. kind

time

---

889. In refrigeration, the _____ temperature is above the freezing point of water or the food, while in freezing the cold temperature is _____ (below / above).

---

917. A third example of a refrigerant that we may use in cooling foods is dry ice. _____ _____ is solid carbon dioxide.

---

945. While in slower types of freezing the freezing process takes much _____ (longer / shorter) time.

---

973. The _____ of the cold air and the kind of food determine both the _____ the food needs to freeze and the _____ by which it should move through the tunnel.

---

889. cold

below

---

917. dry ice

---

945. longer

---

973. temperature

time

speed

---

890. Freezing, then, is a form of _____ temperature than
lower / higher
refrigeration, while refrigeration is a form of a higher temperature than freezing.

---

918. Dry ice or _____ _____ _____ would sublime, i.e. change directly to the gaseous state, producing a very low temperature.

---

946. _____ _____ has a number of advantages over slow freezing: In quick freezing the ice crystals formed are much smaller than those formed in slow freezing.

---

974. Freezing can, then, be effected by _____ the food into a freezing medium, by _____ contact with a freezing medium, and by a _____ of very _____ _____.

---

890. lower

---

918. solid carbon dioxide

---

946. quick freezing

---

974. immersing

indirect

blast

cold

air

---

891. In refrigeration we reduce the activity of microorganisms and enzymes, and by this we _____ spoilage of foods.
reduce / increase

---

919. When dry ice sublimes, it produces a very low _____ of about -80°C (-110°F).

---

947. These _____ crystals of ice formed during quick
smaller / larger
freezing, cause much less damage to the cells of the food than the larger crystals which are formed during slow freezing.

---

975. All these three methods of freezing, namely the _____ _____ method, the _____ _____ method and the _____ _____ method are used in the quick type of freezing of foods.

---

891. reduce

---

919. temperature

---

947. smaller

---

975. direct immersion

indirect contact

air blast

---

892. In freezing, on the other hand, we arrest microorganisms and inactivate spoilage enzymes. Freezing, therefore, is _____ effective in food preservation than refrigeration.
more / less

---

920. Dry ice would produce on sublimation a very _____ temperature equal to about _____ - (110°F).
low / high

---

948. In slow freezing, then, the ice crystals formed are much _____, and will cause rupture of the cells and a _____ damage to the tissues of the food.
larger / smaller
great / little

---

976. Cold _____ or _____; liquid _____ or liquid _____ can be used as cooling media in the _____ _____ method.

---

892. more

---

920. low

$-80^{\circ}C$

---

948. larger

great

---

976. brine

syrup

nitrogen

air

direct immersion

---

893. You have seen also that water constitutes the _____ (largest / smallest) component of most foods. Vegetables and fruits are largely composed of _____.

---

921. Dry ice has other advantages over ordinary ice, or ice and salt; when _____ _____ sublimes, it produces an atmosphere which inhibits respiration of foods and thus helps to _____ (prevent / stimulate) spoilage.

---

949. The shorter is the freezing time the _____ (smaller / larger) will be the ice crystals formed and the longer is the freezing time the _____ (smaller / larger) will be the ice crystals formed.

---

977. Vegetables before they are frozen are first blanched to ensure the _____ (destruction / preservation) of enzymes.

---

893. largest

water

---

921. dry ice

prevent

---

949. smaller

larger

---

977. destruction

---

894. The majority of foods _____ (can / cannot) therefore, be considered a form of water solutions, having cellular structure.

---

922. Carbon dioxide _____ (does / does not) support combustion and respiration. Therefore the carbon dioxide gas produced, when dry ice sublimes, would help to _____ (prevent / allow) spoilage of foods.

---

950. Large ice crystals _____ (will / will not) rupture the cells and damage the _____. Juice will then, drip from the food when it is thawed.

---

978. Vegetables, then, are usually _____ before they are frozen to destroy all _____ that may act during freezing temperatures.

---

894. can

---

922. does not

prevent

---

950. will

tissues

---

978. blanched

enzymes

---

895. The temperature at refrigeration is slightly _____ (higher / lower) than the freezing point of water. Therefore, the water portion of refrigerated food is still in a _____ (liquid / solid) state.

---

923. Still another advantage of dry ice is that when it sublimes it leaves no moisture behind; different from ordinary ice which when it melts it _____ (adds to / reduces) the moisture of the food.

---

951. In slow freezing _____ ice crystals are formed and the tissues are _____ causing the juice of the food _____ (to drip / not to drip) or ooze out on thawing.

---

979. Frozen foods usually retain their flavor and freshness better than canned and dried foods. Therefore, frozen foods are _____ (more / less) acceptable to consumers than other types of preserved foods.

---

895. higher

liquid

---

923. adds to

---

951. larger

damaged

to drip

---

979. more

---

896. At freezing, however, the temperature is _____ the
above / below
freezing point of water. The water content of frozen foods, then, is in the form of _____ .
ice / liquid water

---

924. Dry ice is used sometimes to refrigerate fruits and vegetables during transportation. Fruits and vegetables, refrigerated by dry ice, will keep _____ and protected from spoilage.
dry / wet

---

952. Besides the formation of small _____, in quick freezing the food is quickly cooled below the temperature at which bacteria, yeast and mold may grow.

---

980. Freezing then _____ the flavor and freshness of
preserves / destroys
foods. It may add to the tenderness of meat.

---

896. below

ice

---

924. dry

---

952. crystals

---

980. preserves

---

897. Water is the medium for the activity of both microorganisms and enzymes. In freezing we reduce the water content of the food and we thus _____ (reduce / promote) the action of both microorganisms and _____.

---

925. However, when ice is added to fruits and vegetables it will _____ (increase / decrease) the amount of water and thus _____ (accelerates / slows down) their spoilage.

---

953. In quick freezing, then, there is _____ (more / less) chance of survival of microorganisms than in slow freezing. Quick freezing will thus _____ (arrest / stimulate) the growth of microorganisms in the food. It will almost completely _____ (inactivate / activate) enzymes.

---

981. Frozen meat may be _____ (tenderer / harder) than fresh meat. Frozen meat tastes almost as fresh as fresh meat.

---

897. reduce

enzymes

---

925. increase

accelerates

---

953. less

arrest

inactivate

---

981. tenderer

---

898. Freezing then _____ the water part of the food, as well as lowers its temperature.
separates out / adds to

---

926. Dry ice has then a number of _____ over ordinary ice. It produces a much _____ temperature than ordinary ice, and an atmosphere of a gas which is _____.
advantages / disadvantages
lower / higher
inert / active

---

954. The most critical zone in freezing is between $0^{\circ}C$ and $-4^{\circ}C$ (32° and $25^{\circ}F$). This _____ is known as the zone of maximum crystal formation.

---

982. Refrigeration and freezing are two types of preservation of food by the use of _____ temperatures.
cold / hot

---

898. separates out

---

926. advantages

lower

inert

~~bad~~

---

954. zone

---

982. cold

---

899. Freezing, then, combines the two principles of food preservation; control of _____, and _____ of water content.
reduction / increase

---

927. When dry ice evaporates it keeps the food dry and helps to _____ its spoilage.
delay / accelerate

---

955. In quick freezing this zone of _____ crystal formation must be passed in 30 minutes or less.
maximum / minimum

---

983. Both methods tend to _____ the shelf-life of foods by either destroying spoilage agents, arresting them or inhibiting their action.
lengthen / shorten

---

899. temperature

reduction

---

927. delay

---

955. maximum

---

983. lengthen

---

900. In refrigeration, however, we make use of one principle / two principles of food preservation, namely, the control of _____.

---

928. Ice, ice and salt and dry ice are three examples of common refrigerants used in natural refrigeration. _____ means refrigeration without the use of machines.

---

956. If this zone of _____ _____ _____ is passed in a longer period, the ice crystals will be larger.

---

984. The heat is removed from the food by the use of a refrigerant. A _____ is a substance that absorbs _____ from an environment and produces _____.

---

900. one principle

temperature

---

928. natural refrigeration

---

956. maximum crystal formation

---

984. refrigerant

heat

cooling

---

901. Both refrigeration and freezing, tend to _____ (lengthen / shorten) the shelf-life of foods by either arresting the activity of spoilage agents or destroying them.

---

929. Different from natural refrigeration, artificial or mechanical refrigeration is the process whereby cooling is produced _____ (by / without) the use of machines.

---

957. The longer the time it takes to pass this zone of maximum crystal formation, the _____ (larger / smaller) will be the ice crystals formed and the _____ (more / less) damage to the tissues of the food.

---

985. Ice is a common example of refrigerants. So is dry _____, _____ gas and _____.

---

901. lengthen

---

929. by

---

957. larger

more

---

985. ice

ammonia

freon

---

902. By lengthening the _____ _ _____ of food through refrigeration and freezing, we make possible the safe transport and storage of perishable foods.

---

930. In artificial or _____ _____, whether household or commercial, cooling is produced by the rapid evaporation of a very volatile liquid or a liquified gas.

---

958. Freezing, then, is a _____ effective method of food preservation than refrigeration. It is achieved by a number of methods.
more / less

---

986. Refrigeration can be natural or mechanical. In _____ _____, cooling is produced by a machine when a volatile refrigerant is compressed, then allowed to expand and evaporate and thus _____ the temperature of the environment.
reduce / increase

---

902. shelf-life

---

930. mechanical refrigeration

---

958. more

---

986. mechanical refrigeration

reduce

---

903. Fruits and vegetables which are highly _____ (perishable / nonperishable), can now, under refrigeration, be _____ (safely / unsafely) transported and stored.

---

931. These _____ liquids or _____ gases, on evaporation, absorb heat from the environment and produce _____ (cooling / heating) effect.

---

959. One _____ of freezing is by direct immersion of the food in the cold refrigerant such as cold brine or syrup, liquid nitrogen or liquid air.

---

987. In large cold storages, cooling is either effected by directly circulating the cooling _____ or allowing cooled brine to circulate to the different parts of the system.

---

903. perishable

safely

---

931. volatile

liquefied

cooling

---

959. method

---

987. refrigerant or agent

---

904. Meats also, a _____ food, in now easily
(very perishable / non-perishable)
and _____ transported and stored in frozen form.
(safely / unsafely)

---

932. When the refrigerant evaporates, it _____ heat
(absorbs / gives out)
and produces a _____ of the temperature of the
(lowering / raising)
environment.

---

960. Freezing can then be achieved by the direct _____ of
the food in the cooling medium, such as cold _____ or
syrup, liquid _____ or liquid _____.

---

988. Quick freezing is prefered to slow freezing. In quick freezing
_____ ice crystals are formed and less _____
(larger / smaller)
is done to the tissues of the food.

---

904. very perishable

safely

---

932. absorbs

lowering

---

960. immersion

brine

nitrogen

air

---

988. smaller

damage

---

905. Any substance which removes heat from an environment and thus lowers its temperature is called a refrigerant. A _____ then is that substance which absorbs heat from an environment and produces cooling.

---

933. Among the common refrigerants used in mechanical refrigeration are ammonia gas and freon. Both _____ and _____ are gases that are easily liquified.

---

961. Cold _____ or _____, liquid _____ or _____ _____ are among the _____ media
(freezing / heating)
used in the direct immersion method.

---

989. In quick freezing the food is better protected and the spoilage microorganisms are _____ controlled than in slow freezing.
(more / less)

---

905. refrigerant

---

933. ammonia

freon

---

961. brine

syrup

nitrogen

liquid air

freezing

---

989. more

---

906. A refrigerant _____ the temperature of an environment
(lowers / raises)
by absorbing heat from that particular environment.

---

934. Both of these two gases _____ and _____, are
easily _____ by compression and cooling.

---

962. In the _____ _____ method, the food is dipped into a
freezing refrigerant such as _____ _____ or
_____, liquid _____ or liquid _____.

---

990. Quick freezing tends to _____ the flavor and
(preserve / destroy)
texture of food. Frozen foods are thus more _____ than
other kinds of preserved foods.

---

906. lowers

---

934. ammonia

freon

liquefied

---

962. direct immersion

cold brine

syrup

nitrogen

liquid air

---

990. preserve

acceptable

---

907. Ice is the oldest and most common refrigerant known. When _____ melts, it absorbs heat from the environment and thus _____ the temperature of that particular _____.
lowers / raises

---

935. The boiling point of ammonia is about -33°C (-28°F) and that of freon is -30°C (-22°F). Both gases can be easily liquified by _____ and _____.

---

963. Another method of freezing is by the indirect contact of food with a refrigerant. In this _____ freezing method
indirect / direct
the food is brought in contact with a metal surface which is cooled by refrigeration.

---

907. ice

lower

environment

---

935. cooling

compression

---

963. indirect

---

908. Melting ice _____ heat from the _____ and thus acts as a refrigerant.

---

936. In a closed system of mechanical _____, the refrigerant passes through a cycle of evaporation followed by condensation, then re-evaporation and so on.

---

964. In this indirect method, the food _____ come in direct contact with the refrigerant.
(does not / does)

---

908. absorbs

environment

---

936. refrigeration

---

964. does not

---

909. The amount of heat, i.e. the number of calories _____ by every gram of ice when it melts is called the latent heat of fusion of ice.

---

937. Thus the refrigerant passes from the gaseous phase to the liquid phase, then back to the _____ phase and so on.

---

965. The refrigerant cools a _____ _____ and this in turn _____ the food to freezing temperature.
cools / heats

---

909. absorbed

---

937. gaseous

---

965. metal surface

cools

CHAPTER V

DEHYDRATION

991. You have already learnt that other than control of temperature, the reduction of the water content of food is another important principle in food _____.

1014. Sun drying is one of the oldest natural methods of food _____. Many fruits and vegetables are sun dried. So are cereal g_____ and n_____.

1037. This degree of saturation of air with water vapor is known as the relative humidity. _____ humidity is the degree of _____ of air with water vapor at a particular temperature.

1060. The drying capacity of the hot air _____, then, determined
is / is not
by its wet bulb _____ (W.B.D.).

---

991. preservation

1014. preservation

grains nuts

1037. relative

saturation

1060. is

depression

---

992. The _____ of the water content of foods is an important basis in food preservation.

1015. The other method of drying is machine drying. _____ _____ is usually known as dehydration.

1038. The relative _____ of air is, then, equal to the degree of _____ of the air with water vapor and is given in percentage.

1061. The _____ _____ _____ (W.B.D.) give the maximum drying capacity of the hot air.

---

992. reduction

1015. machine drying

1038. humidity

saturation

1061. wet bulb depression

---

993. Reduction of the water content of food tends to _____ (reduce / augment) the activity of microorganisms and enzymes and thus _____ (inhibit / stimulate) spoilage of food.

1016. Machine drying or _____ is mostly done by passing hot air over the wet food.

1039. When the relative humidity is equal to 100, then the air is _____ (completely / incompletely) saturated. The higher the relative humidity, the _____ (smaller / greater) will be the degree of saturation.

1062. The rate of evaporation or _____ of the food inside a dehydrater, whether a cabinet or a _____ dryer, starts high and then falls as the water content of the food drops.

---

993. reduce

inhibit

1016. dehydration

1039. completely

greater

1062. drying or dehydrating

tunnel

---

994. This principle of food preservation is the basis of drying. _____ is another method of food preservation.

1017. Hot _____ is generally used as the _____ medium, because it is effective and convenient.

1040. As the dehydration process inside a tunnel proceeds, the relative humidity of the air _____ (rises / falls) and its temperature falls.

1063. Next to temperature and _____ humidity of the air, the volume of the air flowing is another important factor in mechanical drying or _____.

---

994. drying

1017. air

drying

1040. rises

1063. relative

dehydration

---

995. In drying we try to remove the greater part of the water content of food and thus reduce the activities of _____ and _____.

1018. Because of its abundance and _____, hot air is considered the _____ medium for dehydration. Through its use, over heating of the food can also be controlled.
best / worst

1041. Dehydration proceeds until the relative _____ of the air reaches 100 percent. At this point the air is _____ saturated.
completely / partially

1064. The volume of _____ flowing per minute is another _____ factor in dehydration.
important / unimportant

---

995. microorganisms

enzymes

1018. convenience

best

1041. humidity

completely

1064. air

important

---

996. In drying, therefore, we tend to _____ the
increase / decrease
amount of the water content of food and thus insure its
_____.
preservation / spoilage

1019. All these three advantages, _____, _____
and the ability to _____ _____ _____ of the
food, make hot air the best medium of dehydration.

1042. When the relative humidity of the drying air reaches 100%,
the process of dehydration will _____.
continue / cease

1065. Beside these three factors or properties of the air, namely,
its temperature, its relative _____ and its
_____ of _____, the nature of the food itself
also determines the rate of dehydration.

---

996. decrease

preservation

1019. abundance convenience

control over heating

1042. cease

1065. humidity

volume

flow

---

997. Drying has a number of advantages over the other methods of food _____.

1020. The hot air is passed over the food to be dried, causing the water in the food to _____ (evaporate / condense). It serves also as a carrier of the water vapor liberated.

1043. At 100 percent relative humidity, air attains its _____ (maximum / minimum) holding capacity of water vapor at that particular temperature.

1066. The properties of the air and the _____ of the food itself, are important factors in _____.

---

997. preservation

1020. evaporate

1043. maximum

1066. nature

dehydration

---

998. Dried foods have a great advantage over others with regard to weight and bulk. Dried food need much _____ space than other forms of foods.
smaller / bigger

1021. The hot air, then, besides supplying the food with the heat of _____, it acts, at the same time, as a vehicle to _____ the water vapor liberated.
evaporation / condensation
carry away / bring in

1044. When the hot air attains _____ percent _____ humidity, the process of dehydration will _____.

1067. The _____ of the _____, then, does also determine the rate of dehydration. Not all foods dry at the same rate. Some foods give up their water slower than others.

---

998. smaller

1021. evaporation

carry away

1044. 100

relative

cease

1067. nature

food

---

999. Dried foods, then, occupy _____ volume and have _____ weight. This means a great economy in storage and shipment of foods.
less / more

1022. Dehydration or _____ _____ is usually carried out in a tunnel or a cabinet, where hot air is forced to pass over the wet food, causing the water in it to _____.

1045. At this stage the saturated drying air is either ejected from the tunnel or dehydrator, or partly mixed with fresh air which has a lower relative _____ and recirculated.

1068. Another method of dehydration, commonly used, is spray drying. _____ _____ is mainly used for liquid foods.

---

999. smaller

less

1022. mechanical drying

evaporate

1045. humidity

1068. spray drying

1000. Because of the smaller weight and volume, dried foods have a great _____ over other forms of food in both storage and shipment.
advantage / disadvantage

1023. Dehydration is either conducted in a _____ or a _____, where hot air is brought in contact with the food to be dried.

1046. When the dehydrating air becomes saturated with water vapor and the relative humidity reaches _____%, part of the saturated air is ejected and the remaining part is mixed with fresh air and recirculated.

1069. The liquid _____ is atomized, i.e., sprayed in a hot gaseous medium, usually air, causing the water to evaporate, and leaving behind the solids as powder.

1000. advantage

1023. cabinet

tunnel

1046. 100%

1069. food

1001. However, dried foods suffer from a number of disadvantages. _____ _____ may lose some of their flavor, color and texture.

1024. Whether in a cabinet or a _____ dryer the hot _____ is kept circulating bringing always fresh supply of hot air in contact with the food.

1047. The partly mixed air is recirculated over the food, until it attains _____ again and the process is repeated.
saturation / unsaturation

1070. Spray drying is, then, used mainly to dry _____ foods. Milk and similar products are usually dried by _____ drying.
liquid / solid

1001. dried foods

1024. tunnel

air

1047. saturation

1070. liquid

spray

1002. The flavor, color and texture of most dried foods are _____ to that of other foods.
different / same

1025. In a cabinet dryer the food would be stationary, while the air is _____, while in a tunnel dryer both the air and the food would be moving.
moving / stationary

1048. This process of _____ part of the saturated air and mixing the remaining part with fresh _____ air is repeated in a cycle.
unsaturated / saturated

1071. Still another method of drying is freeze-drying. In _____ _____ the food is first frozen, then the ice formed evaporates or sublimes under high vacuum.

1002. different

1025. moving

1048. ejecting

unsaturated

1071. freeze-drying

1003. They _____ taste as fresh as other foods and their color
do / do not
is usually darker. Their texture is also _____.
changed / unchanged

1026. In a tunnel dryer both the air and the food keep _____,
while in the cabinet type the air would circulate while the
food remains _____.

1049. By this cycle of _____ and recirculation, maximum
capacity of dehydration would be attained from the air.

1072. Freeze-drying is, then, composed of two steps, _____
followed by evaporation or _____; that is, the ice
passes directly from the solid state to the gaseous state.

1003. do not

changed

1026. moving

stationary

1049. mixing

1072. freezing

sublimation

1004. Besides these changes in _____, _____ and _____, they also lose some of their nutritive value.

1027. In tunnel dryer the food is pushed through the _____ on trucks.

1050. By this cycle of _____ and _____, _____ benefit is made of the heat contained in the drying air.
maximum / minimum

1073. Spray _____ and _____ drying are two other important methods of dehydration which find great use nowadays.

1004. taste color texture

1027. tunnel

1050. mixing recirculation

maximum

1073. drying

freeze

1005. The loss in nutritive _____ may include loss in some sugars, salts and water soluble vitamins.

1028. These _____ loaded with the _____ enter the tunnel at one end and leave it at the opposite end.

1051. The temperature at which the water vapor in the drying air attains saturation and a relative humidity of _____%, that temperature is referred to as the wet bulb temperature (W.B.T.).

1074. Foods, before being dried or _____, pass through a number of preparatory operations. These _____ operations differ with different foods.

1005. value

1028. truck

food

1051. 100 %

1074. dehydrated

preparatory

1006. Some dried foods lose some of their sugar, salts and water _____ vitamins.
soluble / insoluble

1029. The air movement in the _____ may be in the same direction as that of the trucks, parallel flow, or opposite to the travel of the trucks, or _____ flow.
counter / parallel

1052. This _____ _____ temperature (W.B.T.) is the _____ at which relative humidity attains 100, and the air reaches _____. It is also called the due point.
saturation / unsaturation

1075. Different foods pass usually through _____ preparatory operations before they are dried or dehydrated.
different / similar
Vegetables and fruits are usually sulfured or blanched before they are _____ or dried.

1006. soluble

1029. tunnel

counter

1052. wet bulb

temperature

saturation

1075. different

dehydrated

1007. Dried foods may suffer, then, a loss in their nutrients such as _____, _____ and water soluble _____.

1030. In the parallel flow the movement of the air inside the tunnel is in the _____ direction as the movement of the trucks. While in the counter flow, the movement of the air is _____ to the direction of the movement of the trucks.

1053. On the other hand, the temperature of the hot dry air is called the dry bulb temperature (D.B.T.). The _____ _____ _____ (D.B.T.) is then the temperature of the air before it is passed over the food.

1076. Fruits are usually _____ before they are dehydrated or _____.

1007. sugars salts

vitamins

1030. same

opposite

1053. dry bulb temperature

1076. sulfured

dried

1008. Dried foods may also suffer in their flavor, _____ and texture.

1031. The hot air circulating inside a _____ or a tunnel dryer has the capacity of holding more moisture, if it is _____ with water vapor.
saturated / unsaturated

1054. The dry bulb _____(D.B.T.) is the temperature of the air _____ it is passed over the food, while the
before / after
wet bulb _____ (W.B.T.) is the temperature of the air after it is passed over the food and is fully saturated.

1077. Dehydration is then based on the principle of _____
augmentation /
_____ of the water content of food. Natural drying makes
reduction
use of the heat of the sun, hence the name _____ _____.

1008. color

1031. cabinet

unsaturated

1054. temperature

before

temperature

1077. reduction

sun drying

1009. The oldest method of drying is sun-drying. _____ is one of man's _____ methods in food preservation.

1032. This _____ of holding more moisture will decrease as the amount of water vapor in the air _____ (increases / decreases).

1055. The wet bulb temperature (W.B.T.) is the temperature at which the hot _____ attains _____, and the dry bulb temperature (D.B.T.) is the temperature of the _____ air _____ it is passed over the food.

1078. In machine drying or _____, we make use, usually, of heated air. _____ air is used in tunnel, _____ or spray drying.

1009. sun drying

oldest

1032. capacity

increases

1055. air

saturation

hot

before

1078. dehydration

heated

cabinet

1010. All cereal grains are preserved by _____ _____. So are legumes, nuts and certain fruits.

1033. When the air becomes saturated with water vapor, evaporation of the water from the food will _____ to take place.
cease / continue

1056. As the hot dry air is passed over the food, it imparts its heat to the food and itself cools down. The temperature of the hot air then _____ as its humidity rises.
falls / rises

1079. In freeze-drying we make use, however, of the principle of freezing and sublimation, i.e. the ice is _____
directly / indirectly
changed to vapor without passing through liquid phase.

1010. sun drying

1033. cease

1056. falls

1079. directly

1011. Grains, legumes, nuts and certain fruits mature on the plant and dry in the warm wind. This is a natural process of _____.

1034. When the hot air becomes _____ with water vapor, it would then cease to serve as drying or _____ medium.
unsaturated / saturated

1057. The difference between these two temperatures, the D.B.T. and the _____ is known as the wet bulb depression (W.B.D.).

1080. Drying or dehydration has both its advantages and disadvantages. Its _____ are mainly in the savings in transport and shipment. While its _____ lie usually in loss of some nutrients, loss of flavor and change of color and texture.
disadvantages / advantages
advantages / disadvantages

1011. drying

1034. saturated

dehydrating

1057. W.B.T.

1080. advantages

disadvantages

1012. Many vegetables are also _____ dried. Sun drying remains the _____ food preservation process.
smallest / greatest

1035. The rate of dehydration or _____ depends upon the temperature of the hot air and its moisture content.

1058. The wet _____ _____ (W.B.D.) is, then, the difference between the temperature of the dry hot air and the temperature of the air when it is _____.
saturated / unsaturated

1012. sun

greatest

1035. drying

1058. bulb depression

saturated

1013. Figs, apricots and raisins are among the many fruits that are dried naturally by the _____ in many countries.

1036. The rate of dehydration of the food is mainly determined by the _____ of the air and its _____ content, i.e. its degree of saturation with water vapor.

1059. This drop in the temperature of the hot dry air between when it was hot and when it became saturated with moisture is equal to the _____ _____ _____ (W.B.D.). This difference determines the drying capacity of the hot air.

1013. sun

1036. temperature

moisture

1059. wet bulb depression

FABRICATION OF THE SANITARY CAN

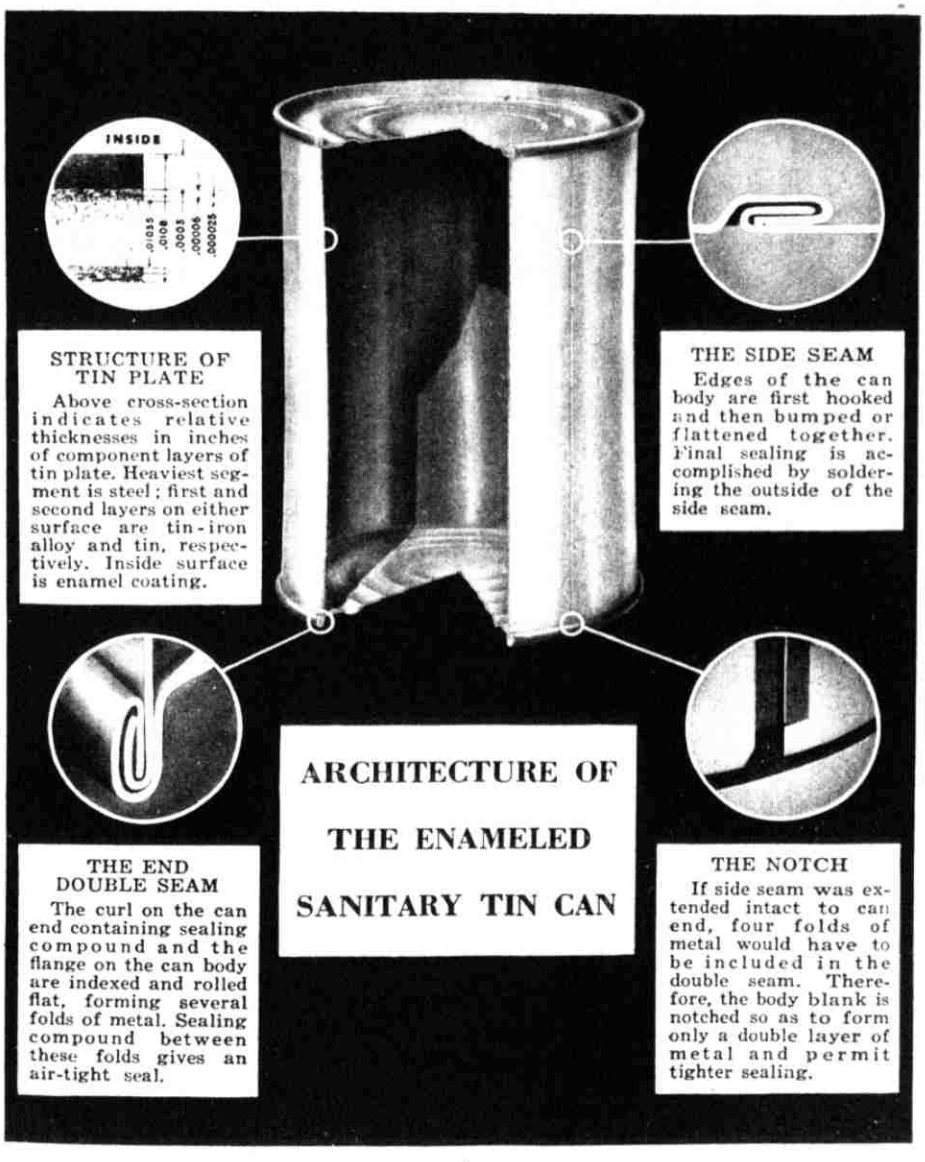

Illustration 1. Fabrication of the sanitary can. (After R.W. Pilcher, ed.; The Canned Food Reference Manual, American Can Company, New York, 1943).

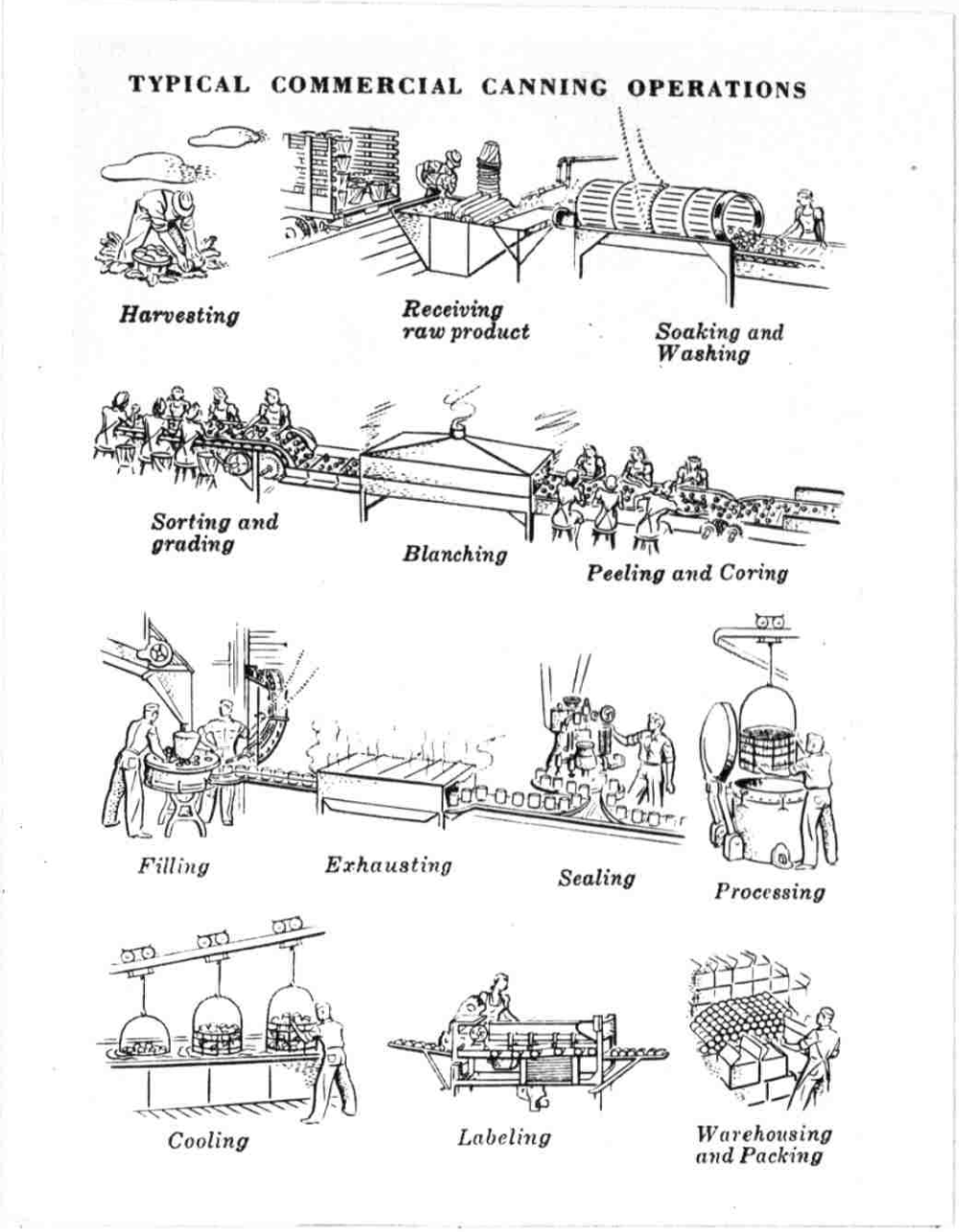

Illustration 2. Typical commercial canning operations. (After R.W. Pilcher, ed.; The Canned Food Reference Manual, American Can Company, New York, 1943).

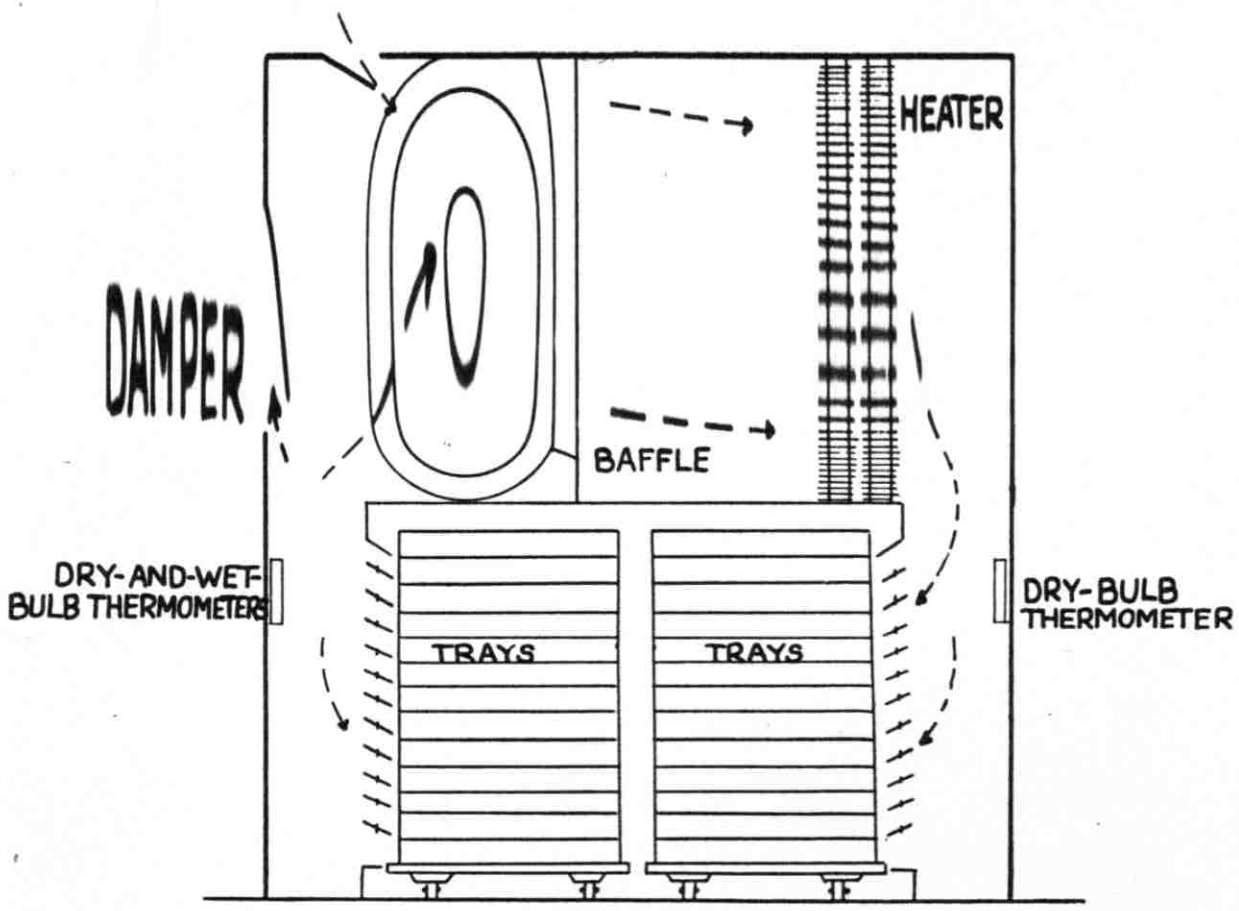

Illustration 3. Schematic diagram of a cabinet dryer. (After U.S.D.A. Miscel. Publ. 540).

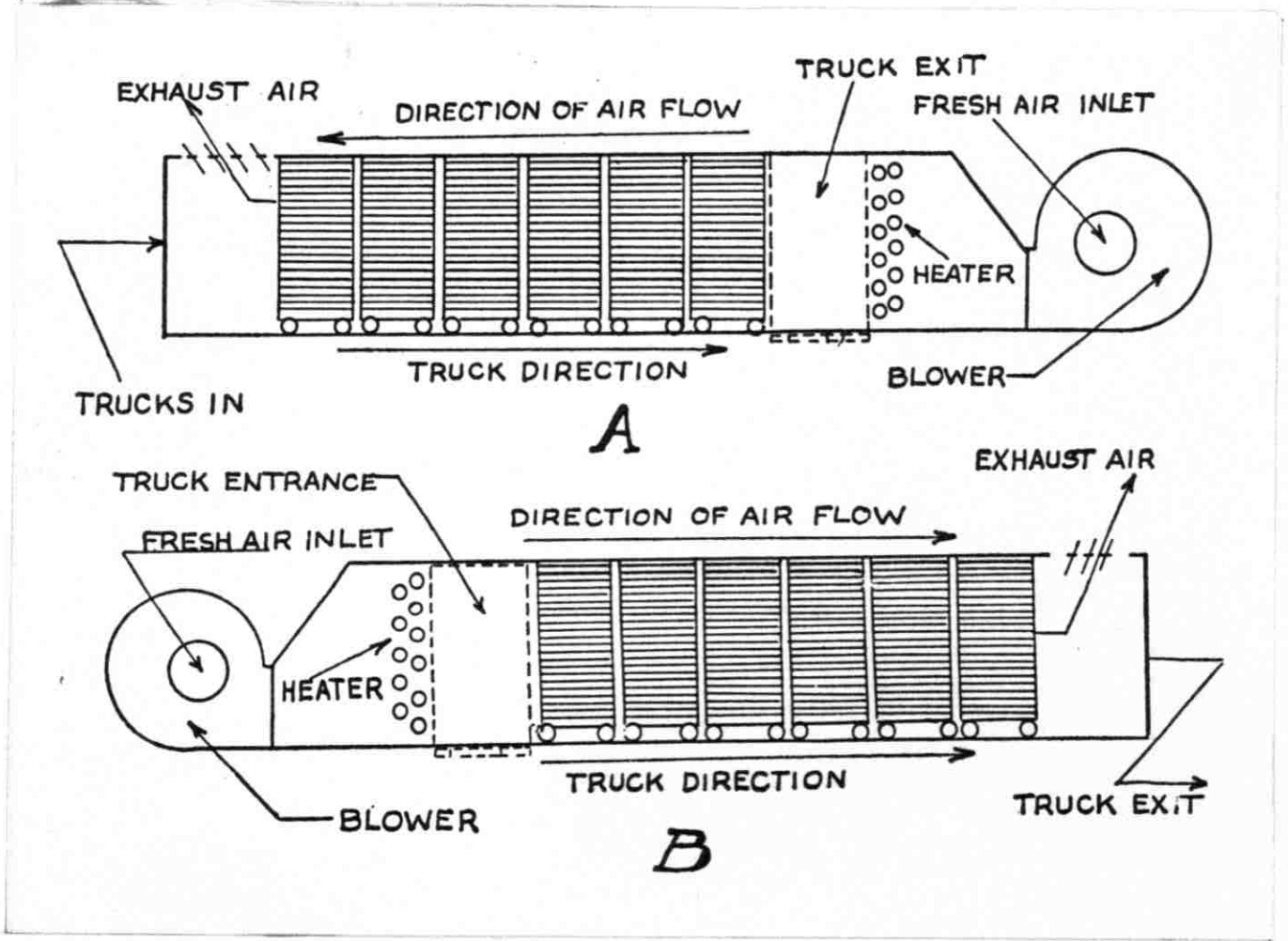

Illustration 4. Schematic diagram of a tunnel dryer. A, simple tunnel; B, simple parallel flow tunnel. (After Von Loesecke, Drying and Dehydration, 1955).

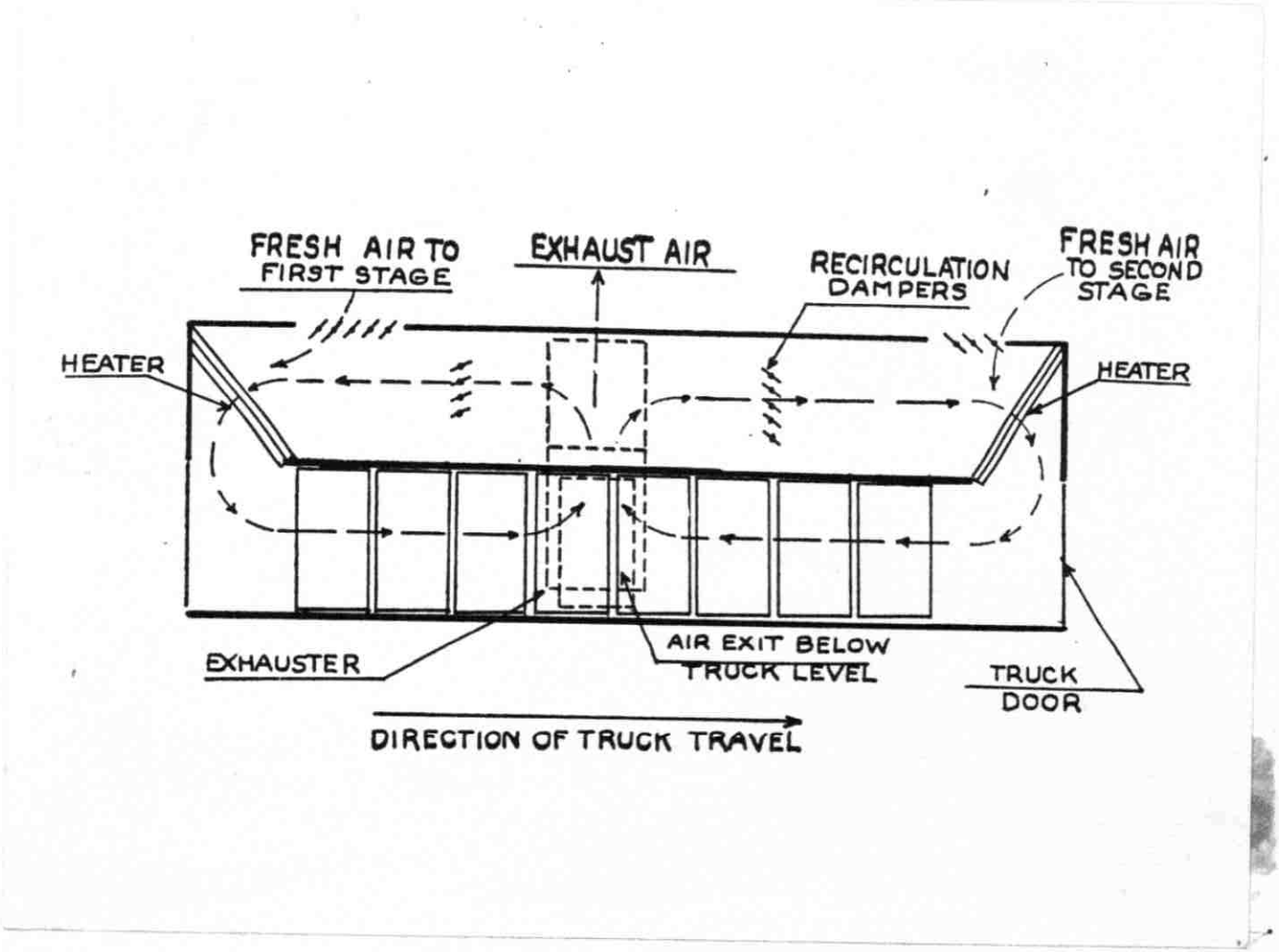

Illustration 5. Schematic diagram of a center exhaust tunnel. (After Van Arsdel, Bur. Agr. Ind. Chem., AIC - 308, 1951).

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