AP PGECET Food Technology 2025 Question Paper With Solution

Time Allowed :2 Hours	**Maximum Marks :**120	**Total questions :**120

General Instructions

Read the following instructions very carefully and strictly follow them:

1. **Exam level**: State-level exam
2. **Test duration**: 2 hours
3. **Type of questions**: Multiple choices questions
    - Each question will be followed by four responses
    - Out of these four responses, only one will be the correct option
4. **Total questions**: 120 questions
5. **Marking scheme**:
    - +1 mark will be awarded for each correct response
    - There is no negative marking
6. **Total marks**: 120 marks

1. Which of the following is an essential fatty acid that must be obtained from the diet?

(1) Stearic acid

(2) Oleic acid

(3) Linoleic acid

(4) Palmitic acid

Correct Answer: (3) Linoleic acid

Solution:

Essential fatty acids are those that the human body cannot synthesize on its own and must obtain from dietary sources.

Among the options given:

- **Linoleic acid** is a polyunsaturated omega-6 fatty acid. It is classified as essential and plays a vital role in maintaining skin integrity, supporting immune function, and forming signaling molecules.

- **Stearic acid** and **Palmitic acid** are saturated fatty acids and are not considered essential since the body can synthesize them.

- **Oleic acid** is a monounsaturated omega-9 fatty acid, also non-essential because it can be made by the human body.

Therefore, linoleic acid is the correct and only essential fatty acid among the options.

Quick Tip

Remember: The two main essential fatty acids are linoleic acid (omega-6) and alpha-linolenic acid (omega-3). The body cannot produce these, so they must come from food.

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2. Which mineral is essential for hemoglobin formation and the prevention of anemia?

(1) Calcium

(2) Iron

(3) Iodine

(4) Sodium

Correct Answer: (2) Iron

Solution:

Hemoglobin is the iron-containing protein found in red blood cells that is responsible for transporting oxygen from the lungs to the rest of the body.
Iron is a critical component of hemoglobin; without sufficient iron, the body cannot produce enough healthy red blood cells.
A deficiency of iron leads to a condition known as iron-deficiency anemia, which results in fatigue, weakness, and poor oxygen transport.
Let's look at the other options:
- **Calcium** is important for bones and teeth, not for hemoglobin.
- **Iodine** is essential for thyroid function, not blood formation.
- **Sodium** is crucial for nerve function and fluid balance, but not directly involved in hemoglobin production.
Thus, the correct mineral required to prevent anemia and aid hemoglobin synthesis is iron.

Quick Tip

Always associate iron with blood and oxygen transport. Remember: Iron $\rightarrow$ Hemoglobin $\rightarrow$ Oxygen delivery.

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3. Which mineral is required for the synthesis of thyroid hormones and prevents goiter?
(1) Zinc
(2) Iron
(3) Iodine
(4) Selenium
Correct Answer: (3) Iodine
Solution:
The thyroid gland produces hormones like thyroxine (T_4) and triiodothyronine (T_3), which regulate metabolism.
These hormones require iodine for their synthesis.
If the body lacks sufficient iodine, the thyroid enlarges in an effort to capture more iodine from the bloodstream — this enlargement is known as a goiter.
Now let's analyze the other options:

- **Zinc** is important for immune function and enzyme activity, but not directly for thyroid hormones.
- **Iron** is required for hemoglobin production, not thyroid function.
- **Selenium** plays a supportive role in thyroid function, but it is not the primary mineral required for hormone synthesis or goiter prevention.

Hence, iodine is the key mineral that prevents goiter and is essential for thyroid hormone synthesis.

Quick Tip

Link iodine with the thyroid. Deficiency of iodine causes goiter, especially in populations without iodized salt in their diets.

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4. The green color of leafy vegetables is due to the pigment:

(1) Chlorophyll

(2) Carotene

(3) Lycopene

(4) Anthocyanin

Correct Answer: (1) Chlorophyll

Solution:

The green color in leafy vegetables such as spinach, kale, and lettuce is due to the presence of the pigment **chlorophyll**.

Chlorophyll is a green pigment located in the chloroplasts of plant cells and is crucial for photosynthesis, the process by which plants convert sunlight into energy.

Let's briefly look at the other pigments:

- **Carotene** is an orange-yellow pigment found in carrots and other orange-colored vegetables.
- **Lycopene** is a red pigment, most commonly found in tomatoes.
- **Anthocyanin** gives red, purple, or blue colors to fruits and vegetables like berries and eggplant.

Thus, chlorophyll is responsible for the distinctive green coloration of leafy vegetables.

Quick Tip

Chlorophyll = Green pigment = Photosynthesis. It's the signature pigment in all green plants and leafy vegetables.

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5. Monosodium glutamate (MSG) is used in foods to enhance which taste sensation?

(1) Bitter

(2) Sour

(3) Umami

(4) Astringency

Correct Answer: (3) Umami

Solution:

Monosodium glutamate (MSG) is a flavor enhancer commonly added to foods such as soups, processed meats, and snacks.

MSG is the sodium salt of glutamic acid, a naturally occurring amino acid.

It is well known for intensifying the taste sensation known as **umami**, which is recognized as the fifth basic taste after sweet, sour, salty, and bitter.

Umami is often described as a savory, broth-like, or meaty flavor. It is commonly found in foods rich in amino acids like glutamate, such as cheese, tomatoes, soy sauce, and mushrooms.

The other options represent different taste sensations:

- **Bitter** is sensed due to substances like quinine or caffeine.

- **Sour** arises from acids like citric acid or acetic acid.

- **Astringency** is not a primary taste but more of a mouthfeel caused by tannins, commonly found in unripe fruits or tea.

Therefore, MSG specifically enhances the umami taste.

Quick Tip

Think MSG $\rightarrow$ Umami $\rightarrow$ Savory flavor. Umami is the fifth basic taste and is often associated with protein-rich foods.

6. Enzymatic browning in cut apples is primarily caused by which enzyme?

(1) Amylase

(2) Polyphenol oxidase

(3) Protease

(4) Lipase

Correct Answer: (2) Polyphenol oxidase

Solution:

When apples are cut or bruised, they often turn brown due to a chemical reaction known as **enzymatic browning**.

This process is catalyzed by the enzyme **polyphenol oxidase (PPO)**, also known as tyrosinase.

PPO reacts with oxygen and phenolic compounds naturally present in plant tissues, leading to the formation of brown-colored melanins.

This reaction serves as a defense mechanism in plants but is undesirable in fruits like apples for aesthetic and quality reasons.

Let's consider why the other enzymes are incorrect:

- **Amylase** breaks down starch into sugars and is not involved in browning.

- **Protease** digests proteins and has no role in this context.

- **Lipase** breaks down fats into fatty acids and glycerol. Again, not involved in browning.

Thus, the correct enzyme causing browning in apples is polyphenol oxidase.

Quick Tip

To reduce browning in apples, you can reduce oxygen exposure (e.g., by soaking in lemon juice) to slow the activity of polyphenol oxidase.

7. Which of the following nutrients should contribute the most calories in a balanced diet?

(1) Proteins

(2) Fats

(3) Carbohydrates

(4) Vitamins

Correct Answer: (3) Carbohydrates

Solution:

A balanced diet includes all essential nutrients in appropriate proportions to meet the body's energy and nutritional needs.

Among the major nutrients, carbohydrates are the primary source of energy.

They are broken down into glucose, which the body uses for immediate energy or stores as glycogen.

Carbohydrates provide **4 kilocalories per gram**, and in a typical balanced diet, they should contribute about **50–60%** of the total calorie intake.

Now let's look at the other options:

- **Proteins** provide 4 kcal/g, but their main function is growth and repair, not as the primary energy source.

- **Fats** provide 9 kcal/g, which is more energy-dense, but they should be consumed in moderation (about 20–30% of daily calories).

- **Vitamins** do not provide calories but are crucial for metabolic processes.

Hence, carbohydrates should provide the majority of calories in a balanced diet.

Quick Tip

Carbohydrates are the body's main fuel source. For energy needs, think "Carbs First" — ideally whole grains, fruits, and vegetables.

8. During the bacterial growth curve, the phase in which bacteria multiply at the fastest rate is the:

(1) Lag phase

(2) Exponential (log) phase

(3) Stationary phase

(4) Death phase

Correct Answer: (2) Exponential (log) phase

Solution:

The bacterial growth curve includes four main phases: Lag phase, Exponential (log) phase, Stationary phase, and Death phase.

- In the **lag phase**, bacteria adjust to their new environment, synthesizing necessary enzymes, but not dividing rapidly yet.
- The **exponential (log) phase** is when bacteria multiply at a constant and maximum rate, with the population doubling at regular intervals. This is the fastest growth period under optimal conditions.
- In the **stationary phase**, the rate of bacterial growth slows due to nutrient depletion and accumulation of waste products. Birth and death rates balance out.
- Finally, in the **death phase**, bacteria die at a faster rate than they reproduce, leading to a decline in population.

Therefore, the exponential (log) phase is the correct answer as it represents the phase of maximum bacterial multiplication.

Quick Tip

Log phase = Fastest growth. It's exponential because the population doubles rapidly — ideal conditions, unlimited nutrients.

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9. Botulism, a severe form of food poisoning, is caused by a toxin produced by:

(1) Staphylococcus aureus

(2) Clostridium botulinum

(3) Salmonella botulinum

(4) Escherichia coli

Correct Answer: (2) Clostridium botulinum

Solution:

Botulism is a rare but extremely serious illness caused by a neurotoxin produced by the bacterium **Clostridium botulinum**.

This bacterium is anaerobic, spore-forming, and can survive in improperly canned or preserved foods where oxygen is absent.

The botulinum toxin blocks nerve function and can cause paralysis, respiratory failure, and even death if not treated quickly.

Let's review the other options:

- **Staphylococcus aureus** causes food poisoning too, but not botulism. It produces enterotoxins that lead to vomiting and diarrhea.

- **Salmonella botulinum** is not a recognized bacterium — it's an incorrect and fictional name.

- **Escherichia coli** (E. coli) can cause foodborne illnesses, especially enterohemorrhagic strains like E. coli O157:H7, but not botulism.

Therefore, **Clostridium botulinum** is the correct answer.

Quick Tip

Botulism = Botulinum toxin = Clostridium botulinum. Always associate the most potent foodborne neurotoxin with this specific bacterium.

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10. Yogurt is produced by the fermentation of milk using:

(1) Saccharomyces cerevisiae

(2) Acetobacter aceti

(3) Lactobacillus bulgaricus (with Streptococcus thermophilus)

(4) Penicillium roqueforti

Correct Answer: (3) Lactobacillus bulgaricus (with Streptococcus thermophilus)

Solution:

Yogurt is made through the bacterial fermentation of milk, a process that converts lactose (milk sugar) into lactic acid.

This process is carried out by a specific combination of bacteria, primarily **Lactobacillus bulgaricus** and **Streptococcus thermophilus**.

These bacteria work symbiotically:

- **Lactobacillus bulgaricus** produces acids and peptides that stimulate Streptococcus thermophilus.

- **Streptococcus thermophilus** rapidly lowers the pH, creating a suitable environment for Lactobacillus bulgaricus to thrive.

Let's evaluate the incorrect options:

- **Saccharomyces cerevisiae** is a yeast used in baking and alcohol production.

- **Acetobacter aceti** is used in vinegar production by converting ethanol to acetic acid.

- **Penicillium roqueforti** is used in cheese ripening, especially blue cheese, not in yogurt.

Thus, the correct microbial culture for yogurt production is the combination of Lactobacillus bulgaricus and Streptococcus thermophilus.

Quick Tip

Remember: Yogurt = Milk + Friendly bacteria (L. bulgaricus + S. thermophilus). It's a classic fermentation duo in dairy products.

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11. Aflatoxin, a dangerous natural toxin found in moldy peanuts, is produced by:

(1) Aspergillus flavus

(2) Clostridium perfringens

(3) Lactococcus lactis

(4) Rhizopus stolonifer

Correct Answer: (1) Aspergillus flavus

Solution:

Aflatoxins are highly toxic and carcinogenic compounds produced by certain molds, especially **Aspergillus flavus** and **Aspergillus parasiticus**.

These molds commonly grow on improperly stored grains and legumes, such as peanuts, maize, and tree nuts in warm and humid environments.

Among them, **Aspergillus flavus** is notorious for contaminating food supplies with aflatoxins — particularly aflatoxin B_1, which is one of the most potent naturally occurring carcinogens.

Review of incorrect options:

- **Clostridium perfringens** causes gas gangrene and food poisoning but does not produce aflatoxins.

- **Lactococcus lactis** is a beneficial bacterium used in dairy fermentation (cheese, buttermilk).

- **Rhizopus stolonifer** is a bread mold, not associated with aflatoxin production.

Thus, aflatoxin contamination is primarily linked to Aspergillus flavus.

Quick Tip

Remember: Aflatoxin = Aspergillus flavus. It's a toxic mold mostly found in stored peanuts, grains, and nuts under warm, humid conditions.

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12. Soy sauce is traditionally produced using a fermentation starter culture of:

(1) Aspergillus oryzae

(2) Lactobacillus acidophilus

(3) Saccharomyces cerevisiae

(4) Propionibacterium shermanii

Correct Answer: (1) Aspergillus oryzae

Solution:

Soy sauce is a traditional fermented condiment made from soybeans, wheat, salt, and water. The fermentation process relies heavily on the action of a specific mold, **Aspergillus oryzae**, also known as ”koji mold.”

Aspergillus oryzae is responsible for producing enzymes like proteases and amylases, which break down the proteins and carbohydrates in soy and wheat into amino acids and simple sugars.

This enzymatic activity initiates the flavor and aroma development crucial to soy sauce production.

Now let’s look at the other options:

- **Lactobacillus acidophilus** is used in dairy fermentation (e.g., yogurt), not soy sauce.
- **Saccharomyces cerevisiae** is a yeast used in bread and alcohol fermentation.
- **Propionibacterium shermanii** is used in Swiss cheese production, not in soy-based products.

Thus, the correct and traditional fermentation starter for soy sauce is Aspergillus oryzae.

Quick Tip

Aspergillus oryzae = Koji mold = Soy sauce fermentation. It starts the process by breaking down soy and wheat into flavorful components.

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13. Which of the following is used as a starter culture for cheese production (to ferment lactose into lactic acid)?

(1) Lactococcus lactis

(2) Penicillium roqueforti

(3) Acetobacter aceti

(4) Rhizopus oligosporus

Correct Answer: (1) Lactococcus lactis

Solution:

Lactococcus lactis is a lactic acid bacterium widely used as a **starter culture** in the dairy industry, especially in the production of cheese and buttermilk.

It ferments **lactose (milk sugar)** into **lactic acid**, which helps acidify the milk, coagulate proteins, and develop the characteristic texture and flavor of cheese.

Review of the incorrect options:

- **Penicillium roqueforti** is a mold used in ripening blue cheeses, but not for starting fermentation.

- **Acetobacter aceti** is used in vinegar production, where it converts ethanol to acetic acid.

- **Rhizopus oligosporus** is a mold used in fermenting soybeans to make tempeh, not dairy products.

Therefore, the correct starter culture used to ferment lactose into lactic acid for cheese production is **Lactococcus lactis**.

Quick Tip

Cheese fermentation = Lactose $\rightarrow$ Lactic acid $\rightarrow$ by Lactococcus lactis. It sets the foundation for flavor and curdling in dairy products.

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14. Using a high concentration of salt or sugar helps preserve foods mainly by:

(1) Lowering the pH significantly

(2) Adding a sterilizing effect

(3) Reducing the water activity

(4) Providing a surface sanitizer

Correct Answer: (3) Reducing the water activity

Solution:

The preservation of food using high concentrations of salt or sugar is a well-established method, known as osmosis.

By adding salt or sugar, we create an environment with a high solute concentration, which draws water out of microbial cells. This process reduces the amount of free water in the food, which inhibits the growth of spoilage-causing microorganisms.

The key mechanism is **reducing water activity**, which refers to the amount of water available for microbial growth. With less available water, microorganisms cannot thrive, which extends the shelf life of the food.

Let's evaluate the incorrect options:

- **Lowering the pH significantly** is not the primary mechanism. While salt or sugar can lower pH in some cases (e.g., in pickling), it's the water activity reduction that plays the most critical role in preservation.

- **Adding a sterilizing effect** is not accurate. Salt and sugar do not sterilize; they merely inhibit microbial growth.

- **Providing a surface sanitizer** is incorrect. Salt and sugar preserve food through osmotic pressure, not by sanitizing surfaces.

Thus, the correct answer is the reduction of water activity.

Quick Tip

Think: Salt/Sugar = Less water = Less microbial growth. A common method for preserving fruits, meats, and vegetables.

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15. Which of these bacteria forms heat-resistant spores and can survive inadequate cooking, potentially causing food poisoning?

(1) Bacillus cereus

(2) Lactobacillus casei

(3) Staphylococcus aureus

(4) Vibrio cholerae

Correct Answer: (1) Bacillus cereus

Solution:

Bacillus cereus is a spore-forming bacterium that can produce heat-resistant spores. These spores are able to survive the cooking process and can germinate to form vegetative cells, which may lead to food poisoning if the food is not properly stored or reheated.

Bacillus cereus is commonly found in starchy foods such as rice, pasta, and potatoes. If these foods are improperly handled (e.g., left at room temperature for too long), the spores can germinate, and the bacteria can produce toxins that cause gastrointestinal illness.

Let's analyze the incorrect options:

- **Lactobacillus casei** is a beneficial bacterium used in the fermentation of dairy products, not associated with heat-resistant spores.

- **Staphylococcus aureus** can produce toxins that cause food poisoning, but it does not form heat-resistant spores like **Bacillus cereus**.

- **Vibrio cholerae** is responsible for cholera, but it is not a spore-forming bacterium and does not survive cooking in the same way.

Therefore, the correct answer is **Bacillus cereus**, a spore-forming bacterium that survives inadequate cooking.

Quick Tip

Bacillus cereus = Heat-resistant spores = Food poisoning, especially with improperly stored rice, pasta, and potatoes.

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16. "Golden rice," a genetically modified variety of rice, has been engineered to be rich in:

(1) Vitamin A

(2) Vitamin B12

(3) Iron

(4) Protein

Correct Answer: (1) Vitamin A

Solution:

Golden rice is a genetically modified variety of rice designed to combat Vitamin A deficiency, which is a significant health issue in many developing countries, especially where rice is a staple food. The rice has been engineered to produce **beta-carotene**, a precursor to Vitamin A, which gives it its yellow (golden) color.

Vitamin A is essential for maintaining healthy vision, immune function, and skin. People who do not consume enough Vitamin A may suffer from conditions like night blindness and other visual impairments.

Now, let's analyze the other options:

- **Vitamin B12** is not present in Golden rice; it's typically found in animal-based products and is essential for nerve function and red blood cell formation.
- **Iron** is a crucial mineral, but Golden rice is not engineered to be rich in it.
- **Protein** is important for body function, but the primary goal of Golden rice is to provide Vitamin A, not protein.

Thus, the correct answer is **Vitamin A**, which is the main purpose behind the genetic modification of Golden rice.

Quick Tip

Golden rice = Vitamin A = Beta-carotene. It's a biofortified crop aimed at tackling Vitamin A deficiency.

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17. Parboiling is a processing technique commonly associated with which cereal grain?

(1) Wheat

(2) Maize

(3) Rice

(4) Oats

Correct Answer: (3) Rice

Solution:

Parboiling is a unique processing technique primarily used for rice, which involves soaking the rice grains in water, steaming them, and then drying them before milling. This method helps improve the nutritional quality of rice, as it transfers some of the nutrients from the husk into the grain, making it more nutritious. It also makes the rice less sticky during cooking and improves its shelf life.

This technique is most commonly associated with **rice**, particularly in regions where rice is a staple food.

Now, let's look at the other options:

- **Wheat** is generally not parboiled; instead, it is typically milled into flour for various food products.

- **Maize** is also not parboiled in the same way as rice. Maize is often processed into products like cornmeal, tortillas, or popcorn.

- **Oats** are usually steamed or rolled, not parboiled. They are processed differently to create oatmeal or oat-based products.

Thus, **rice** is the cereal grain most commonly associated with the parboiling process.

Quick Tip

Parboiling = Rice = Steaming = Improved nutrition and cooking quality.

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18. High-Temperature-Short-Time (HTST) pasteurization of milk is typically conducted at:

(1) 63°C for 30 minutes

(2) 72°C for 15 seconds

(3) 100°C for 5 minutes

(4) 135°C for 1 second

Correct Answer: (2) 72°C for 15 seconds

Solution:

High-Temperature-Short-Time (HTST) pasteurization is a process used to kill harmful microorganisms in milk and other liquids while maintaining their nutritional quality. The HTST method typically involves heating the liquid to 72°C for 15 seconds. This process helps to achieve pasteurization without excessively heating the liquid, which would degrade the nutrients or affect the flavor.

- Option (1) 63°C for 30 minutes refers to the Low-Temperature-Long-Time (LTLT) pasteurization method, which is not HTST. This method uses a lower temperature and longer time to pasteurize milk.
- Option (3) 100°C for 5 minutes is too high and is typically associated with sterilization, not pasteurization. Sterilization uses higher temperatures to kill microorganisms.
- Option (4) 135°C for 1 second is also incorrect as it pertains to ultra-pasteurization or ultra-high temperature (UHT) processing, which is different from HTST pasteurization. UHT processing uses even higher temperatures for a much shorter duration.

Thus, the correct process for HTST pasteurization is 72°C for 15 seconds.

Quick Tip

HTST = 72°C for 15 seconds = Ideal pasteurization method.

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19. If cereal grains are stored with too high moisture content, which is a likely outcome?

(1) Increased germination during storage

(2) Mold growth and spoilage

(3) Improved shelf-life

(4) Higher protein content

Correct Answer: (2) Mold growth and spoilage

Solution:

When cereal grains are stored with too high moisture content, they become prone to microbial growth, particularly mold. Excess moisture can create an environment conducive to the growth of mold and bacteria, which can spoil the grains.

- Option (1) ”Increased germination during storage” is incorrect. High moisture content can induce early germination, but it does not improve the storage of grains. Germination is not desired during storage.

- Option (3) ”Improved shelf-life” is incorrect. Excess moisture can reduce the shelf-life of cereal grains by promoting mold growth and spoilage.

- Option (4) ”Higher protein content” is incorrect. High moisture does not increase the protein content of cereal grains; it can, in fact, degrade the quality of the stored grain.

Therefore, the correct answer is ”Mold growth and spoilage” (Option 2).

Quick Tip

To prevent spoilage, cereal grains should be stored in a cool, dry environment with controlled humidity levels.

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20. The process of ”malting” barley (for brewing or malted foods) involves:

(1) Sprouting the barley grains to activate enzymes

(2) Roasting the grains at high temperature

(3) Fermenting the grains with yeast

(4) Grinding the grains into flour

Correct Answer: (1) Sprouting the barley grains to activate enzymes

Solution:

The process of malting barley involves soaking the grains in water to encourage sprouting. This activates enzymes that break down the starches in the barley, which are then converted into fermentable sugars. These sugars are essential for the brewing process.

- Option (2) ”Roasting the grains at high temperature” is incorrect. Roasting is typically done later in the process to develop flavor, not during malting.
- Option (3) ”Fermenting the grains with yeast” is incorrect. Fermentation happens after malting, where yeast is used to convert sugars into alcohol.
- Option (4) ”Grinding the grains into flour” is incorrect. Grinding is not part of the malting process and occurs later when the malt is used in brewing or baking.

Therefore, the correct answer is ”Sprouting the barley grains to activate enzymes” (Option 1).

Quick Tip

Malting is essential for brewing beer, as it activates enzymes that convert starches into sugars, which yeast can then ferment to produce alcohol.

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21. Freezing foods very quickly (such as in blast freezers) is beneficial because it:

(1) Freezes only the water, leaving food components unfrozen

(2) Creates smaller ice crystals, preserving texture

(3) Can sterilize the food completely

(4) Adds a protective ice glaze to the food

Correct Answer: (2) Creates smaller ice crystals, preserving texture

Solution:

When food is frozen quickly, as in blast freezing, the water inside the food forms many small ice crystals. These smaller crystals help maintain the food’s structure and texture after thawing, as opposed to larger crystals that can rupture cell walls and degrade the texture.

- Option (1) ”Freezes only the water, leaving food components unfrozen” is incorrect. Freezing also affects the food components, but it primarily freezes the water within the food.
- Option (3) ”Can sterilize the food completely” is incorrect. Freezing does not sterilize food; it only preserves it by slowing microbial growth.
- Option (4) ”Adds a protective ice glaze to the food” is incorrect. While some foods may be

coated for protection, this is not a result of blast freezing itself.

Thus, the correct answer is ”Creates smaller ice crystals, preserving texture” (Option 2).

Quick Tip

Quick freezing helps retain the food’s texture and nutritional value by minimizing the formation of large ice crystals that can damage the food’s structure.

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22. Using a multiple-effect evaporator in food concentrate production is mainly to:

(1) Improve the color of the product

(2) Increase the boiling point in each stage

(3) Save energy by reusing heat in successive stages

(4) Add flavors during evaporation

Correct Answer: (3) Save energy by reusing heat in successive stages

Solution:

Multiple-effect evaporators are designed to improve the energy efficiency of food concentrate production. They achieve this by utilizing the steam produced in one stage to heat the next stage, thereby reducing the amount of energy needed for the evaporation process. This process is called ”reuse of heat.”

- Option (1) ”Improve the color of the product” is incorrect. While evaporation can impact the product’s characteristics, the primary function of multiple-effect evaporators is energy savings, not color improvement.

- Option (2) ”Increase the boiling point in each stage” is incorrect. The boiling point can be influenced by factors such as pressure, but the main goal of a multiple-effect evaporator is energy efficiency, not altering boiling points.

- Option (4) ”Add flavors during evaporation” is incorrect. The evaporator does not add flavors; it concentrates the liquid by removing water.

Thus, the correct answer is ”Save energy by reusing heat in successive stages” (Option 3).

Quick Tip

Multiple-effect evaporators reduce energy consumption by reusing the heat from one evaporation stage to assist the next, making them highly efficient for concentrating food products.

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23. Brix is a measurement of a solution's:

(1) Sugar concentration

(2) Acidity level

(3) Protein content

(4) Salt content

Correct Answer: (1) Sugar concentration

Solution:

Brix is a scale used to measure the sugar concentration in an aqueous solution, typically expressed in degrees. It is commonly used in the food industry, particularly in the measurement of fruit juice, wine, and other liquid food products. A higher Brix value indicates a higher sugar concentration.

- Option (2) "Acidity level" is incorrect. Brix specifically measures sugar content, not acidity.

- Option (3) "Protein content" is incorrect. Brix does not measure protein content in solutions.

- Option (4) "Salt content" is incorrect. While salts can be present in solutions, Brix measures sugar, not salt content.

Thus, the correct answer is "Sugar concentration" (Option 1).

Quick Tip

When measuring the Brix level, you're essentially determining the percentage of sugar in the solution, which helps in gauging the sweetness and quality of liquid foods like juices and syrups.

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24. A common refrigerant used in large-scale food refrigeration systems (such as cold

storage facilities) is:

(1) Chlorine gas

(2) Ammonia (NH_3)

(3) Oxygen

(4) Carbon dioxide snow

Correct Answer: (2) Ammonia (NH_3)

Solution:

Ammonia (NH_3) is a commonly used refrigerant in large-scale refrigeration systems, especially in industrial and cold storage facilities. It is highly efficient, cost-effective, and has a low environmental impact when handled correctly.

- Option (1) ”Chlorine gas” is incorrect. Chlorine gas is toxic and is not used as a refrigerant in such systems due to its hazardous nature.
- Option (3) ”Oxygen” is incorrect. Oxygen is not typically used in refrigeration systems as it does not have the cooling properties required for efficient refrigeration.
- Option (4) ”Carbon dioxide snow” is incorrect. While carbon dioxide is used in some specialized refrigeration methods (like dry ice), it is not the main refrigerant in large-scale cold storage.

Thus, the correct answer is Ammonia (NH_3) (Option 2).

Quick Tip

Ammonia is particularly valued for its high latent heat of vaporization, making it an ideal refrigerant for large-scale refrigeration systems.

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25. Which factor generally increases the efficiency of drying a food product?

(1) Greater surface area exposed to air

(2) Larger piece size of the food

(3) Lower air velocity over the food

(4) Higher humidity in the drying air

Correct Answer: (1) Greater surface area exposed to air

Solution:

The efficiency of drying a food product increases when a larger surface area is exposed to the air. This allows more moisture to be evaporated at a faster rate. A greater surface area accelerates the heat transfer process, making drying more efficient.

- Option (2) ”Larger piece size of the food” is incorrect. Larger pieces have a smaller surface area, which reduces the efficiency of drying because less of the food’s surface is exposed to the drying air.

- Option (3) ”Lower air velocity over the food” is incorrect. Higher air velocity helps to remove the moisture from the food more effectively. Lower air velocity will slow down the drying process.

- Option (4) ”Higher humidity in the drying air” is incorrect. Higher humidity in the air reduces the capacity of the air to absorb moisture from the food, thus slowing down the drying process.

Therefore, the correct answer is ”Greater surface area exposed to air.”

Quick Tip

To speed up the drying process, consider cutting food into smaller pieces to expose more surface area to the drying air.

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26. Adulteration of turmeric with metanil yellow is:

(1) Beneficial for nutrition

(2) Permitted under food law

(3) Illegal and a health hazard

(4) Used to enhance natural flavor

Correct Answer: (3) Illegal and a health hazard

Solution:

The adulteration of turmeric with metanil yellow is illegal and poses a health hazard. Metanil yellow is a non-edible dye and is harmful to health when consumed. This type of adulteration is strictly prohibited under food safety laws.

- Option (1) ”Beneficial for nutrition” is incorrect because metanil yellow is not beneficial for nutrition; it is a harmful substance.

- Option (2) ”Permitted under food law” is incorrect as the use of metanil yellow in food products is illegal and not permitted.
- Option (4) ”Used to enhance natural flavor” is incorrect because metanil yellow is a dye, not a flavor enhancer.
Therefore, the correct answer is ”Illegal and a health hazard.”

Quick Tip

Always ensure the purity of food products, especially spices, to avoid harmful health effects due to adulterants.

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27. FSSAI, the national food authority in India, stands for:

(1) Food Science Society and Institute

(2) Food Safety and Standards Authority of India

(3) Federation of Safe Food Associations, India

(4) Food Sterility and Sanitation Agency of India

Correct Answer: (2) Food Safety and Standards Authority of India

Solution:

FSSAI stands for ”Food Safety and Standards Authority of India.” It is the statutory body under the Ministry of Health and Family Welfare in India that ensures food safety and standards are met for the production, distribution, and consumption of food products.
- Option (1) ”Food Science Society and Institute” is incorrect as it does not reflect the role or the name of the FSSAI.
- Option (3) ”Federation of Safe Food Associations, India” is incorrect and does not represent the FSSAI.
- Option (4) ”Food Sterility and Sanitation Agency of India” is also incorrect.
Therefore, the correct answer is ”Food Safety and Standards Authority of India.”

Quick Tip

The FSSAI plays a crucial role in ensuring the safety and quality of food consumed in India, and it regulates food safety standards under the Food Safety and Standards Act, 2006.

28. FSMS in food industry discussions stands for:

(1) Food Safety Management System

(2) Food Storage Monitoring Schedule

(3) Federal Standard for Microbiological Safety

(4) Food Supply Management Scheme

Correct Answer: (1) Food Safety Management System

Solution:

FSMS stands for ”Food Safety Management System.” It is a structured approach that is implemented to ensure that food products are safe for consumption throughout the food supply chain. FSMS includes hazard analysis, risk assessment, and control measures to maintain food safety standards.

- Option (2) ”Food Storage Monitoring Schedule” is incorrect as it refers to a process for monitoring food storage, not a system for food safety.

- Option (3) ”Federal Standard for Microbiological Safety” does not match the meaning of FSMS. FSMS is not focused on federal standards, but on the safety management of food.

- Option (4) ”Food Supply Management Scheme” is also incorrect, as FSMS is specifically about food safety, not food supply chain management.

Therefore, the correct answer is ”Food Safety Management System.”

Quick Tip

FSMS is essential for compliance with food safety regulations and ensuring the safe handling, preparation, and storage of food at every step of the food chain.

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29. HACCP is a system designed for:

(1) Improving the taste of food products

(2) Analyzing food cost and pricing

(3) Identifying and controlling potential hazards in food production

(4) Managing inventory in food warehouses

Correct Answer: (3) Identifying and controlling potential hazards in food production

Solution:

HACCP (Hazard Analysis Critical Control Point) is a food safety management system designed to identify and control potential hazards that could harm food during its production, handling, and consumption. The system focuses on preventing biological, chemical, and physical hazards to ensure the safety of food products.

- Option (1) ”Improving the taste of food products” is incorrect because HACCP is not designed to improve the taste but to ensure safety through hazard analysis.
- Option (2) ”Analyzing food cost and pricing” is incorrect because HACCP does not address food costs; it is concerned with safety management.
- Option (4) ”Managing inventory in food warehouses” is incorrect because HACCP is not focused on inventory management, but rather on ensuring food safety during production.

Thus, the correct answer is ”Identifying and controlling potential hazards in food production.”

Quick Tip

HACCP is a proactive system that helps food businesses identify, evaluate, and control food safety risks, making it a crucial part of maintaining food safety standards.

---

30. AGMARK is a certification in India that assures the quality of:

(1) Organic milk

(2) Gold jewelry

(3) Medical devices

(4) Agricultural products

Correct Answer: (4) Agricultural products

Solution:

AGMARK (Agricultural Marketing) is a certification system in India that ensures the quality and standard of agricultural products, including crops, fruits, vegetables, seeds, and other related products. The certification assures consumers that the agricultural products meet the quality standards established by the government.

- Option (1) ”Organic milk” is incorrect because AGMARK is related to a broader category

of agricultural products, not just milk.

- Option (2) ”Gold jewelry” is incorrect as AGMARK is not related to the certification of jewelry.

- Option (3) ”Medical devices” is incorrect because AGMARK is not concerned with medical products.

Thus, the correct answer is ”Agricultural products.”

Quick Tip

AGMARK certification helps ensure that consumers receive high-quality agricultural products that meet safety and quality standards, which are vital for food safety and consumer health.

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31. Monosaccharides present in stachyose:

(1) galc-galc-glc-fruc.

(2) glc-fruc-glc-glc.

(3) galc-glc-fruc-glc.

(4) glc-galc-glc-fruc.

Correct Answer: (1) galc-galc-glc-fruc.

Solution:

Stachyose is a tetrasaccharide that consists of two galactose (galc) units, one glucose (glc) unit, and one fructose (fruc) unit. The monosaccharides in stachyose are arranged as galactose-galactose-glucose-fructose. The structure of stachyose is important in both food and biological systems, particularly because of its role in fiber-rich foods.

- Option (1) ”galc-galc-glc-fruc” is correct as it accurately reflects the monosaccharide components of stachyose.

- Option (2) ”glc-fruc-glc-glc” is incorrect as it does not follow the correct sequence of monosaccharides.

- Option (3) ”galc-glc-fruc-glc” is incorrect due to the incorrect positioning of glucose and fructose.

- Option (4) ”glc-galc-glc-fruc” is incorrect because it does not reflect the correct arrangement of monosaccharides.

Thus, the correct answer is ”galc-galc-glc-fruc.”

Quick Tip

Stachyose is often found in beans and other legumes. It’s a type of oligosaccharide that cannot be fully digested by humans, leading to its fermentation in the gut.

---

32. The basic difference between myoglobin and hemoglobin is:

(1) Phytol group

(2) Molecular weight of globin protein

(3) Porphyrin ring

(4) Central iron atom

Correct Answer: (2) Molecular weight of globin protein

Solution:

Myoglobin and hemoglobin are both oxygen-carrying proteins but differ mainly in their structure and function. The basic difference between them is related to the molecular weight of their globin protein.

- Myoglobin has a smaller molecular weight because it consists of a single polypeptide chain, whereas hemoglobin consists of four subunits (globin proteins), making it heavier. This difference in molecular weight contributes to their distinct physiological roles.

- The phytol group, porphyrin ring, and central iron atom are part of the heme group in both proteins, and are not the primary distinguishing features.

Thus, the correct answer is the molecular weight of globin protein.

Quick Tip

Both myoglobin and hemoglobin contain the same heme group, but their structural differences (size and subunits) influence their oxygen-binding affinity and role in the body.

---

33. Examples of pigments benzopyran derivatives:

(1) Chlorophyll and hemes

(2) Carotenoids and anthocyanins

(3) Anthocyanins and flavonoids

(4) Anthocyanins and hemes

Correct Answer: (3) Anthocyanins and flavonoids

Solution:

Benzopyran derivatives are organic compounds that contain a benzene ring fused with a pyran ring. These derivatives are important in the structure of various plant pigments. The correct combination of pigments that are benzopyran derivatives are anthocyanins and flavonoids. These pigments are responsible for a wide range of colors in plants and are considered derivatives of the benzopyran structure.

- **Chlorophyll and hemes:** Chlorophyll is not a benzopyran derivative; it is a porphyrin-based compound.

- **Carotenoids and anthocyanins:** Carotenoids are also not benzopyran derivatives. They are terpene-based pigments.

- **Anthocyanins and flavonoids: Correct!** Both of these pigments are derived from the benzopyran structure.

- **Anthocyanins and hemes:** Heme is not a benzopyran derivative. It is a porphyrin derivative.

Thus, the correct answer is (3) Anthocyanins and flavonoids.

Quick Tip

When studying plant pigments, remember that anthocyanins and flavonoids are common examples of benzopyran derivatives responsible for many colors in fruits, flowers, and leaves.

34. Examples of prolamins in corn and wheat:

(1) Hordein and zein

(2) Gliadin and hordein

(3) Oryzenin and zein

(4) Zein and gliadin

Correct Answer: (4) Zein and gliadin

Solution:

Prolamins are a group of plant storage proteins that are rich in proline and glutamine. They are found in the seeds of certain cereal grains, particularly in corn, wheat, and rice.

- **Hordein and zein:** Hordein is a prolamin found in barley, while zein is the prolamin found in corn. This combination is incorrect because it mixes prolamins from different plants.

- **Gliadin and hordein:** Gliadin is a prolamin found in wheat, and hordein is found in barley. Again, this is incorrect as it mixes prolamins from different plants.

- **Oryzenin and zein:** Oryzenin is a prolamin found in rice, and zein is found in corn. This is also incorrect as it involves two different plant sources.

- **Zein and gliadin: Correct!** Zein is the prolamin in corn, and gliadin is the prolamin in wheat. These two prolamins are the correct examples for corn and wheat.

Thus, the correct answer is (4) Zein and gliadin.

Quick Tip

Remember that prolamins are plant storage proteins found in cereals like corn (zein), wheat (gliadin), barley (hordein), and rice (oryzenin). These proteins are rich in proline and glutamine.

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35. Cobalt is a constituent of which vitamin:

(1) Vitamin D

(2) Vitamin C

(3) Vitamin B12

(4) Folic acid

Correct Answer: (3) Vitamin B12

Solution:

Cobalt is an essential element and is a key constituent of Vitamin B12, also known as cyanocobalamin. Vitamin B12 is crucial for the production of red blood cells, nerve function, and DNA synthesis.

- **Vitamin D:** This vitamin does not contain cobalt. It is primarily involved in calcium absorption and bone health.

- **Vitamin C:** Vitamin C (ascorbic acid) does not contain cobalt. It is important for collagen formation and immune function.

- **Vitamin B12: Correct!** Vitamin B12 contains cobalt at the center of its structure, making it unique among vitamins. It is essential for various biological functions, including red blood cell production.

- **Folic acid:** This vitamin does not contain cobalt. It is vital for DNA synthesis and the formation of red blood cells.

Thus, the correct answer is (3) Vitamin B12.

Quick Tip

Cobalt is an essential component of Vitamin B12, which is necessary for nerve health and red blood cell production. It is also used in some enzymes in the body.

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36. Deficiency symptoms of minerals iodine and iron:

(1) Goitre and anaemia

(2) Osteoporosis and osteomalacia

(3) Anaemia and osteopenia

(4) Goitre and night blindness

Correct Answer: (1) Goitre and anaemia

Solution:

Iodine and iron are essential minerals that play key roles in the body. Their deficiencies lead to specific health issues.

- **Goitre and anaemia: Correct!** Iodine deficiency leads to goitre, an enlargement of the thyroid gland, while iron deficiency causes anaemia, a condition marked by a lack of healthy

red blood cells.

- **Osteoporosis and osteomalacia:** These conditions are typically associated with vitamin D and calcium deficiencies, not iodine or iron. Osteoporosis is a condition of weakened bones, while osteomalacia involves softening of the bones.

- **Anaemia and osteopenia:** Anaemia is related to iron deficiency, but osteopenia (a precursor to osteoporosis) is usually associated with calcium and vitamin D deficiencies.

- **Goitre and night blindness:** Night blindness is typically caused by vitamin A deficiency, not iodine or iron. Goitre is correct for iodine deficiency, but night blindness does not relate to iodine or iron.

Thus, the correct answer is (1) Goitre and anaemia.

Quick Tip

Remember that iodine deficiency causes goitre and iron deficiency leads to anaemia. Both are critical deficiencies, but they affect different body systems.

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37. Protein efficiency ratio is not based on:

(1) Intake of plant protein

(2) Intake and output of food protein residues

(3) Output of protein

(4) Intake of animal protein

Correct Answer: (2) Intake and output of food protein residues

Solution:

The Protein Efficiency Ratio (PER) is a measure of protein quality. It is used to assess the effectiveness of protein sources based on weight gain in test animals (usually rats) when they are fed a particular protein. The PER is calculated as the ratio of weight gain to the amount of protein consumed. It is used to evaluate how well a protein supports growth.

- **Intake of plant protein:** Plant protein intake is considered in the calculation of PER, as it helps assess the efficiency of plant proteins for growth.

- **Intake and output of food protein residues: Correct!** PER is not based on the output or residues of food proteins, as this does not directly correlate to growth or the efficiency of the

protein for that purpose.

- **Output of protein:** The output of protein, or the effect of protein on weight gain, is a factor in determining PER, as the ratio is based on protein intake and the weight gain observed.

- **Intake of animal protein:** Animal protein intake is similarly considered in the PER, as it also contributes to weight gain in test animals.

Thus, the correct answer is (2) Intake and output of food protein residues.

Quick Tip

Remember that the Protein Efficiency Ratio (PER) is based on the weight gain of an animal per unit of protein consumed, not on the protein residues or output.

---

38. Amino acid which can be converted to niacin in the body:

(1) Phenylalanine

(2) Tyrosine

(3) Tryptophan

(4) Histidine

Correct Answer: (3) Tryptophan

Solution:

Niacin (Vitamin B3) is an essential nutrient that can be synthesized in the body from the amino acid tryptophan. This process occurs in the liver, where tryptophan is converted into niacin through a series of biochemical steps.

- **Phenylalanine:** This amino acid is essential for the production of tyrosine and other neurotransmitters but does not directly convert into niacin.

- **Tyrosine:** Tyrosine, derived from phenylalanine, is involved in the synthesis of neurotransmitters but is not directly converted to niacin.

- **Tryptophan: Correct!** Tryptophan can be converted into niacin in the body, making it the correct answer. This conversion is especially important when dietary intake of niacin is insufficient.

- **Histidine:** Histidine is an essential amino acid involved in protein synthesis and enzyme regulation but is not involved in the conversion to niacin.

Thus, the correct answer is (3) Tryptophan.

Quick Tip

Tryptophan is a precursor for niacin (Vitamin B3). Ensuring adequate intake of tryptophan can help maintain niacin levels in the body, especially when dietary niacin is low.

---

39. Red or bloody bread results from growth of:

(1) Serratia marcescens

(2) Bacillus licheniformis

(3) Pseudomonas species

(4) Endomycopsis

Correct Answer: (1) Serratia marcescens

Solution:

The red or bloody appearance on bread results from the growth of the bacterium **Serratia marcescens**, which produces a red pigment called prodigiosin. This bacterium is known to cause the red discoloration on moist surfaces such as bread, especially in warm and humid environments.

- **Serratia marcescens: Correct!** This bacterium is responsible for the red or bloody appearance on bread due to its production of the red pigment prodigiosin.
- **Bacillus licheniformis:** This bacterium does not produce a red pigment. It is known for producing other types of compounds but does not cause red discoloration on bread.
- **Pseudomonas species:** While some species of **Pseudomonas** can cause discoloration, they typically produce blue or green pigments, not red.
- **Endomycopsis:** This is a genus of fungi, but it does not typically cause red discoloration on bread.

Thus, the correct answer is (1) Serratia marcescens.

Quick Tip

Serratia marcescens is a bacterium that produces a red pigment called prodigiosin, which can cause red discoloration, particularly in moist environments like bread.

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40. Black rots in eggs are caused by:

(1) Serratia species

(2) Proteus melanovogenes

(3) Alcaligenes

(4) Flavobacterium

Correct Answer: (2) Proteus melanovogenes

Solution:

Black rot in eggs is a spoilage caused by the growth of certain bacteria. One of the most common bacteria responsible for black rot in eggs is **Proteus melanovogenes**. This bacterium produces a black coloration in the egg due to the production of sulfur compounds.

- **Serratia species:** While **Serratia** species are associated with other forms of spoilage, they do not typically cause black rot in eggs.

- **Proteus melanovogenes: Correct!** This bacterium is the primary cause of black rot in eggs due to its production of sulfur compounds, which cause the black coloration.

- **Alcaligenes: Alcaligenes** species are involved in spoilage, but they are not known to cause black rot in eggs.

- **Flavobacterium: Flavobacterium** species are also associated with spoilage in food but are not the cause of black rot in eggs.

Thus, the correct answer is (2) **Proteus melanovogenes**.

Quick Tip

Proteus melanovogenes is known for producing black rot in eggs, caused by the generation of sulfur compounds. Keeping eggs in cool and dry conditions helps prevent this type of spoilage.

41. Barny flavour in butter is produced by:

(1) Yeasts

(2) Actinomycetes

(3) Enterobacter species

(4) Pseudomonas

Correct Answer: (3) Enterobacter species

Solution:

The barny flavour in butter is caused by the growth of certain microorganisms, particularly **Enterobacter species**. These bacteria are known to produce compounds that contribute to the characteristic off-flavours in dairy products, including butter.

- **Yeasts:** Yeasts are involved in fermentation but are not typically responsible for the barny flavour in butter. They may contribute to other types of fermentation processes.

- **Actinomycetes:** While actinomycetes can produce some odours, they are not primarily responsible for the barny flavour in butter.

- **Enterobacter species: Correct!** This group of bacteria is known to produce the barny flavour due to the production of certain volatile compounds during their growth.

- **Pseudomonas: Pseudomonas** species are involved in spoilage but are not responsible for the barny flavour in butter. They cause other spoilage effects, particularly in refrigerated products.

Thus, the correct answer is (3) Enterobacter species.

Quick Tip

Enterobacter species are responsible for the barny or undesirable flavour in butter due to their metabolic activities, including the production of volatile compounds.

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42. TA spoilage is caused by:

(1) Clostridium perfringens

(2) Clostridium botulinum

(3) Clostridium nigricans

(4) Clostridium thermosaccharolyticum

Correct Answer: (4) Clostridium thermosaccharolyticum

Solution:

TA spoilage (Toxic Anaerobic spoilage) in food is commonly caused by the growth of **Clostridium thermosaccharolyticum**, which is an anaerobic bacterium. This bacterium is capable of producing toxins and spoilage compounds under anaerobic conditions, leading to spoilage in foods like canned goods.

- **Clostridium perfringens:** While **Clostridium perfringens** is involved in food poisoning, it is not the primary cause of TA spoilage. It is known for causing gastrointestinal illnesses but not specifically anaerobic spoilage.

- **Clostridium botulinum: Clostridium botulinum** is associated with botulism, a serious foodborne illness caused by the neurotoxin produced by this bacterium. It is not the primary cause of TA spoilage.

- **Clostridium nigricans:** This species is not commonly associated with spoilage, particularly TA spoilage.

- **Clostridium thermosaccharolyticum: Correct!** This bacterium is known to cause TA spoilage in food due to its ability to produce gas and toxins in anaerobic conditions. It is associated with the spoilage of canned and vacuum-packed foods.

Thus, the correct answer is (4) **Clostridium thermosaccharolyticum**.

Quick Tip

Clostridium thermosaccharolyticum is a common cause of TA spoilage in anaerobic food environments, such as canned goods. Proper food storage and handling are crucial to prevent this type of spoilage.

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43. Enterohaemorrhagic E coli (EHEC) sometimes is also known as:

(1) Enteropathogenic E coli (EPEC)

(2) Verotoxin producing E coli (VTEC)

(3) Entero invasive E coli (EIEC)

(4) Entero toxigenic E coli (ETEC)

Correct Answer: (2) Verotoxin producing E coli (VTEC)

Solution:

Enterohaemorrhagic E. coli (EHEC) is a type of Escherichia coli that produces a toxin called verotoxin. This toxin is responsible for causing severe gastrointestinal illnesses, including hemorrhagic colitis and hemolytic uremic syndrome. EHEC is commonly referred to as **Verotoxin-producing E. coli (VTEC)**.

- **Enteropathogenic E coli (EPEC):** This is another strain of E. coli that causes diarrheal disease but is not related to the verotoxin produced by EHEC.
- **Verotoxin producing E coli (VTEC): Correct!** This is another name for Enterohaemorrhagic E. coli (EHEC), as it is defined by the production of verotoxins.
- **Entero invasive E coli (EIEC):** EIEC is another pathogenic strain of E. coli that invades the intestinal lining but does not produce the same toxins as EHEC.
- **Entero toxigenic E coli (ETEC):** This strain of E. coli produces enterotoxins and is associated with traveler's diarrhea, but it is not involved in the hemorrhagic conditions caused by EHEC.

Thus, the correct answer is (2) Verotoxin producing E coli (VTEC).

Quick Tip

Enterohaemorrhagic E coli (EHEC) is known for producing verotoxin, which leads to severe gastrointestinal issues. It's important to recognize this strain due to its potential to cause hemolytic uremic syndrome.

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44. An example of hard cheese:

(1) Cottage cheese

(2) Roquefort cheese

(3) Parmesan cheese

(4) Cheddar cheese

Correct Answer: (4) Cheddar cheese

Solution:

Hard cheeses are those that have undergone a long aging process and have a firm texture.

They are typically grated or sliced thinly. Among the options listed, **Cheddar cheese** is a well-known example of hard cheese.

- **Cottage cheese:** Cottage cheese is a soft cheese, not a hard one. It has a mild flavor and a soft, creamy texture.

- **Roquefort cheese:** Roquefort is a blue cheese, which is semi-hard, but not considered a hard cheese. It has a crumbly texture and distinct blue veins.

- **Parmesan cheese:** Parmesan is indeed a hard cheese, but the correct answer here is **Cheddar** as the best example of hard cheese in the options provided.

- **Cheddar cheese: Correct!** Cheddar is a classic example of hard cheese. It is made from cow's milk and aged for varying periods, with the aging process contributing to its firm texture.

Thus, the correct answer is (4) **Cheddar cheese**.

Quick Tip

Cheddar cheese is a well-known hard cheese that is widely used in cooking and sandwiches. It can be aged for different periods, affecting its flavor and texture.

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45. The bacteria which initiate fermentation of sauerkraut is:

(1) Leuconostoc mesenteroides

(2) E coli

(3) Bacillus species

(4) Lactobacillus plantarum

Correct Answer: (1) Leuconostoc mesenteroides

Solution:

In the fermentation process of sauerkraut, **Leuconostoc mesenteroides** is one of the key bacteria responsible for initiating fermentation. This bacterium begins the process by converting sugars into lactic acid, which gives sauerkraut its characteristic tangy flavor.

- **Leuconostoc mesenteroides: Correct!** This bacterium is involved in the initial stages of sauerkraut fermentation, leading to the formation of lactic acid.

- **E coli:** While **E. coli** may be present in some food fermentations, it is not involved in the

production of sauerkraut. It is generally considered a contaminant.

- **Bacillus species: Bacillus** species are not typically involved in sauerkraut fermentation. They are more associated with spoilage or other fermentation processes.

- **Lactobacillus plantarum: Lactobacillus plantarum** is involved in the later stages of sauerkraut fermentation, after **Leuconostoc mesenteroides** has started the process. It is important in the development of the final taste but does not initiate the fermentation.

Thus, the correct answer is (1) **Leuconostoc mesenteroides**.

Quick Tip

Leuconostoc mesenteroides is crucial in the early stages of sauerkraut fermentation. It produces lactic acid from sugars, which is key to preserving the cabbage and developing the flavor.

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46. The ratio of small fish to salt in fish sauce and paste is:

(1) 4 parts of fish and 1 part salt

(2) 3 parts of fish and 2 parts salt

(3) 3 parts of fish and 1 part salt

(4) 2 parts of fish and 2 parts salt

Correct Answer: (3) 3 parts of fish and 1 part salt

Solution:

The ratio of small fish to salt in fish sauce and paste is typically **3 parts of fish and 1 part salt**. This ratio ensures the right balance of flavor and preservation for the fish paste. Too much salt could make the paste too salty, while too little would affect its preservation and flavor.

- **4 parts of fish and 1 part salt:** This is not the correct ratio for fish paste. While it may be used in other recipes, it doesn't align with the traditional ratio for fish sauce and paste.

- **3 parts of fish and 2 parts salt:** This ratio results in too much salt compared to the fish, which could make the paste too salty for typical recipes.

- **3 parts of fish and 1 part salt: Correct!** This is the proper ratio of fish to salt in traditional fish sauce and paste recipes. It provides the right balance of flavor and preservation.

- **2 parts of fish and 2 parts salt:** This ratio has too much salt, making the paste overly salty, which is not typical for most recipes.

Thus, the correct answer is (3) **3 parts of fish and 1 part salt**.

Quick Tip

For the best flavor and preservation in fish sauce and paste, a common ratio is 3 parts fish to 1 part salt. This ensures the right balance for fermentation and taste.

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47. Dehulling is done for which oilseeds:

(1) Sunflower

(2) Sunflower and soybean

(3) Soybean and groundnut

(4) Soybean

Correct Answer: (2) Sunflower and soybean

Solution:

Dehulling refers to the process of removing the outer hull or shell from seeds. This process is typically done for oilseeds like sunflower and soybean to improve the quality and yield of the oil extracted.

- **Sunflower:** Sunflower seeds are dehulled to extract the oil efficiently. However, dehulling is often done in combination with other seeds.

- **Sunflower and soybean: Correct!** Both sunflower and soybean are commonly dehulled during oil extraction to improve the yield and quality of the oil.

- **Soybean and groundnut:** While soybean is dehulled, groundnut (peanut) is generally not subjected to dehulling in the same way.

- **Soybean:** Soybeans are often dehulled during oil extraction, but dehulling alone is not exclusive to soybean seeds.

Thus, the correct answer is (2) **Sunflower and soybean**.

Quick Tip

Dehulling sunflower and soybean seeds improves the efficiency of oil extraction and the quality of the oil. This is especially important in commercial oil production.

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48. Conventional pulses milling methods followed in India:

(1) Wet milling

(2) Steam milling

(3) Wet and dry milling

(4) Wet and steam milling

Correct Answer: (3) Wet and dry milling

Solution:

In India, the conventional methods for milling pulses typically include both wet and dry milling. Wet milling involves the use of water or other liquids to help separate the husk from the pulse, while dry milling uses dry methods for grinding and processing. This combined approach helps in the efficient extraction of pulse flour and ensures better product quality.

- **Wet milling:** This method uses water for separating the husk from the pulse but does not typically involve dry milling techniques.

- **Steam milling:** Steam milling is not a conventional method used in India for pulses milling.

- **Wet and dry milling: Correct!** This is the conventional method widely used for milling pulses in India. It combines the advantages of both wet and dry methods.

- **Wet and steam milling:** While steam can be used for certain processing tasks, it is not a conventional combination for milling pulses in India.

Thus, the correct answer is (3) **Wet and dry milling**.

Quick Tip

In India, the conventional pulses milling process often includes both wet and dry milling to improve the quality of pulse flour and facilitate the removal of the husk effectively.

49. In dal milling industry which of the following is used for conditioning:

(1) Oil

(2) Water

(3) Red earth

(4) Oil, water and red earth

Correct Answer: (4) Oil, water and red earth

Solution:

In the dal milling industry, conditioning of the pulses is done to soften the outer layer, making it easier to dehull. The conditioning process involves using a combination of oil, water, and red earth to achieve the desired effect.

- **Oil:** While oil is sometimes used in the processing of pulses, it is not the only conditioning agent.
- **Water:** Water is essential for conditioning, but it works best when combined with other agents like oil and red earth.
- **Red earth:** Red earth, when used in combination with water and oil, helps in conditioning the pulses by softening their outer skin, which facilitates easier dehulling.
- **Oil, water and red earth: Correct!** This combination is the traditional and most effective method for conditioning pulses in the dal milling industry.

Thus, the correct answer is (4) **Oil, water and red earth**.

Quick Tip

In the dal milling process, the combination of oil, water, and red earth is commonly used for conditioning pulses. This helps in softening the outer hull for easier dehulling.

50. Blanching of fruits and vegetables is done:

(1) To inactivate enzymes

(2) To reduce moisture content

(3) To reduce volume to surface area

(4) To prevent nutrient loss

Correct Answer: (1) To inactivate enzymes

Solution:

Blanching is a process of briefly immersing fruits and vegetables in boiling water or steam and then rapidly cooling them in cold water. The primary purpose of blanching is to inactivate enzymes that can lead to the deterioration of the product's color, flavor, and texture during storage.

- **To inactivate enzymes: Correct!** Blanching effectively deactivates enzymes that can cause spoilage, ensuring the vegetables and fruits retain their quality during storage.
- **To reduce moisture content:** While blanching may slightly reduce moisture content, this is not its primary purpose.
- **To reduce volume to surface area:** This is not the main objective of blanching. The process does not significantly alter the ratio of volume to surface area.
- **To prevent nutrient loss:** While blanching may cause some nutrient loss, especially water-soluble vitamins, it helps preserve nutrients in the long run by preventing enzymatic degradation.

Thus, the correct answer is (1) **To inactivate enzymes**.

Quick Tip

Blanching is crucial in preserving the quality of fruits and vegetables by inactivating spoilage-causing enzymes, allowing for better storage and longer shelf life.

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51. Which of the following step is not a part of tea processing?

(1) Withering

(2) Fermentation

(3) Rolling

(4) Winnowing

Correct Answer: (4) Winnowing

Solution:

Tea processing involves several key steps that contribute to the final product's flavor and quality. The primary steps in tea processing include withering, fermentation (or oxidation),

and rolling. Each of these plays a significant role in the development of flavor and the overall quality of the tea.

- **Withering:** Withering is the process of wilting the freshly plucked tea leaves to reduce their moisture content, making them pliable for further processing.

- **Fermentation:** Also known as oxidation, this step is crucial in the production of different types of tea, such as black tea, where the leaves are allowed to oxidize and develop flavor.

- **Rolling:** After withering, the leaves are rolled to break up the cell walls and release enzymes that help in the fermentation process.

- **Winnowing: Correct!** Winnowing is not part of tea processing. This process is used in grain and seed cleaning to separate lighter particles from the heavier ones and is not related to tea leaf processing.

Thus, the correct answer is (4) **Winnowing**.

Quick Tip

In tea processing, the key steps are withering, fermentation, and rolling. Winnowing is not part of tea processing but is used in other industries like grain processing.

---

52. Wet processing of coffee bean yields:

(1) Parchment coffee

(2) Cherry coffee

(3) Kerala coffee

(4) Ivory coffee

Correct Answer: (1) Parchment coffee

Solution:

Wet processing of coffee beans is a method where the fruit is removed from the beans before drying. This results in parchment coffee, where the beans are still enclosed in a thin layer called the parchment, but the fruit and the mucilage are removed. This is a typical method for high-quality coffee production.

- **Parchment coffee:** Correct! This is the result of wet processing, where the beans are left with a parchment layer after removing the fruit and mucilage.

- **Cherry coffee:** Incorrect! Cherry coffee refers to coffee that still retains the fruit and is not processed wet.
- **Kerala coffee:** Incorrect! Kerala coffee is a term used to describe coffee grown in the Kerala region, but it is not related to the wet processing method.
- **Ivory coffee:** Incorrect! This is not a term used in coffee processing and is unrelated to the wet processing method.

Thus, the correct answer is (1) **Parchment coffee**.

Quick Tip

In wet coffee processing, the beans are first washed and then dried with a thin layer of parchment. This process helps produce higher-quality coffee compared to dry processing.

---

53. Clove contains:

(1) Carveol

(2) Indole

(3) Clovonol

(4) Eugenol

Correct Answer: (4) Eugenol

Solution:

Clove contains eugenol, which is the main active compound responsible for its characteristic aroma and medicinal properties. Eugenol is an essential oil found in clove and other plants such as cinnamon.

- **Carveol:** Incorrect! Carveol is found in caraway seeds, not in cloves.
- **Indole:** Incorrect! Indole is a compound found in various plants, but it is not found in cloves.
- **Clovonol:** Incorrect! Clovonol is not a compound found in cloves.
- **Eugenol:** Correct! Eugenol is the compound that gives clove its distinct flavor and is used for its medicinal and aromatic properties.

Thus, the correct answer is (4) **Eugenol**.

Quick Tip

Clove is widely known for its strong aroma and medicinal uses, primarily due to the presence of eugenol. This compound is also used in dentistry for its analgesic properties.

---

54. For smoking of meat which wood is used:

(1) Hard wood like hickory, oak, pecan, maple.

(2) Soft woods like pine, cedar

(3) Sandal wood

(4) Semi hard wood like beech

Correct Answer: (1) Hard wood like hickory, oak, pecan, maple.

Solution:

When it comes to smoking meat, hard woods like hickory, oak, pecan, and maple are commonly used. These woods produce dense smoke that imparts a strong, rich flavor to the meat. The hardwoods burn slower and produce steady heat, which is ideal for long smoking times.

- **Soft woods like pine, cedar:** Incorrect! Softwoods tend to burn too quickly and produce resinous smoke, which can result in an unpleasant flavor.

- **Sandal wood:** Incorrect! Sandalwood is often used in incense and aromatic purposes, but it is not typically used in smoking meat.

- **Semi hard wood like beech:** Incorrect! Beech is a good wood for smoking but it is considered a semi-hardwood, not ideal for extended smoking.

Thus, the correct answer is (1) **Hard wood like hickory, oak, pecan, maple.**

Quick Tip

For the best smoking results, use hardwoods like hickory or oak for long, slow smoking to give the meat a deep, rich flavor. Avoid softwoods that produce harsh or bitter smoke.

---

55. Enzyme present in papaya, pineapple and figs:

(1) Papain, bromelin

(2) Papain, bromelin and ficin

(3) Ficin

(4) Papain

Correct Answer: (2) Papain, bromelin and ficin

Solution:

Papaya contains the enzyme **Papain**, which is proteolytic, helping in the breakdown of proteins. Pineapple contains **Bromelin**, which also has proteolytic properties. Figs contain **Ficin**, another protease that helps in protein digestion. Thus, the correct answer is **Papain, bromelin and ficin.**

- **Papain, bromelin:** Incorrect! While papain and bromelin are indeed found in papaya and pineapple respectively, figs also contain ficin, making this answer incomplete.

- **Papain, bromelin and ficin:** Correct! This option correctly lists all three enzymes found in papaya, pineapple, and figs.

- **Ficin:** Incorrect! Ficin is present in figs, but this answer doesn't consider the presence of papain in papaya and bromelin in pineapple.

- **Papain:** Incorrect! Papain is present in papaya, but this answer ignores the other enzymes.

Quick Tip

Remember, **Papain** is found in papaya, **Bromelin** in pineapple, and **Ficin** in figs. These enzymes have proteolytic properties, aiding in digestion.

---

56. Egg shell is composed of:

(1) Calcium carbonate

(2) Magnesium carbonate

(3) Calcium sulphate

(4) Manganese carbonate

Correct Answer: (1) Calcium carbonate

Solution:

Eggshells are primarily made of **calcium carbonate ($CaCO_3$)**. This compound gives the eggshell its rigidity and structure. It forms a protective barrier for the developing embryo inside the egg. Magnesium carbonate, calcium sulphate, and manganese carbonate are not significant components of the eggshell.

- **Calcium carbonate:** Correct! Calcium carbonate makes up a major portion of the eggshell, providing structure and strength.
- **Magnesium carbonate:** Incorrect! Magnesium carbonate is not a primary component of eggshells.
- **Calcium sulphate:** Incorrect! Calcium sulphate is not a significant component of the eggshell.
- **Manganese carbonate:** Incorrect! Manganese carbonate does not form a significant part of eggshell composition.

Quick Tip

Remember, **Calcium carbonate** is the main component of eggshells, providing strength and protection.

---

57. As per FSSAI regulation, what is the fat content (percent) in whole milk powder:

(1) Not less than 26%

(2) Not less than 2%

(3) Not more than 1.5%

(4) Not more than 28%

Correct Answer: (1) Not less than 26%

Solution:

According to the FSSAI (Food Safety and Standards Authority of India) regulations, the fat content in whole milk powder must be **not less than 26%**. This regulation ensures that the milk powder meets the standard of quality for consumption.

- **Not less than 26%:** Correct! The minimum fat content required for whole milk powder as per FSSAI regulation is 26%.
- **Not less than 2%:** Incorrect! The fat content must be much higher than 2% for whole milk

powder.

- **Not more than 1.5%:** Incorrect! Whole milk powder requires a fat content far higher than 1.5%.

- **Not more than 28%:** Incorrect! While the fat content can be up to 28%, it cannot be lower than 26%.

Quick Tip

Remember, the FSSAI regulation mandates that the fat content in whole milk powder should be **not less than 26%** to meet the quality standards.

---

58. Milk product obtained by acid coagulation of hot milk and subsequent drainage of whey:

(1) Curds

(2) Rasogolla

(3) Paneer

(4) Sandesh

Correct Answer: (3) Paneer

Solution:

Paneer is a type of fresh cheese made by acid coagulation of hot milk and subsequent drainage of the whey. It is a common dairy product in Indian cuisine.

- **Curds:** Incorrect! Curds are made by the fermentation of milk using bacteria and do not require hot milk or acid for coagulation.

- **Rasogolla:** Incorrect! Rasogolla is made by boiling balls of chhena (freshly made paneer) in a sugary syrup, not by acid coagulation of milk.

- **Sandesh:** Incorrect! Sandesh is made from chhena (a form of paneer) mixed with sugar and other ingredients, and is not produced by acid coagulation of hot milk.

Quick Tip

To make Paneer, heat milk, add lemon juice or vinegar to curdle it, and drain the whey to form the soft cheese. It is a rich source of protein and is commonly used in various Indian dishes.

---

59. Whey proteins are:

(1) Gamma globulins, alpha lactoglobulins

(2) Beta lactoglobulins, alpha lactoglobulins

(3) Casein, lactalbumin

(4) Casein, beta lactoglobulins

Correct Answer: (1) Gamma globulins, alpha lactoglobulins

Solution:

Whey proteins are mainly composed of several proteins, including:

- **Gamma globulins** and **alpha lactoglobulins**, which are major whey proteins found in the milk of mammals.

- **Beta lactoglobulins** and **lactalbumin** are other types of whey proteins found in significant amounts.

- **Casein** is the major protein in milk, but it is not a whey protein, as whey proteins are the liquid portion separated from curds when milk is processed.

Quick Tip

Whey proteins are considered high-quality proteins due to their essential amino acid profile. They are commonly used in sports nutrition and as a supplement for muscle recovery.

---

60. Eyes are characteristic feature of:

(1) Ice cream

(2) Khoa

(3) Swiss cheese

(4) Cottage cheese

Correct Answer: (3) Swiss cheese

Solution:

The formation of ”eyes” or holes is a characteristic feature of **Swiss cheese**. This phenomenon occurs during the fermentation process when specific bacteria, such as **Propionibacterium shermanii**, metabolize lactic acid and release carbon dioxide gas. The gas forms bubbles that result in the characteristic holes, which are often referred to as ”eyes” in Swiss cheese.

Unlike Swiss cheese, **Cottage cheese** is made by curdling milk and does not undergo the fermentation that produces gas bubbles. Similarly, **Khoa**, which is made by reducing milk to a solid, does not form any holes. **Ice cream**, while it involves freezing, does not undergo the same bacterial fermentation process and, therefore, does not have eyes like Swiss cheese. Swiss cheese, also known as Emmental, is commonly used in sandwiches and fondue due to its smooth texture and distinctive taste provided by these holes.

Quick Tip

The characteristic eyes in Swiss cheese result from the gas-producing bacteria, **Propionibacterium shermanii**. During the fermentation process, the bacteria consume lactic acid and release carbon dioxide, which creates bubbles in the cheese. Remember that the size and number of eyes depend on the bacterial activity and aging process.

---

61. Heat transfer by convection occurs in:

(1) Solids

(2) Solids and liquids

(3) Solid surface to liquids and gases

(4) Gases

Correct Answer: (3) Solid surface to liquids and gases

Solution:

Convection is a process of heat transfer that involves the bulk movement of a fluid, which can be a liquid or gas. In this process, the heated molecules in the fluid move away from the heat source, transferring the heat energy to cooler regions. This movement of fluid particles is a key characteristic of convection.

In solids, however, heat is transferred through conduction, where thermal energy is passed from particle to particle without bulk motion of the material. This is because solids have tightly packed molecules, and the heat transfer occurs via vibrational energy from one molecule to the next. Hence, convection does not occur in solids.

The correct mechanism for convection occurs at the interface between a solid and a fluid (liquid or gas). For example, when a metal pan is heated on a stove, heat is transferred from the pan's surface (solid) to the surrounding air (gas) or any liquid in contact with it. The heated fluid then moves, carrying the heat away from the surface.

Thus, the correct answer is option (3): heat transfer by convection occurs between a solid surface and the fluids (liquids and gases) in contact with it.

Quick Tip

Convection requires a fluid medium (either liquid or gas) to facilitate the transfer of heat through the movement of particles. Solids rely on conduction for heat transfer, which involves no fluid motion.

---

62. Super-heated steam is produced at:

(1) Boiling point

(2) Above boiling point

(3) Below boiling point

(4) At boiling point

Correct Answer: (2) Above boiling point

Solution:

Super-heated steam refers to steam that has been heated beyond its boiling point, at which point it no longer exists as a liquid. Normally, water boils at 100°C under standard

atmospheric pressure, but steam produced at a temperature higher than this is termed super-heated.

When steam is heated further at a constant pressure, it doesn't condense back into liquid water because the temperature is above its boiling point, so it is called superheated steam. This steam has higher energy compared to saturated steam (steam at its boiling point), and it can be used for various applications like driving turbines and other mechanical processes.

Thus, the correct answer is option (2): Super-heated steam is produced above the boiling point.

Quick Tip

Super-heated steam is steam that is heated above its boiling point without an increase in pressure, making it more energetic than normal steam.

---

63. The filter press commonly used in oil mill is:

(1) Continuous type pressure filter

(2) Continuous type vacuum filter

(3) Discontinuous type pressure filter

(4) Discontinuous type vacuum filter

Correct Answer: (3) Discontinuous type pressure filter

Solution:

In an oil mill, the most commonly used filter press is the discontinuous type pressure filter. This type of filter press is used to separate solid particles from liquids under pressure. It works by applying pressure to force the liquid through a filter medium, leaving the solid particles behind. The filter press operates in batches, meaning it works in a discontinuous or intermittent cycle.

Continuous type filters, on the other hand, are used in situations where the filtering process needs to be continuous, but they are not as commonly used in oil mills. Discontinuous type filters are more suitable for the specific requirements of oil extraction, where the volume of oil to be filtered is not constant and may vary over time.

Thus, the correct answer is option (3): The filter press commonly used in oil mills is the

discontinuous type pressure filter.

Quick Tip

Discontinuous type pressure filters are ideal for batch processing in industries like oil mills, where the filtering process is not continuous and requires intermittent operation.

---

64. Separation of solids from solid is called as:

(1) Filtration

(2) Sedimentation

(3) Centrifugation

(4) Sieving

Correct Answer: (4) Sieving

Solution:

The process of separating solids from solids is typically achieved by methods that exploit the difference in particle sizes. Among the given options, sieving is the process where solids of different sizes are separated using a mesh or screen. This technique is widely used in various industries to separate fine particles from coarse ones.

- **Filtration** is used to separate solids from liquids or gases, not from other solids. It relies on a filter medium to trap solid particles while allowing liquids or gases to pass through.

- **Sedimentation** involves the settling of particles from a liquid or gas under the influence of gravity, not separation between two solid phases.

- **Centrifugation** uses high-speed rotation to separate substances based on their densities, usually liquids or a mixture of solids and liquids, but not to separate solid particles from another solid.

Thus, the correct method for separating solids from solids is Sieving, making option (4) the correct answer.

Quick Tip

Sieving is effective for separating particles of different sizes. It's commonly used in industries like construction and food processing to filter solids based on size.

65. The milk is ..... to increase the keeping quality so that it does not spoil during distribution.

(1) Homogenised

(2) Defatted

(3) Pasteurized

(4) Fortified

Correct Answer: (3) Pasteurized

Solution:

To prevent milk from spoiling during distribution, it is often **pasteurized**. Pasteurization is the process of heating milk to a specific temperature for a set period to kill harmful bacteria and microorganisms that could cause spoilage. This method helps increase the shelf life of milk, making it safe for consumption over an extended period, especially during distribution.

- **Homogenization** is a process that breaks down the fat molecules in milk to prevent cream from separating, but it does not directly affect the keeping quality.

- **Defatting** refers to the removal of fat from milk, which is done for producing skim milk, but this process does not necessarily extend the shelf life.

- **Fortification** refers to adding nutrients to milk, such as vitamins or minerals, but it does not directly affect its ability to prevent spoilage.

Thus, the correct answer is option (3): Milk is pasteurized to increase its keeping quality.

Quick Tip

Pasteurization helps kill harmful bacteria and prolong the shelf life of milk, making it safer for consumption and reducing spoilage during transport and distribution.

---

66. Instrument used to test specific gravity of milk and adulteration of milk by water:

(1) Hydrometer

(2) Penetrometer

(3) Lactometer

(4) Colorimeter

Correct Answer: (3) Lactometer

Solution:

A **lactometer** is an instrument specifically designed to test the specific gravity of milk. It helps to determine the purity of the milk and check for any adulteration, particularly the presence of water in the milk. The lactometer floats in the milk, and the level at which it floats gives an indication of the specific gravity. If water has been added to the milk, the lactometer will float higher, indicating lower specific gravity.

A **hydrometer** is used to measure the specific gravity of liquids in general, but it is not specifically designed for milk.

A **penetrometer** is used to measure the firmness or consistency of materials, not the specific gravity.

A **colorimeter** is used to measure the color intensity of liquids, not related to specific gravity or adulteration of milk.

Thus, the correct instrument for testing the specific gravity of milk and checking for adulteration is the **lactometer**.

Quick Tip

Lactometers are essential tools in the dairy industry to ensure the quality and purity of milk by detecting any water adulteration.

---

67. Guidelines for nutritional labelling has been published by:

(1) ISO 14000

(2) ISO 9000

(3) Codex Alimentarius Commission

(4) ISO 22000

Correct Answer: (3) Codex Alimentarius Commission

Solution:

The guidelines for nutritional labelling have been published by the **Codex Alimentarius Commission**. This organization, established by the Food and Agriculture Organization (FAO) and the World Health Organization (WHO), sets international food standards,

including guidelines on food labeling and nutritional content.

- **ISO 14000** refers to standards related to environmental management systems, not food labeling.

- **ISO 9000** is a set of quality management standards that focus on improving organizational quality but does not specifically deal with nutritional labelling.

- **ISO 22000** is concerned with food safety management systems, ensuring that food products are safe for consumption, but it doesn't specifically set guidelines for nutritional labelling.

Thus, the correct answer is option (3): **Codex Alimentarius Commission**.

Quick Tip

The Codex Alimentarius Commission plays a crucial role in establishing international food standards, including guidelines for nutritional labelling to ensure consumer protection and fair trade practices.

---

68. Turmeric is adulterated with:

(1) Auramine

(2) Metanil yellow

(3) Rhodamine B

(4) Orange-II

Correct Answer: (2) Metanil yellow

Solution:

Turmeric is often adulterated with **Metanil yellow**, a synthetic dye that is used illegally to color food items. This is done to enhance the yellow color of turmeric and make it appear more attractive and brighter. However, Metanil yellow is toxic and is harmful to health when consumed in large quantities.

- **Auramine** is another synthetic dye but is not commonly used to adulterate turmeric.

- **Rhodamine B** is used as a dye in some applications but is not typically used to adulterate turmeric.

- **Orange-II** is used in coloring applications, but it is not the typical adulterant in turmeric.

Thus, the correct answer is option (2): **Metanil yellow**.

Quick Tip

Metanil yellow is illegal and harmful when used as an adulterant in food. Always ensure the quality of turmeric before consumption.

---

69. ISO9001:2008 Quality Management System deals with:

(1) Fundamentals and vocabulary

(2) Management

(3) Requirements

(4) Performance improvement

Correct Answer: (3) Requirements

Solution:

The ISO9001:2008 standard for Quality Management Systems primarily focuses on the **requirements** for establishing a quality management system within an organization. The main goal of this standard is to ensure that an organization meets customer and regulatory requirements while continuously improving its processes.

- **Fundamentals and vocabulary** are part of the standard, but the standard itself is more concerned with defining the actual requirements for quality management systems, not just the terminology.

- **Management** refers to the organizational structure and leadership but is not the central focus of the ISO9001:2008 standard, although it is a key element in meeting the requirements.

- **Performance improvement** is a goal of the quality management system, but the standard deals specifically with the requirements necessary to implement and maintain a successful system.

Thus, the correct answer is option (3): **Requirements**.

Quick Tip

ISO9001:2008 focuses on ensuring organizations meet specific requirements for quality management to consistently provide products that meet customer needs and enhance satisfaction.

70. Adulterant found in watermelon fruits:

(1) Carmosine

(2) Erythrosine

(3) Rhodamine B

(4) Auramine

Correct Answer: (2) Erythrosine

Solution:

Watermelons are sometimes adulterated with **Erythrosine**, a synthetic red dye. This dye is harmful and used illicitly to make the fruit appear more vibrant and appealing. The use of Erythrosine in food products is not recommended as it poses potential health risks.

- **Carmoisine** is another synthetic dye, but it is not typically used to adulterate watermelon.

- **Rhodamine B** is used as a dye in some applications, but it is not the typical adulterant found in watermelon.

- **Auramine** is also a dye but is not commonly used to adulterate watermelon fruits.

Thus, the correct answer is option (2): **Erythrosine**.

Quick Tip

Erythrosine, when used in food, can cause health issues. Always ensure that food is checked for harmful additives and dyes.

---

71. Which of the following statement is true for enantiomers?

(1) Optical isomers that are superimposable mirror images

(2) Isomers which differ in their configuration around a single carbon atom

(3) Stereoisomers that are non-superimposable and non-mirror images

(4) Stereoisomers that are non-superimposable mirror images

Correct Answer: (4) Stereoisomers that are non-superimposable mirror images

Solution:

Enantiomers are a type of stereoisomers that are non-superimposable mirror images of each other. These molecules have the same molecular formula and connectivity of atoms but differ

in the spatial arrangement of their atoms in such a way that one cannot be superimposed on the other, just like how left and right hands are mirror images but cannot overlap.

- **Option (1)**: Optical isomers are enantiomers or diastereomers, but enantiomers specifically are non-superimposable mirror images, so this option is not correct.

- **Option (2)**: This is a general definition of stereoisomers, but it is not specific to enantiomers. Enantiomers specifically refer to isomers that are mirror images and not superimposable.

- **Option (3)**: This describes diastereomers, which are stereoisomers that are not mirror images of each other, unlike enantiomers, which are specifically mirror images.

Thus, the correct answer is option (4): Enantiomers are **stereoisomers that are non-superimposable mirror images**.

Quick Tip

Enantiomers are always non-superimposable mirror images, and this is a key feature distinguishing them from other stereoisomers like diastereomers.

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72. Trehalose is a combination of:

(1) Two glucose molecules

(2) Two maltose molecules

(3) Two lactose molecules

(4) Two sucrose molecules

Correct Answer: (1) Two glucose molecules

Solution:

Trehalose is a disaccharide composed of two glucose molecules linked by an α-1,1-glycosidic bond. It is naturally found in some plants, fungi, and invertebrates, and serves as a source of energy and protection against environmental stress.

- **Maltose** is also a disaccharide, but it consists of two glucose molecules linked by an α-1,4-glycosidic bond, not the same linkage as in trehalose.

- **Lactose** is a disaccharide composed of glucose and galactose, not two glucose molecules.

- **Sucrose** is a disaccharide made up of glucose and fructose, not two glucose molecules.

Thus, the correct answer is option (1): Trehalose is a combination of **two glucose molecules**.

Quick Tip

Trehalose is unique for its ability to protect cells from damage due to dehydration and freezing. It is distinct from other disaccharides in its structure and biological functions.

---

73. The chemical formula of palmitic acid is:

(1) CH4(CH2)14COOH

(2) CH3(CH2)15COOH

(3) CH3(CH2)14COOH

(4) CH3(CH3)14COOH

Correct Answer: (3) CH3(CH2)14COOH

Solution:

The chemical formula of palmitic acid, which is a saturated fatty acid, is CH3(CH2)14COOH. It consists of a long hydrocarbon chain (14 carbon atoms), with a carboxyl group (-COOH) at one end. This formula is widely known and is used as a standard reference for palmitic acid.

- **Option (1)**: The formula CH4(CH2)14COOH is incorrect as it contains an extra CH4 group which is not part of the structure of palmitic acid.

- **Option (2)**: The formula CH3(CH2)15COOH corresponds to a fatty acid with 15 carbon atoms, which is not palmitic acid but another fatty acid.

- **Option (4)**: The formula CH3(CH3)14COOH is incorrect because the structure includes incorrect carbon bonding and doesn't correspond to any known fatty acid.

Thus, the correct answer is option (3): The chemical formula of palmitic acid is CH3(CH2)14COOH.

Quick Tip

Palmitic acid is one of the most common saturated fatty acids found in animals and plants, and its structure consists of a 16-carbon chain with a carboxyl group at the end.

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74. Tartrazine is an:

(1) Food colouring agent

(2) Food sweetner

(3) Food fortifier

(4) Food preservative

Correct Answer: (1) Food colouring agent

Solution:

Tartrazine is a synthetic lemon yellow azo dye used as a food colouring agent. It is commonly added to a variety of food and beverage products to give them a yellow color. It is also used in cosmetics, medications, and other non-food products.

- **Food sweetener** refers to substances added to food to provide sweetness without significantly increasing the calorie content, such as sugar substitutes. Tartrazine is not used as a sweetener.

- **Food fortifier** is a substance added to food to enhance its nutritional value, such as vitamins or minerals. Tartrazine does not serve this purpose.

- **Food preservative** is used to prevent spoilage and extend the shelf life of food, which is not the role of tartrazine.

Thus, the correct answer is option (1): Tartrazine is a **food colouring agent**.

Quick Tip

Tartrazine is commonly used in processed foods and beverages. Be cautious if you have allergies, as it may cause reactions in sensitive individuals.

---

75. In animals, pantothenic acid is associated with which of the following?

(1) Synthesis of cholesterol

(2) Synthesis of Coenzyme A

(3) Synthesis of thyroid hormones

(4) Synthesis of hemoglobin

Correct Answer: (2) Synthesis of Coenzyme A

Solution:

Pantothenic acid, also known as vitamin B5, is a water-soluble vitamin that plays a crucial role in the synthesis of Coenzyme A. Coenzyme A is essential for various biochemical reactions, including the synthesis and breakdown of fatty acids, and the production of acetyl-CoA, which is involved in the citric acid cycle.

- **Synthesis of cholesterol** is indirectly related to pantothenic acid as Coenzyme A is involved in the synthesis of cholesterol, but pantothenic acid directly facilitates Coenzyme A synthesis.

- **Synthesis of thyroid hormones** and **Synthesis of hemoglobin** are not directly related to pantothenic acid, although they are crucial biological processes. Pantothenic acid does not play a direct role in either process.

Thus, the correct answer is option (2): Pantothenic acid is associated with the **synthesis of Coenzyme A**.

Quick Tip

Pantothenic acid is vital for energy production and metabolic processes through its role in Coenzyme A synthesis. It is found in a wide variety of foods like eggs, fish, and whole grains.

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76. Limonene is a:

(1) Ketone

(2) Quinone

(3) Terpene

(4) Ester

Correct Answer: (3) Terpene

Solution:

Limonene is a monoterpene, which is a type of terpene, a class of compounds derived from isoprene units (C5H8). It is commonly found in the essential oils of citrus fruits and is responsible for the characteristic citrus scent. Limonene has the chemical formula C10H16, and it is classified as a hydrocarbon.

- **Ketone** refers to a class of compounds containing a carbonyl group (C=O), which limonene

does not have.

- **Quinone** refers to a class of aromatic compounds with a fully conjugated ring structure and two oxygen atoms. Limonene does not belong to this category.

- **Ester** is a compound derived from an acid (usually organic) and an alcohol, which is not the case for limonene.

Thus, the correct answer is option (3): Limonene is a **terpene**.

Quick Tip

Limonene is often used in perfumes and cleaning products due to its citrus fragrance. It also has applications in aromatherapy for its calming effects.

---

77. The basic difference between chlorophyll a and chlorophyll b is:

(1) In chlorophyll a, pyrrole ring contains methyl group while in chlorophyll b pyrrole ring contains aldehyde group

(2) In chlorophyll a, pyrrole ring contains aldehyde group while in chlorophyll b pyrrole ring contains methyl group

(3) In chlorophyll a, pyrrole ring contains carboxylic group while in chlorophyll b pyrrole ring contains aldehyde group

(4) In chlorophyll a, pyrrole ring contains methyl group while in chlorophyll b pyrrole ring contains carboxylic group

Correct Answer: (1) In chlorophyll a, pyrrole ring contains methyl group while in chlorophyll b pyrrole ring contains aldehyde group

Solution:

The main difference between chlorophyll a and chlorophyll b lies in the structure of the pyrrole ring. In chlorophyll a, the pyrrole ring contains a methyl group (-CH3) at one of the positions, whereas in chlorophyll b, the pyrrole ring contains an aldehyde group (-CHO) at that same position. This structural difference is what gives the two types of chlorophyll different light absorption properties, allowing them to absorb slightly different wavelengths of light.

- **Option (2)** is incorrect because the groups in chlorophyll a and b are reversed. Chlorophyll

a has a methyl group, and chlorophyll b has an aldehyde group.

- **Option (3)** is incorrect because neither chlorophyll a nor b contains a carboxylic group in the pyrrole ring.

- **Option (4)** is incorrect because chlorophyll b contains an aldehyde group, not a carboxylic group in the pyrrole ring.

Thus, the correct answer is option (1): In chlorophyll a, pyrrole ring contains **methyl group** while in chlorophyll b pyrrole ring contains **aldehyde group**.

Quick Tip

The structural difference between chlorophyll a and b allows plants to absorb light more efficiently and optimize photosynthesis by capturing a broader spectrum of light.

---

78. Shigella flexneri is:

(1) gram-negative, nonmotile, facultatively anaerobic, non-spore-forming bacillus

(2) gram-negative, motile, facultatively anaerobic, non-spore-forming bacillus

(3) gram-negative, nonmotile, facultatively aerobic, non-spore-forming bacillus

(4) gram-negative, nonmotile, facultatively anaerobic, spore-forming bacillus

Correct Answer: (1) gram-negative, nonmotile, facultatively anaerobic, non-spore-forming bacillus

Solution:

Shigella flexneri is a gram-negative bacterium that is nonmotile and facultatively anaerobic, meaning it can survive with or without oxygen. It does not form spores, which is a characteristic of some other types of bacteria. The key traits that define Shigella flexneri include:

- **Gram-negative**: The bacteria have a thin peptidoglycan layer and an outer membrane.

- **Nonmotile**: Unlike some other species of Shigella, flexneri does not have flagella and cannot move.

- **Facultatively anaerobic**: It can live in both oxygen-rich and oxygen-poor environments.

- **Non-spore-forming**: Unlike some bacteria, Shigella flexneri does not produce spores to survive harsh conditions.

- **Option (2)** is incorrect because Shigella flexneri is nonmotile, not motile.

- **Option (3)** is incorrect because it is facultatively anaerobic, not facultatively aerobic.

- **Option (4)** is incorrect because Shigella flexneri does not form spores.

Thus, the correct answer is option (1): **gram-negative, nonmotile, facultatively anaerobic, non-spore-forming bacillus**.

Quick Tip

Shigella flexneri is one of the causative agents of dysentery, leading to severe intestinal illness. It is often transmitted via contaminated water or food.

---

79. Mevalonate pathway is associated with the biosynthesis of:

(1) Cholesterol

(2) Testosterone

(3) Thyroid hormones

(4) Corticosteroids

Correct Answer: (1) Cholesterol

Solution:

The mevalonate pathway is a critical metabolic pathway involved in the synthesis of cholesterol and other isoprenoids. This pathway plays a key role in the biosynthesis of cholesterol, which is essential for cellular membranes and the production of steroid hormones.

- **Option (1)** is correct because cholesterol is synthesized through the mevalonate pathway.

- **Option (2)** is incorrect because testosterone is synthesized from cholesterol, but the mevalonate pathway itself directly produces cholesterol.

- **Option (3)** is incorrect because thyroid hormones are synthesized through different pathways, not directly from the mevalonate pathway.

- **Option (4)** is incorrect because corticosteroids are also derived from cholesterol, but they do not directly result from the mevalonate pathway.

Thus, the correct answer is option (1): **Cholesterol**.

Quick Tip

The mevalonate pathway is vital for the production of cholesterol, which serves as the precursor for various steroid hormones, including corticosteroids and sex hormones.

---

80. What represents dx/dt in a microbial growth equation: dx/dt = μx?

(1) Rate of change of time

(2) No change of time

(3) No change of biomass

(4) Rate of change of biomass

Correct Answer: (4) Rate of change of biomass

Solution:

In the microbial growth equation, dx/dt represents the rate of change of the biomass. The equation $dx/dt = \mu x$ indicates the relationship between the rate of change of biomass (dx/dt), the specific growth rate (μ), and the biomass concentration (x).

- **Option (1)** is incorrect because dx/dt refers to the rate of change of biomass, not time.

- **Option (2)** is incorrect because there is no mention of no change of time. Time is implicitly involved, but the rate change refers to biomass.

- **Option (3)** is incorrect because dx/dt is not referring to a lack of biomass change but rather the rate of biomass change.

- **Option (4)** is correct as it accurately represents the rate of change of biomass as described by the equation.

Thus, the correct answer is option (4): **Rate of change of biomass**.

Quick Tip

The equation $dx/dt = \mu x$ is fundamental in microbial growth kinetics and shows how the biomass increases over time at a rate proportional to the current biomass concentration.

---

81. The oxygen dissociation curve of myoglobin is:

(1) Sigmoid

(2) Rectangular hyperbola

(3) Flat

(4) Hampered

Correct Answer: (2) Rectangular hyperbola

Solution:

The oxygen dissociation curve of myoglobin is characterized as a rectangular hyperbola. Unlike hemoglobin, which shows a sigmoid curve due to cooperative binding, myoglobin binds oxygen with a hyperbolic relationship. The binding curve is steep at low oxygen concentrations and reaches a plateau as the oxygen concentration increases.

- **Option (1)** is incorrect because the oxygen dissociation curve of myoglobin is not sigmoid. This characteristic is typical of hemoglobin, which exhibits cooperative binding.

- **Option (2)** is correct because myoglobin's oxygen dissociation curve is a rectangular hyperbola, reflecting its non-cooperative binding behavior.

- **Option (3)** is incorrect because the curve is not flat but shows a characteristic steep rise.

- **Option (4)** is incorrect as 'hampered' does not describe the oxygen dissociation curve.

Thus, the correct answer is option (2): **Rectangular hyperbola**.

Quick Tip

Remember that myoglobin, found in muscle tissues, binds oxygen more strongly than hemoglobin. Its oxygen dissociation curve is hyperbolic, indicating that it binds oxygen more readily at lower oxygen concentrations compared to hemoglobin.

---

82. Feni is a:

(1) Wine prepared from cashew nuts

(2) Wine prepared from grapes

(3) Wine prepared from mangoes

(4) Wine prepared from mixture of mangoes and grapes

Correct Answer: (1) Wine prepared from cashew nuts

Solution:

Feni is a traditional alcoholic beverage that is produced primarily in Goa, India. It is made from the fermentation of cashew apples and distillation.

- **Option (1)** is correct because Feni is made from the cashew nut fruit. The cashew apple is fermented to produce Feni.
- **Option (2)** is incorrect because wine made from grapes is typically referred to as grape wine or simply wine, not Feni.
- **Option (3)** is incorrect because mangoes are used to make another alcoholic beverage called ”mango wine,” not Feni.
- **Option (4)** is incorrect as Feni is specifically made from cashew apples, not a mixture of mangoes and grapes.

Thus, the correct answer is option (1): **Wine prepared from cashew nuts**.

Quick Tip

Feni is an iconic beverage of Goa, and its production process is an important aspect of the state’s cultural heritage. Remember, it is made from the cashew apple, which is often fermented before distillation.

---

83. Hooke’s law states that:

(1) Stress is irreversible to the strain of ideal solid

(2) Stress is directly proportional to strain of ideal solid

(3) Stress is independent of strain of ideal solid

(4) Strain is proportional to stress of ideal solids

Correct Answer: (2) Stress is directly proportional to strain of ideal solid

Solution:

Hooke’s law describes the relationship between the stress and strain in a material within the elastic limit. It states that the stress (force per unit area) applied to an elastic material is directly proportional to the strain (deformation) produced, as long as the material is within its elastic limit. The mathematical expression of Hooke’s law is:

$$\text{Stress} = \text{Elastic Modulus} \times \text{Strain}$$

- **Option (1)** is incorrect because stress is not irreversible in relation to strain in ideal solids. Hooke's law assumes linear elasticity, where the material returns to its original shape when the stress is removed.
- **Option (2)** is correct as Hooke's law asserts that stress is directly proportional to strain in ideal solids (elastic materials) within the elastic limit.
- **Option (3)** is incorrect because stress depends directly on strain in ideal solids, especially within the elastic limit.
- **Option (4)** is incorrect because the proportional relationship in Hooke's law is between stress and strain, not the other way around.

Thus, the correct answer is option (2): **Stress is directly proportional to strain of ideal solid**.

Quick Tip

For Hooke's law, remember the fundamental relationship: stress is proportional to strain within the elastic limit. If stress increases, strain increases proportionally, but the material will return to its original shape once the stress is removed, provided the material remains in the elastic region.

---

84. How many iodine molecules are present in thyroxine?

(1) 3

(2) 2

(3) 1

(4) 4

Correct Answer: (4) 4

Solution:

Thyroxine (T4) is a hormone produced by the thyroid gland. The molecular formula of thyroxine is $C_15H_11I_4NO_4$, which indicates that there are 4 iodine (I) atoms in the thyroxine

molecule. Thus, there are 4 iodine molecules present in thyroxine.

- **Option (1)** is incorrect because there are 4 iodine atoms, not 3.

- **Option (2)** is incorrect because the molecular formula clearly shows 4 iodine atoms.

- **Option (3)** is incorrect because the iodine content is 4, not 1.

- **Option (4)** is correct because the molecular formula of thyroxine contains 4 iodine atoms.

Thus, the correct answer is option (4): **4**.

Quick Tip

The molecular formula of thyroxine contains 4 iodine atoms. Always check the molecular formula to determine the number of atoms of each element present in the compound.

---

85. World food day is celebrated every year on:

(1) October 16

(2) January 16

(3) December 16

(4) March 16

Correct Answer: (1) October 16

Solution:

World Food Day is celebrated annually on October 16 to honor the founding of the Food and Agriculture Organization (FAO) of the United Nations in 1945. The day is dedicated to promoting awareness and action for those who suffer from hunger and to highlight the need for a healthy diet.

- **Option (1)** is correct because World Food Day is indeed celebrated on October 16.

- **Option (2)** is incorrect as January 16 is not the date for World Food Day.

- **Option (3)** is incorrect as December 16 is not the date for World Food Day.

- **Option (4)** is incorrect as March 16 is also not the date for World Food Day.

Thus, the correct answer is option (1): **October 16**.

Quick Tip

Remember, World Food Day is celebrated on October 16 every year to raise awareness about hunger and food security worldwide.

---

86. Butyrometer is used to:

(1) Detect water percentage in milk

(2) Detect fat percentage in milk

(3) Detect protein content in milk

(4) Detect fat percentage in oils

Correct Answer: (2) Detect fat percentage in milk

Solution:

A **butyrometer** is an instrument used to determine the fat percentage in milk. It works on the principle of centrifugal separation of milk's components. It is commonly used in the dairy industry to assess the quality and richness of milk in terms of fat content.

- **Option (1)** is incorrect because the butyrometer does not measure the water content in milk.

- **Option (2)** is correct because the butyrometer is specifically used to measure the fat percentage in milk.

- **Option (3)** is incorrect because the butyrometer is not used for protein content measurement in milk.

- **Option (4)** is incorrect because the butyrometer is not used for measuring fat content in oils.

Thus, the correct answer is option (2): **Detect fat percentage in milk**.

Quick Tip

Remember, butyrometers are primarily used to measure the fat content in milk, a crucial factor for determining milk's nutritional value.

---

87. Sequence of steps in gram's staining technique in the identification of bacteria are:

(1) Crystal violet - ethanol - Grams Iodine - Safranin

(2) Crystal violet - Safranin - Grams Iodine - ethanol

(3) Crystal violet - ethanol - Safranin - Grams Iodine

(4) Crystal violet - Grams Iodine - ethanol - Safranin

Correct Answer: (4) Crystal violet - Grams Iodine - ethanol - Safranin

Solution:

Gram's staining technique involves the following sequence:

1. **Crystal violet** is the primary stain applied to the bacterial sample.

2. **Grams iodine** is used as a mordant to fix the crystal violet stain within the bacterial cells.

3. **Ethanol** or acetone is applied to decolorize the cells. This step removes the stain from Gram-negative bacteria, leaving Gram-positive bacteria colored.

4. **Safranin** is the counterstain, which stains the decolorized Gram-negative bacteria red or pink.

- **Option (1)** is incorrect because the correct sequence is Crystal violet, Iodine, ethanol, and then Safranin.

- **Option (2)** is incorrect because Safranin should be the last step.

- **Option (3)** is incorrect because the iodine step should come before the decolorization (ethanol) step.

- **Option (4)** is the correct answer, which follows the correct order: Crystal violet, Grams Iodine, ethanol, and Safranin.

Thus, the correct answer is option (4): **Crystal violet - Grams Iodine - ethanol - Safranin**.

Quick Tip

Gram's staining technique is widely used in microbiology to distinguish between Gram-positive and Gram-negative bacteria.

88. Which of the following is correct about α-amino acids?

(1) All α-amino acids contain an asymmetric carbon atom

(2) In nature, they are always present in optically active form

(3) They are always exist in L forms

(4) In nature, they are present in both L and D forms

Correct Answer: (4) In nature, they are present in both L and D forms

Solution:

α-amino acids are the building blocks of proteins and contain a central carbon atom bonded to an amino group (-NH_2), a carboxyl group (-COOH), a hydrogen atom, and a variable side chain (R group).

1. **Option (1)** is incorrect. Not all α-amino acids contain an asymmetric carbon atom. For example, glycine, the simplest α-amino acid, does not have an asymmetric carbon.

2. **Option (2)** is also incorrect. While α-amino acids are optically active when they contain an asymmetric carbon, not all of them exist in optically active forms in nature.

3. **Option (3)** is incorrect because α-amino acids exist in both L and D forms in nature. However, L-form amino acids are predominantly used in the synthesis of proteins.

4. **Option (4)** is correct. α-amino acids exist in both L- and D-forms. The L-form is primarily found in nature, especially in proteins, while the D-form can be found in some bacterial cell walls.

Thus, the correct answer is option (4): **In nature, they are present in both L and D forms**.

Quick Tip

In nature, amino acids primarily exist in the L-form, and only the L-forms are incorporated into proteins. However, D-forms of some amino acids are found in certain biological systems, like bacterial cell walls.

89. Codex Alimentarius Commission is an international food standard commission?

(1) Jointly established by Food and Agriculture Organization and the World Health Organization

(2) Established by HACCP

(3) Established by FSSAI

(4) Jointly established by FSSAI and HACCP

Correct Answer: (1) Jointly established by Food and Agriculture Organization and the World Health Organization

Solution:

The Codex Alimentarius Commission (CAC) is an international body responsible for establishing food standards, guidelines, and codes of practice to protect consumer health and ensure fair practices in food trade.

1. **Option (1)** is correct. The Codex Alimentarius Commission was established by the Food and Agriculture Organization (FAO) and the World Health Organization (WHO) in 1963. These organizations work together to develop food standards and guidelines for global trade and consumer protection.

2. **Option (2)** is incorrect because HACCP (Hazard Analysis and Critical Control Points) is a food safety management system, not an organization that established Codex.

3. **Option (3)** is incorrect because FSSAI (Food Safety and Standards Authority of India) is an Indian organization and did not establish Codex Alimentarius.

4. **Option (4)** is incorrect because although FSSAI is a food safety authority, it is not involved in the establishment of Codex, and HACCP is not directly involved in the establishment either.

Thus, the correct answer is option (1): **Jointly established by Food and Agriculture Organization and the World Health Organization**.

Quick Tip

The Codex Alimentarius Commission plays a crucial role in ensuring the safety and fairness of international food trade. It sets internationally recognized food standards to help protect consumer health.

90. Heat sterilization method to inactivate deleterious enzymes prior to canning, freezing and drying is .....

(1) Sterilization

(2) Pasteurization

(3) Leaching

(4) Blanching

Correct Answer: (4) Blanching

Solution:

Blanching is a heat treatment process commonly used in food processing to inactivate enzymes that could cause spoilage or loss of quality during canning, freezing, and drying. It involves briefly immersing the food (such as vegetables or fruits) in boiling water or steam and then quickly cooling it. This process helps preserve the color, texture, and nutritional value of the food while preventing enzymatic deterioration.

- **Sterilization** is a more intense heat process used to kill all microorganisms and is typically used for foods that need to be fully sterilized.

- **Pasteurization** is a milder heat treatment, usually used to kill harmful bacteria in liquids like milk but not specifically for inactivating enzymes before canning or freezing.

- **Leaching** refers to the process of extracting substances (often soluble) from solid materials, usually with water, and does not involve heat treatment.

Thus, the correct answer is option (4): **Blanching**, as it is specifically designed to inactivate enzymes prior to canning, freezing, and drying.

Quick Tip

Blanching helps preserve the quality of fruits and vegetables by inactivating enzymes that could lead to spoilage. It is an essential step before freezing or canning certain foods.

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91. The scientific name of barley is:

(1) Triticum vulgare

(2) Hordeum vulgare

(3) Vigna mungo

(4) Oryza sativum

Correct Answer: (2) Hordeum vulgare

Solution:

Barley is a cereal grain, and its scientific name is **Hordeum vulgare**. It is commonly grown for its edible seeds, which are used as food, animal feed, and in the production of beverages such as beer and whiskey.

- **Triticum vulgare** refers to wheat, another cereal grain, not barley.

- **Vigna mungo** is the scientific name for black gram (also known as urad dal), a legume, not barley.

- **Oryza sativum** is the scientific name for rice, a different cereal grain from barley.

Thus, the correct answer is option (2): **Hordeum vulgare** is the scientific name of barley.

Quick Tip

When learning about plants, it's important to remember that different species of cereal grains have distinct scientific names. Barley is specifically **Hordeum vulgare**, not to be confused with wheat or rice.

---

92. The mathematical equation of enthalpy (H) is:

(1) $H = U + pV$

(2) $H = U - pV$

(3) $H = \frac{U}{pV}$

(4) $H = pV$

Correct Answer: (1) $H = U + pV$

Solution:

The mathematical equation for enthalpy (H) is given by:

$$H = U + pV$$

where:

- H is the enthalpy,

- U is the internal energy of the system,

- p is the pressure,

- V is the volume.

This equation is derived from the first law of thermodynamics and represents the total energy of a system, including both the internal energy and the energy required to ”push” against the system’s surroundings due to pressure and volume.

- Option (2) $H = U - pV$ is incorrect because it doesn’t represent the correct relation between enthalpy, internal energy, pressure, and volume.

- Option (3) $H = \frac{U}{pV}$ is also incorrect as it introduces an unnecessary division of U by pV, which doesn’t match the definition of enthalpy.

- Option (4) $H = pV$ is incorrect because it doesn’t account for the internal energy U, which is an essential part of the enthalpy calculation.

Thus, the correct answer is option (1): $H = U + pV$.

Quick Tip

Remember that enthalpy (H) is the sum of internal energy (U) and the energy associated with pressure and volume (pV) in thermodynamic systems.

---

93. Caffeine belongs to ..... class.

(1) Methylxanthine

(2) Ethylxanthine

(3) Trimethylhydroxanthine

(4) Tetrahydromethylxanthine

Correct Answer: (1) Methylxanthine

Solution:

Caffeine is a stimulant that belongs to the **methylxanthine** class of compounds. Methylxanthines are a group of naturally occurring alkaloids that include caffeine, theobromine, and theophylline, which are commonly found in coffee, tea, and cocoa.

- **Ethylxanthine** is not a class caffeine belongs to; it refers to a compound that has an ethyl group, which is not relevant to caffeine.

- **Trimethylhydroxanthine** and **Tetrahydromethylxanthine** are also incorrect, as these are

not the classifications of caffeine. These names refer to derivatives or other related compounds, but caffeine specifically belongs to the methylxanthine class.
Thus, the correct answer is option (1): **Methylxanthine**, as caffeine is part of this group of alkaloids.

Quick Tip

Caffeine is a methylxanthine, a class of compounds known for their stimulating effects on the central nervous system. Other examples include theobromine and theophylline.

---

94. Water activity is defined as:

(1) the vapour pressure of water in substance

(2) a ratio of the vapour pressure of water in substance to vapour pressure of pure water at the different temperatures

(3) a ratio of the vapour pressure of water in substance to vapour pressure of pure water at the same temperature

(4) vapour pressure of pure water

Correct Answer: (3) a ratio of the vapour pressure of water in substance to vapour pressure of pure water at the same temperature

Solution:

Water activity (a_w) is a measure of the availability of water in a substance for biological activity, and it is defined as the ratio of the vapour pressure of water in the substance to the vapour pressure of pure water at the same temperature.

- Option (1) refers to the vapour pressure of water in the substance but does not include the comparison to the vapour pressure of pure water, which is necessary for defining water activity.

- Option (2) includes the comparison to the vapour pressure of pure water, but at different temperatures, which is not the correct definition of water activity, as it must be measured at the same temperature.

- Option (3) is the correct definition, as water activity is the ratio of the vapour pressure of water in the substance to the vapour pressure of pure water at the same temperature.

- Option (4) just refers to the vapour pressure of pure water, which is not the complete definition of water activity.

Thus, the correct answer is option (3): **a ratio of the vapour pressure of water in substance to vapour pressure of pure water at the same temperature.**

Quick Tip

Water activity is an important measure in food science, pharmaceuticals, and microbiology, as it indicates the potential for microbial growth and chemical reactions.

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95. High gravity wort refers to a brew where the original gravity is significantly higher than standard and ranges between:

(1) 13-18° Plato.

(2) 18-20° Plato.

(3) 20-25° Plato.

(4) 25-30° Plato.

Correct Answer: (1) 13-18° Plato.

Solution:

High gravity wort refers to a brewing wort that has a higher sugar concentration compared to standard wort. The original gravity of a brew indicates the amount of dissolved sugars present before fermentation, which affects the alcohol content of the final product. High gravity worts are typically used to produce stronger beers.

The Plato scale is commonly used in brewing to measure the concentration of extract (sugars) in a liquid. A range of 13-18° Plato is considered high gravity, as it is significantly higher than the standard gravity used in regular brewing. This means that the wort has a higher concentration of sugars, which will result in a stronger beer once fermented.

- Option (2) 18-20° Plato is too high for the definition of high gravity wort, as it's generally used for stronger styles of beer. - Option (3) 20-25° Plato is considered a very high gravity range, not typically used for standard brewing practices. - Option (4) 25-30° Plato is far beyond the typical range for high gravity worts, and is used only for brewing very high-alcohol beers.

Thus, the correct answer is option (1): 13-18° Plato.

Quick Tip

High gravity worts typically range from 13-18° Plato, and are used to create stronger beers with higher alcohol content. The higher the Plato value, the more sugar is dissolved in the wort before fermentation.

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96. Penetrometer is a device to:

(1) Measure the tenderness of meat

(2) Measure the taste of meat

(3) Measure the colour of meat

(4) Measure the quantity of meat

Correct Answer: (1) Measure the tenderness of meat

Solution:

A penetrometer is an instrument used to measure the tenderness of meat, specifically by measuring the force required to penetrate a piece of meat. This device is commonly used in food quality testing to determine how tender or soft a piece of meat is, which is an important quality attribute for meat consumers.

- Option (2) refers to measuring the taste of meat, but this is not what a penetrometer is used for.

- Option (3) refers to measuring the color of meat, but again, this is not the function of a penetrometer.

- Option (4) refers to measuring the quantity of meat, which is not the purpose of a penetrometer either.

Thus, the correct answer is option (1): **Measure the tenderness of meat**.

Quick Tip

Penetrometers are key tools in the food industry for assessing the tenderness of various foods, especially meats. A softer texture usually indicates higher tenderness, which can be influenced by factors like the type of meat and cooking method.

97. What are the factors that affect fluid flow regimes?

(1) Mass flow rate, density, viscosity of fluid and geometry of the flow channel

(2) Mass flow rate and geometry of the flow channel

(3) Density and viscosity of the fluid

(4) Geometry of the flow channel only

Correct Answer: (1) Mass flow rate, density, viscosity of fluid and geometry of the flow channel

Solution:

Fluid flow regimes are primarily influenced by a combination of various factors that define how a fluid moves through a channel or pipe. These factors include:

- **Mass flow rate**, which determines how much fluid is flowing through the system over a given period.

- **Density** and **viscosity** of the fluid, as these properties affect the resistance of the fluid to flow.

- **Geometry of the flow channel**, which impacts the flow characteristics such as turbulence, laminar flow, or transition between the two.

Thus, the correct answer is option (1): **Mass flow rate, density, viscosity of fluid and geometry of the flow channel.**

- Option (2) is incorrect because it omits the viscosity and density of the fluid, which are key factors in determining the flow regime.

- Option (3) overlooks the role of the mass flow rate and geometry, which are also essential.

- Option (4) is incomplete, as the geometry alone cannot explain all the flow regimes, as viscosity and mass flow rate are also important.

Therefore, the correct answer is option (1).

Quick Tip

To determine the fluid flow regime, consider not just the geometry of the flow channel, but also the mass flow rate, density, and viscosity of the fluid.

98. Which of the following diseases occurs due to vitamin deficiency:

(1) Hyperthyroidism and hypothyroidism

(2) Pellagra and Beriberi

(3) Phenylketonuria and alkaptonuria

(4) Myositis and Myasthenia gravis

Correct Answer: (2) Pellagra and Beriberi

Solution:

Pellagra and Beriberi are diseases caused by vitamin deficiencies. Specifically:

- **Pellagra** is caused by a deficiency of **niacin** (vitamin B3), and symptoms include dermatitis, diarrhea, and dementia. - **Beriberi** is caused by a deficiency of **thiamine** (vitamin B1), leading to symptoms like weakness, pain in the limbs, and heart problems.

These two diseases are directly related to the lack of essential vitamins in the diet, making option (2) the correct answer.

- Option (1), **Hyperthyroidism and hypothyroidism**, are disorders of the thyroid gland and are not related to vitamin deficiencies. They are typically caused by hormonal imbalances.

- Option (3), **Phenylketonuria** and **alkaptonuria**, are genetic disorders related to amino acid metabolism, not vitamin deficiencies.

- Option (4), **Myositis** and **Myasthenia gravis**, are autoimmune or muscle-related disorders and do not stem from vitamin deficiencies.

Thus, the correct answer is option (2): **Pellagra and Beriberi**.

Quick Tip

Deficiencies in essential vitamins, like niacin and thiamine, lead to conditions such as Pellagra and Beriberi, respectively. Ensuring a balanced diet rich in vitamins is key to preventing these diseases.

---

99. Maillard browning is a:

(1) Enzymatic reaction between amino acids and reducing sugars

(2) Non-enzymatic reaction between amino acids and reducing sugars

(3) Enzymatic reaction between amino acids and lipids

(4) Non-enzymatic reaction between amino acids and lipids

Correct Answer: (2) Non-enzymatic reaction between amino acids and reducing sugars

Solution:

The Maillard reaction is a non-enzymatic reaction between amino acids and reducing sugars. This reaction is responsible for the browning of food during cooking and is important in the development of flavors, especially in roasted or fried foods. It is a complex series of chemical reactions that occur when amino acids (the building blocks of proteins) react with reducing sugars at elevated temperatures.

- Option (1) is incorrect because Maillard browning does not involve an enzymatic reaction; it is non-enzymatic in nature.
- Option (3) and (4) are incorrect because Maillard browning does not involve lipids, but rather the reaction of amino acids and reducing sugars.

Thus, the correct answer is option (2): **Non-enzymatic reaction between amino acids and reducing sugars.**

Quick Tip

The Maillard reaction is crucial in cooking, as it contributes to the flavor and color of browned foods. It is often associated with cooking methods like roasting, baking, and frying.

---

100. What is the principle of centrifugation?

(1) Sedimentation principle

(2) Filtration principle

(3) Evaporation principle

(4) Size reduction principle

Correct Answer: (1) Sedimentation principle

Solution:

Centrifugation is based on the **sedimentation principle**, which involves the separation of particles from a liquid or suspension by the application of centrifugal force. The principle behind centrifugation is that particles of different densities will experience different levels of

force when subjected to a rotating force (centrifugal force). Heavier particles will settle faster at the bottom of the container, whereas lighter particles will stay suspended in the liquid.
- Option (2), the **filtration principle**, is incorrect because filtration involves separating particles from a liquid using a porous medium. It is not related to centrifugal force.
- Option (3), the **evaporation principle**, refers to the process where a liquid is converted into a gas due to heat, which is also unrelated to centrifugation.
- Option (4), the **size reduction principle**, involves reducing the size of particles and is not related to the concept of centrifugation.
Thus, the correct answer is option (1): **Sedimentation principle**.

Quick Tip

Centrifugation is a key technique used in laboratories to separate particles based on their size and density. Understanding the sedimentation principle can help in optimizing the process for better separation efficiency.

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101. The basic law of fluid flow through porous media is known as:

(1) Boltzmann law

(2) Bernoulli's law

(3) Darcy Law

(4) Stokes law

Correct Answer: (3) Darcy Law

Solution:

Darcy's law is the fundamental principle used to describe the flow of fluids through porous media. It states that the flow rate of a fluid through a porous medium is proportional to the pressure difference and the permeability of the medium. The equation is expressed as:

$$Q = -k \cdot A \cdot \frac{\Delta P}{\mu \cdot L}$$

Where:

- Q is the flow rate,
- k is the permeability of the medium,
- A is the cross-sectional area of the flow,

- ΔP is the pressure difference,

- μ is the dynamic viscosity of the fluid, and

- L is the length of the porous medium.

- Option (1) **Boltzmann law** describes the behavior of particles in gases, particularly their distribution in terms of energy, and is unrelated to fluid flow through porous media.

- Option (2) **Bernoulli's law** is used to describe the behavior of a moving fluid, typically along a streamline, and does not apply to flow through porous media.

- Option (4) **Stokes law** describes the motion of spherical particles through a viscous fluid, but is not the governing law for flow through porous media.

Thus, the correct answer is option (3): **Darcy Law**.

Quick Tip

When dealing with fluid flow through porous materials, remember that Darcy's law provides the relationship between flow rate and pressure difference, accounting for permeability and fluid viscosity.

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102. Which of the following is a size reduction unit operation in liquids?

(1) Milling

(2) Homogenization

(3) Grinding

(4) Mixing

Correct Answer: (2) Homogenization

Solution:

Homogenization is a size reduction operation that is typically used for liquids, where the goal is to break down larger particles or droplets into finer, more uniform sizes. This process is essential in industries like food and pharmaceuticals to create consistent product quality, such as emulsions or suspensions. Homogenizers use high pressure or mechanical force to break down particles into smaller sizes.

- Option (1) **Milling** is generally used for size reduction in solids rather than liquids, although there are certain types of milling that can be applied to liquids.

- Option (3) **Grinding** is also a size reduction process but is typically used for solid materials.
- Option (4) **Mixing** involves blending different substances together but does not necessarily reduce the size of particles in liquids.

Therefore, the correct answer is option (2): **Homogenization**.

Quick Tip

In the processing of liquids, homogenization is the key technique for achieving uniform particle sizes, especially for emulsions and suspensions.

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103. If the value of Reynolds number > 10000 for an impeller, the power number:

(1) Increases first and then decreases with an increase in impeller Reynolds number

(2) Increase with an increase in impeller Reynolds number

(3) Remains constant with an increase in impeller Reynolds number

(4) Decreases first and then increases with an increase in impeller Reynolds number

Correct Answer: (3) Remains constant with an increase in impeller Reynolds number

Solution:

For Reynolds numbers greater than 10,000, the flow generally becomes turbulent, and the power number tends to remain constant. This behavior occurs because, in this range, the flow regime is well established and independent of changes in Reynolds number. The power number is a dimensionless number that characterizes the power consumption of an impeller in turbulent flow.

- Option (1) **Increases first and then decreases with an increase in impeller Reynolds number** is incorrect because, for Reynolds numbers above 10,000, the power number does not follow this pattern.
- Option (2) **Increase with an increase in impeller Reynolds number** is incorrect, as the power number tends to remain constant rather than increase.
- Option (4) **Decreases first and then increases with an increase in impeller Reynolds number** is also incorrect since the power number remains constant in this Reynolds number range.

Thus, the correct answer is option (3): **Remains constant with an increase in impeller Reynolds number**.

Quick Tip

When dealing with turbulent flow and Reynolds numbers greater than 10,000, remember that the power number typically stabilizes and does not change significantly with further increases in Reynolds number.

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104. In a feedback control of milk heat exchanger:

(1) A thermometer measures the temperature of the milk coming out of the heat exchanger and sends to the controller a measurement signal

(2) Temperature of the milk is not measured through feedback control of milk heat exchanger

(3) A thermometer measures the temperature of the milk entering the heat exchanger and sends a measurement signal to the controller.

(4) A thermometer measures the temperature of the milk entering the heat exchanger first and then measure temperature coming out of the heat exchanger

Correct Answer: (1) A thermometer measures the temperature of the milk coming out of the heat exchanger and sends to the controller a measurement signal

Solution:

In a feedback control system, the temperature of the milk exiting the heat exchanger is measured using a thermometer. This temperature is used as a feedback signal for the controller, which regulates the heat exchanger's operation. The controller adjusts the temperature by responding to the measurements taken at the exit of the heat exchanger to ensure the milk's temperature remains at the desired setpoint. This process is crucial in maintaining consistent product quality during pasteurization or other thermal processes.

- Option (2) **Temperature of the milk is not measured through feedback control of milk heat exchanger** is incorrect as feedback control relies on the temperature measurement to adjust the system.

- Option (3) **A thermometer measures the temperature of the milk entering the heat exchanger and sends a measurement signal to the controller.** is incorrect because the

input temperature isn't typically measured for the feedback loop.

- Option (4) **A thermometer measures the temperature of the milk entering the heat exchanger first and then measure temperature coming out of the heat exchanger** is incorrect as feedback control focuses on the output (exiting) temperature.

Thus, the correct answer is option (1): **A thermometer measures the temperature of the milk coming out of the heat exchanger and sends to the controller a measurement signal**.

Quick Tip

In a typical feedback control loop for heat exchangers, the key measurement is the temperature of the fluid leaving the system. This ensures that the controller can adjust the system based on the actual temperature of the fluid exiting the process.

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105. The process of food preservation using drying technique:

(1) Increases water activity

(2) No change in water activity

(3) Reduces water activity

(4) Independent of water activity

Correct Answer: (3) Reduces water activity

Solution:

The drying technique in food preservation primarily works by removing moisture or water content from the food. As the moisture content decreases, so does the water activity. Water activity is an essential factor in microbial growth and food spoilage. By reducing water activity, drying helps in preserving the food by slowing down the growth of bacteria, yeasts, and molds, which require water to thrive.

- Option (1) **Increases water activity** is incorrect because drying reduces, not increases, the water activity in food.

- Option (2) **No change in water activity** is incorrect because drying inevitably reduces the water activity in food.

- Option (4) **Independent of water activity** is incorrect because the fundamental mechanism

behind drying is the reduction of water activity.

Thus, the correct answer is option (3): **Reduces water activity**.

Quick Tip

Drying food to preserve it reduces water activity, which is crucial for preventing the growth of spoilage microorganisms. Foods with low water activity remain stable for longer periods.

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106. If a culture starts with 500 bacteria and doubles every hour, how many bacteria will there be after 4 hours?

(1) 4×10^3

(2) 8×10^3

(3) 6×10^3

(4) 5×10^3

Correct Answer: (2) 8×10^3

Solution:

In this problem, the number of bacteria doubles every hour, which follows an exponential growth pattern. The formula for exponential growth is:

$$N(t) = N_0 \times 2^t$$

Where:

- $N(t)$ is the number of bacteria at time t.
- N_0 is the initial number of bacteria.
- t is the time in hours.

Given:

- Initial bacteria $N_0 = 500$.
- Time $t = 4$ hours.

Substitute these values into the formula:

$$N(4) = 500 \times 2^4 = 500 \times 16 = 8000 = 8 \times 10^3$$

Thus, the number of bacteria after 4 hours is 8×10^3. Therefore, the correct answer is option (2).

Quick Tip

Exponential growth can be calculated using the formula $N(t) = N_0 \times 2^t$, where N_0 is the initial amount, and t is the time elapsed. Each hour, the population doubles.

---

107. PFA act was established in the year:

(1) 1954

(2) 1955

(3) 1956

(4) 1965

Correct Answer: (1) 1954

Solution:

The Prevention of Food Adulteration (PFA) Act was enacted in the year 1954 in India. The PFA Act aims to ensure the safety and quality of food products consumed by the public, and to prevent adulteration of food. It is a significant law in food safety and health regulations in India.

Quick Tip

The Prevention of Food Adulteration Act (PFA) was introduced in 1954. It is crucial for regulating food quality and preventing adulteration, ensuring consumer safety.

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108. Alpha tocopherol contains:

(1) No methyl group attached to chromanol ring

(2) One methyl group attached to chromanol ring

(3) Eight methyl groups attached to chromanol ring

(4) Three methyl groups attached to chromanol ring

Correct Answer: (4) Three methyl groups attached to chromanol ring

Solution:

Alpha tocopherol is the most active form of Vitamin E in the human body, playing a critical role in protecting cells from oxidative damage. It is a fat-soluble antioxidant that has a chemical structure consisting of a chromanol ring, which is a six-membered aromatic ring containing an oxygen atom. Attached to this chromanol ring are various functional groups, including methyl groups, which are crucial for its antioxidant activity.

In alpha tocopherol, specifically, there are three methyl groups attached to the chromanol ring. These methyl groups help stabilize the structure and enhance its ability to scavenge free radicals, thereby preventing oxidative stress and protecting cellular membranes. The presence of these methyl groups also makes alpha tocopherol more potent than other forms of Vitamin E, like beta or gamma tocopherol, which have different methyl group arrangements.

It's important to note that these methyl groups are vital for the antioxidant function of alpha tocopherol. Without these groups, the compound would not be as effective in neutralizing free radicals or in protecting cell membranes from oxidative damage. The structure of tocopherols, including the chromanol ring and methyl groups, allows them to interact with lipids in cellular membranes, preventing lipid peroxidation and maintaining membrane integrity.

This detailed structure-activity relationship makes alpha tocopherol an essential molecule for human health, particularly in preventing diseases related to oxidative stress, such as heart disease and certain cancers.

Quick Tip

Alpha tocopherol, the most active form of Vitamin E, contains three methyl groups attached to the chromanol ring. These groups are essential for its potent antioxidant activity, helping to protect cells from oxidative damage.

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109. The relationship between pressure drop and velocity follows:

(1) Hooke's law

(2) Stokes' Law

(3) Bernoulli Law

(4) Venturi's Law

Correct Answer: (3) Bernoulli Law

Solution:

The relationship between pressure drop and velocity is governed by Bernoulli's Law, which is fundamental in fluid dynamics. Bernoulli's equation describes the conservation of mechanical energy in flowing fluids. It relates pressure, velocity, and elevation in a streamline flow, assuming no energy losses. Specifically, it can be written as:

$$P + \frac{1}{2}\rho v^2 + \rho g h = \text{constant}$$

where:

- P is the pressure,
- ρ is the fluid density,
- v is the velocity,
- g is the acceleration due to gravity,
- h is the elevation.

In simpler terms, Bernoulli's principle states that as the velocity of a fluid increases, the pressure exerted by the fluid decreases, and vice versa. This relationship shows that for a given fluid, if the velocity increases in a specific region of the flow, the pressure in that region will drop. This phenomenon is important in various engineering applications, such as in aircraft wings, piping systems, and fluid transport systems. Bernoulli's Law assumes that the flow is ideal, meaning it is incompressible and there is no energy loss due to friction.

In contrast, Hooke's law relates to elasticity, describing how materials stretch or compress under force. Stokes' law describes the motion of spherical objects through a viscous fluid, and Venturi's law deals with the flow of fluid through a constricted pipe, leading to a pressure drop and increase in velocity, but Bernoulli's law provides a more direct and generalized explanation of the relationship between pressure and velocity.

Quick Tip

Bernoulli's Law explains the inverse relationship between pressure and velocity in a fluid flow. As velocity increases, pressure decreases, and this principle is essential in many fluid dynamics applications.

110. Identify the index organism of pasteurization efficacy:

(1) Escherichia coli

(2) Bacillus subtilis

(3) Staphylococcus aureus

(4) Coxiella burnetti

Correct Answer: (4) Coxiella burnetti

Solution:

Coxiella burnetti is the index organism of pasteurization efficacy. This organism is used to evaluate the effectiveness of pasteurization because it is more heat-resistant than many other microorganisms commonly found in food and beverages. Coxiella burnetti is a bacterium that causes Q fever and is used as the reference microorganism for testing pasteurization processes, particularly in the dairy industry.

The rationale for using Coxiella burnetti is based on its high resistance to heat, which makes it a challenging organism to kill during pasteurization. When pasteurization conditions are set to effectively destroy Coxiella burnetti, it ensures that other less heat-resistant pathogens will also be eliminated or inactivated, ensuring the safety of the product.

Other microorganisms like Escherichia coli, Bacillus subtilis, and Staphylococcus aureus are important in food safety but are not as resilient to heat as Coxiella burnetti. Therefore, they are not used as standard indicators for pasteurization efficacy.

Quick Tip

Coxiella burnetti is chosen as the standard indicator for pasteurization efficacy due to its exceptional heat resistance. If pasteurization can eliminate this pathogen, it ensures the process is effective for most foodborne microorganisms.

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111. Role of Gram's Iodine in gram staining technique:

(1) Enhances the binding of crystal violet to cell wall

(2) Blocks the binding of crystal violet to cell wall

(3) Neither blocks nor enhances the binding of crystal violet to cell wall

(4) Enhances the ability of alcohol to remove the binding of crystal violet to cell wall

Correct Answer: (1) Enhances the binding of crystal violet to cell wall

Solution:

Gram's iodine plays an essential role in the Gram staining technique. When performing the Gram stain, crystal violet, the primary stain, is applied to bacterial cells. Gram's iodine acts as a mordant, which forms a complex with crystal violet. This iodine-crystal violet complex gets trapped in the thick peptidoglycan layer of Gram-positive bacteria, enhancing the binding of crystal violet to the cell wall.

Iodine's role is crucial in intensifying the color of the stain and aiding in the retention of the crystal violet within the cell wall, making the Gram-positive bacteria appear purple. This is in contrast to Gram-negative bacteria, where the thinner peptidoglycan layer does not retain the iodine-crystal violet complex, leading to the use of a counterstain (usually safranin) to visualize them as red or pink.

Without the iodine step, the crystal violet would not form such a stable complex, and the staining results would be inaccurate. Therefore, Gram's iodine enhances the binding of crystal violet to the cell wall, making it a vital component of the Gram staining process.

Quick Tip

Gram's iodine is used in the Gram staining process to form a crystal violet-iodine complex, which strengthens the color retention in Gram-positive bacteria's thick peptidoglycan layer.

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112. Which of the following is a phospholipid?

(1) Lecithin

(2) Arachidonic acid

(3) Ergosterol

(4) Cerebroside

Correct Answer: (1) Lecithin

Solution:

Phospholipids are a class of lipids that are a major component of all cell membranes. They consist of two fatty acid tails (hydrophobic) and a phosphate group (hydrophilic) attached to

a glycerol backbone. Lecithin is a type of phospholipid found in plant and animal tissues. It is commonly used in food products and as a supplement.

Lecithin is composed of choline, which is a part of the phosphate group, making it a typical phospholipid. Phospholipids like lecithin are vital in forming the lipid bilayer in biological membranes, which forms a barrier and provides structural integrity to cells.

The other options listed:

- Arachidonic acid is a fatty acid.

- Ergosterol is a sterol, found in fungal cell membranes.

- Cerebroside is a type of glycolipid, which consists of a sugar and a lipid but lacks a phosphate group, making it not a phospholipid.

Therefore, Lecithin is the correct answer.

Quick Tip

Lecithin is an important phospholipid commonly used in food products and as a supplement. It is composed of glycerol, fatty acids, and a phosphate group.

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113. The gelling agent in the preparation of jam is:

(1) Lectin

(2) Rutin

(3) Pectin

(4) Inulin

Correct Answer: (3) Pectin

Solution:

Pectin is the correct answer because it is the primary gelling agent used in the preparation of jams and jellies. It is a naturally occurring carbohydrate found in the cell walls of fruits, especially in apples, citrus fruits, and berries. Pectin has the ability to form a gel when combined with sugar and acid, which is why it is used in the production of jams and jellies to give them their characteristic texture.

The other options listed:

- **Lectin** is a type of protein that can bind to specific sugars but is not used as a gelling agent

in food products.

- **Rutin** is a type of flavonoid found in plants but does not have gelling properties.

- **Inulin** is a type of carbohydrate (fructan) found in plants, primarily used as a fiber supplement, but it is not used as a gelling agent in jam.

Thus, Pectin is the correct choice for the gelling agent in jams.

Quick Tip

Pectin is widely used in the food industry for its gelling ability, especially in jams and jellies. It requires the presence of sugar and acid to form a gel.

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114. Consumer protection act was established in the year?

(1) 1987

(2) 1980

(3) 1986

(4) 1979

Correct Answer: (3) 1986

Solution:

The Consumer Protection Act, which is an important piece of legislation in India aimed at protecting the rights of consumers, was enacted in the year **1986**. This act established consumer councils at both the central and state levels to address grievances related to the unfair trade practices faced by consumers. The law provides a framework for consumers to file complaints regarding defective goods, unfair trade practices, and service deficiencies.

The options listed:

- **1987** is incorrect because the Consumer Protection Act was enacted in 1986, not in 1987.

- **1980** is also incorrect as it predates the establishment of the act.

- **1979** is incorrect for the same reason, as the act was established in 1986, not earlier.

Thus, the correct year of establishment of the Consumer Protection Act is 1986.

Quick Tip

The Consumer Protection Act of 1986 is a landmark law in India that empowers consumers to seek redressal in case of grievances related to unfair trade practices.

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115. Spice oils are extracted by a process known as:

(1) Fermentation

(2) Steam distillation

(3) Sublimation

(4) Milling

Correct Answer: (2) Steam distillation

Solution:

Spice oils, which are essential oils derived from various spices, are extracted using the process of **steam distillation**. This method involves passing steam through the spice material, which causes the essential oils to evaporate. The vapors are then condensed back into liquid form, separating the essential oils from the rest of the plant material.

Let's review the options: - **Fermentation** (Option 1) is not correct because it involves the breakdown of organic substances by microorganisms, typically used for alcohol or bread production.

- **Sublimation** (Option 3) is incorrect because it refers to the transition of a substance from solid to gas without passing through the liquid phase, which is not relevant to the extraction of spice oils.

- **Milling** (Option 4) refers to grinding or crushing, not an extraction method, and hence is also incorrect.

Thus, **steam distillation** is the correct process for extracting spice oils.

Quick Tip

Steam distillation is widely used for extracting essential oils from plants and spices, as it ensures that the volatile compounds are not destroyed by excessive heat.

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116. Which international standardization organization represents food safety management system?

(1) ISO 20000

(2) ISO 22000

(3) ISO 02000

(4) ISO 22200

Correct Answer: (2) ISO 22000

Solution:

The correct international standardization organization for food safety management is **ISO 22000**. This standard defines the requirements for a food safety management system that ensures the safety of food at every step in the food chain, from farm to table.

Let's evaluate the options:

- **ISO 20000** (Option 1) is incorrect. This standard pertains to information technology service management.

- **ISO 02000** (Option 3) is a non-existent ISO standard number and is not related to food safety.

- **ISO 22200** (Option 4) is also incorrect. This standard does not relate to food safety management.

Thus, **ISO 22000** is the correct answer. It sets the criteria for a food safety management system that helps organizations ensure their food products are safe for consumption.

Quick Tip

ISO 22000 provides a framework for implementing food safety systems across the entire food chain, focusing on food safety hazards and their control.

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117. If the melting point of oils are low as compared to its surrounding temperature, then oils remain in:

(1) gaseous state

(2) solid state

(3) liquid state

(4) vapour state

Correct Answer: (2) solid state

Solution:

When the melting point of oils is low compared to the surrounding temperature, the oils will remain in the **solid state**. This is because the oil will not melt as its melting point is lower than the surrounding temperature, keeping it solid.

Now, let's examine the options:

- **Gaseous state (Option 1)** is incorrect. Oils in this case will not turn into gas since they will not reach their boiling point.

- **Liquid state (Option 3)** is also incorrect. If the oil does not reach its melting point, it will remain solid.

- **Vapour state (Option 4)** is incorrect for the same reason: the oil will not evaporate since its melting point is lower than the surrounding temperature.

Therefore, the correct answer is **solid state**, where the oils will remain in their solid form because they cannot melt or transition into a liquid state.

Quick Tip

Oils with low melting points can be solidified at a lower surrounding temperature compared to oils with higher melting points.

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118. A wet food product contains 70% water. After drying, it is found that 70% of original water has been removed. The mass of water removed per kilogram of wet food is:

(1) 4.9 kg

(2) 49 kg

(3) 0.49 kg

(4) 0.049 kg

Correct Answer: (3) 0.49 kg

Solution:

Given that the wet food contains 70% water, we can express the amount of water in 1 kg of

the wet food as:

$$\text{Initial water} = 70\% \text{ of } 1 \text{ kg} = 0.70 \text{ kg}$$

After drying, 70% of the original water has been removed. The mass of water removed is therefore:

$$\text{Water removed} = 70\% \times 0.70 \text{ kg} = 0.49 \text{ kg}$$

Thus, the mass of water removed per kilogram of wet food is **0.49 kg**.

Now, let's examine the options:

- **Option (1) 4.9 kg** is incorrect. This value would be relevant if the food contained 100% water.

- **Option (2) 49 kg** is incorrect. This is far too large for 1 kg of wet food.

- **Option (4) 0.049 kg** is also incorrect. This is too small when considering the mass of water in 1 kg of food.

Thus, the correct answer is **0.49 kg**.

Quick Tip

To calculate the mass of water removed, multiply the percentage of original water removed by the initial amount of water in the food.

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119. Miso is a product of:

(1) Fermented mangoes

(2) Fermented Soya beans

(3) Fermented grapes

(4) Fermented cabbage

Correct Answer: (2) Fermented Soya beans

Solution:

Miso is a traditional Japanese food product that is made from fermented soya beans. The fermentation process involves using the fungus *Aspergillus oryzae* to ferment the soybeans along with other ingredients like salt and water. This results in a paste with a rich, savory flavor commonly used in soups, sauces, and other dishes.

Now, let's analyze the options:

- **Option (1) Fermented mangoes** is incorrect. Mangoes are not typically used in the production of miso.
- **Option (3) Fermented grapes** is incorrect. Grapes are not used to make miso.
- **Option (4) Fermented cabbage** is also incorrect. Cabbage is used in the making of other fermented products like sauerkraut, not miso.

Thus, the correct answer is **Fermented Soya beans**.

Quick Tip

Miso is typically made from fermented soybeans and is an essential ingredient in Japanese cuisine. It's rich in protein and is often used to add umami flavor to dishes.

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120. Fat bloom is the defect found in:

(1) Margarine

(2) Yoghurt

(3) Ghee

(4) Chocolate

Correct Answer: (4) Chocolate

Solution:

Fat bloom is a defect that commonly occurs in chocolate. It is caused by the migration of fat (usually cocoa butter) to the surface of chocolate, leading to the appearance of a white, powdery or greasy film. This happens when the chocolate is exposed to temperature fluctuations or stored improperly. The fat crystallizes on the surface, forming the bloom. While fat bloom does not affect the safety of the chocolate, it does reduce its aesthetic appeal and texture.

In the context of other food products mentioned in the options:

- Margarine, ghee, and yoghurt typically do not exhibit fat bloom as they have different fat compositions and do not undergo the same crystallization process during storage as chocolate. Fat bloom specifically occurs in products like chocolate that contain cocoa butter, which is sensitive to temperature changes.

The correct answer is (4) Chocolate, where fat bloom is most commonly observed due to the

unique properties of cocoa butter and the way chocolate is processed and stored.

Quick Tip

Fat bloom in chocolate occurs when the cocoa butter migrates to the surface due to temperature changes. This is common in chocolate and does not affect its safety, but it does affect the texture and appearance. Store chocolate in a stable, cool environment to avoid fat bloom.
