MISSION MBBS

Date: 05/11/2022

Subject: BOTANY

Topic : MICROBES IN HUMAN WELFARE L1

Class: Standard XII

1. Lactic acid bacteria (LAB) grow in milk and convert it into curd. During growth, the LAB produces acids that

   ✗ **A.** coagulate and completely digest the milk proteins

   ✗ **B.** coagulate and completely digest the milk sugars

   ✓ **C.** coagulate and partially digest the milk proteins

   ✗ **D.** coagulate and partially digest the milk sugars

   Curd is produced by the fermentation of milk by the lactic acid bacteria (LAB).

   During curd preparation, a small amount of curd is added to the fresh milk and is kept undisturbed at a warm temperature. The small amount of curd added as an inoculum or starter contains millions of LAB. These bacteria grow in milk and breakdown the lactose sugar in the milk to lactic acid.

   The lactic acid formed causes the coagulation and partial digestion of the milk proteins(casein) which precipitate as curd.
   Thus, we can say that option c is correct.

2. Curd is easy to digest than milk because

A. it contains vitamin B_{12}

B. it does not contain proteins

C. it contains partially digested proteins

D. it contains lactose

Curd is obtained by the fermentation of milk by lactic acid bacteria such as *Lactobacillus.*These microbes convert the lactose present in the milk, in the absence of oxygen, to form lactic acid.

The lactic acid lowers the pH of milk causing the coagulation and partial digestion of the milk proteins. Thus, curd is formed.

It is easier for the proteolytic (protein digesting) enzymes of our digestive system to break down the partially digested proteins, present in curd. This is what makes curd easily digestible.

The lactic acid bacteria present in curd produces Vitamin B_{12} which enhances its nutritional quality. Vitamin B_{12} is essential for the synthesis of red blood cells in the body.

Most of the lactose in the milk is converted into lactic acid by the lactic acid bacteria during curd formation. Hence, curd has less amount of lactose. Therefore, the correct answer is 'it contains partially digested proteins'.

3. During bread making, baker's yeast is added to the bread dough. The yeast in the dough

A. releases oxygen causing the dough to “puff up" or rise

B. releases carbon dioxide causing the dough to “puff up" or rise

C. produces ethyl alcohol preventing the dough to “puff up" or rise

D. makes the bread very hard

Baker's yeast is a unicellular fungus that is widely used in the baking industry for its ability to raise the bread dough, making it soft and fluffy. Baker's yeast is known as *Saccharomyces cerevisiae.*

4. Identify the organism responsible for the formation of holes in the product shown in the image below.

A. *Penicillium roqueforti*

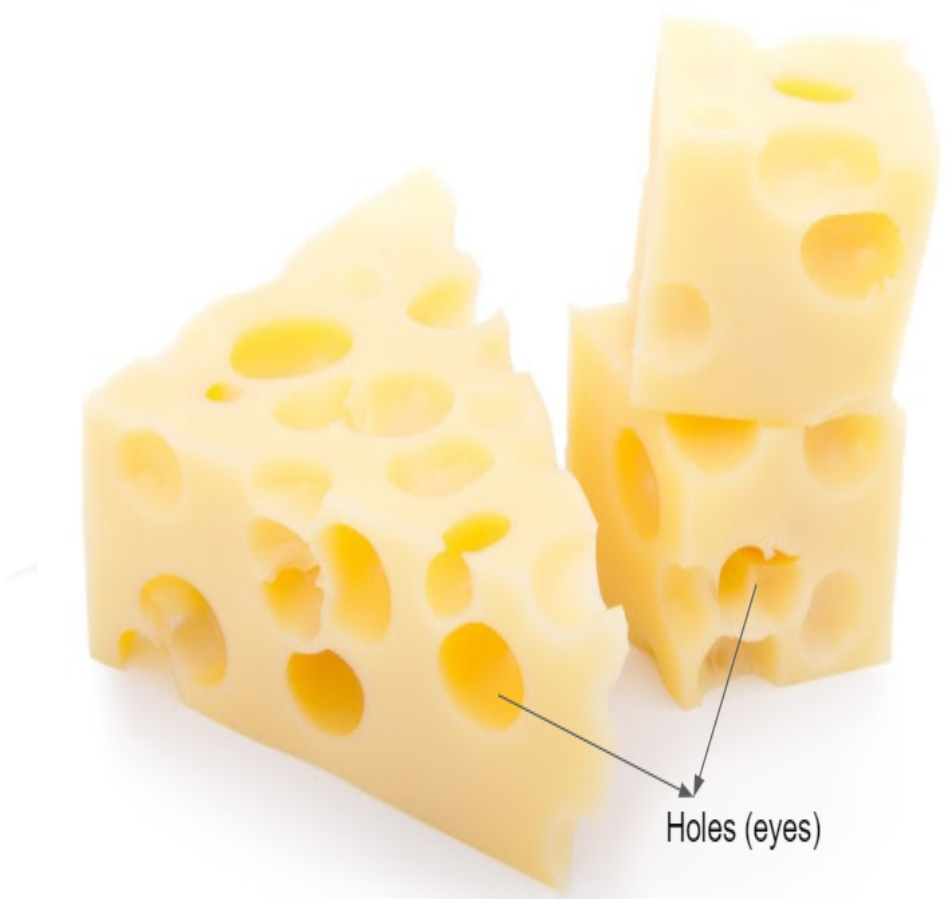
B. *Penicillium camemberti*

C. *Propionibacterium sharmanii*

D. *Saccharomyces cerevisiae*

There are several varieties of cheese prepared by the fermentation of milk by different microbes of choice. The image of the product given in the question is that of Swiss cheese.

After curdling the milk using lactic acid bacteria, the moisture is removed from the curd and salt is added to it. The curd is then allowed to ripen under the action of *Propionibacterium sharmanii.* The bacteria acts on lactic acid producing propionic acid and carbon dioxide. The production of a large amount of carbon dioxide causes large holes. These holes are also called eyes.



SWISS CHEESE

Camembert cheese is obtained from the cow's milk. This cheese is ripened by the action of *Penicillium camemberti*. This cheese is known for its smooth texture.

Penicillium roqueforti is used for the ripening of Roquefort cheese.

Saccharomyces cerevisiae is used for bread and wine making.

5. Assertion: Swiss cheese has large holes due to the production of a large amount of carbon dioxide.
Reason: *Propionibacterium sharmanii* used for the ripening of Swiss cheese utilises lactic acid to produce propionic acid and carbon dioxide.

- ✓ **A.** Both assertion and reason are true and the reason is the correct explanation for the assertion
- ✗ **B.** Both assertion and reason are true but the reason is not the correct explanation for the assertion
- ✗ **C.** Only assertion is true
- ✗ **D.** Both assertion and reason are false

Cheese is a fermented milk product. Swiss cheese is a particular type of cheese that is characterised by the presence of large holes.

Fig: Swiss Cheese

After curdling of milk with lactic acid bacteria and salting, *Propionibacterium sharmanii* is added for the ripening of cheese and adding the flavor. The bacteria utilises the lactic acid in the curd to produce propionic acid and carbon dioxide. The carbon dioxide gas rises through the cheese block,

creating large holes in it. Thus, large holes are produced by the action of the bacterium *Propionibacterium sharmanii.*

Thus, both assertion and reason are true and the reason is the correct explanation for the assertion.

6. Which process is responsible for the making of bread and wine?

- **A.** Filtration
- **B.** Fermentation
- **C.** Sedimentation
- **D.** Leavening

Fermentation is an enzyme catalysed metabolic process, where organisms (such as yeast and bacteria) convert sugars to alcohol or an acid anaerobically and release very little energy.

For making bread, baker's yeast is used. Under anaerobic conditions, yeast undergoes fermentation. The yeast converts the carbohydrates in the bread dough into ethanol and releases carbon dioxide gas. The carbon dioxide makes the dough rise. This is called leavening of bread.

Hence, the process responsible for the making of bread and wine is fermentation.

Filtration is defined as the process of separating solid matter suspended in a liquid, by passing through the pores or a membrane, called a filter.

Sedimentation is another simple separation method used to separate particles based on their size.

7. Toddy is prepared by the fermentation of _____ .

A. rice grains

B. sap from palms

C. grape juice

D. whey

Fermentation is an enzyme catalysed metabolic process, where organisms (such as yeast and bacteria) convert sugars to alcohol or an acid anaerobically and release very little energy.

Toddy is an alcoholic drink of some parts of southern India which is formed due to the fermentation of the sap collected from palm trees. The fermentative activities of the microbes result in the generation of alcohol.

Sake is an alcoholic beverage made from fermented rice.

Grape juice is fermented by *Saccharomyces cerevisiae* to produce an alcoholic beverage called wine.

Whey is the liquid left behind after curdling of milk. It contains a considerable amount of lactose (milk sugar) and is often fermented for obtaining alcoholic beverages but not toddy.

8. Roquefort cheese: *Penicillium roqueforti* :: Swiss cheese:_____

A. *Penicillium camemberti*

B. *Saccharomyces cerevisiae*

C. *Salmonella typhi*

D. *Propionibacterium sharmanii*

Swiss cheese is characterised by the presence of large holes created due to the production of carbon dioxide by the bacterium *Propionibacterium sharmanii* during the ripening process.

Fig: Swiss cheese

Roquefort cheese is obtained from the fermentation of sheep's milk. This cheese comes from the south of France. It is ripened by using a fungus called *Penicillium roqueforti*. The growth of the mold appears as greenish-blue strings on the cheese which is why it is categorised as a blue cheese.

Fig: Roquefort cheese

Camembert cheese is obtained from the cow's milk. This cheese is ripened by the action of *Penicillium camemberti.* This cheese is known for its smooth texture.

Saccharomyces cerevisiae or baker's yeast is used for the production of bread.

Salmonella typhi is a pathogenic bacteria that causes typhoid fever in human beings.

9. Which of the following pH values is responsible for the curd formation by *Lactobacillus*?

A. Around 6.7

B. Around 8.7

C. Around 7

D. Around 4

Curd is a food product obtained by the fermentative activities of the lactic acid bacteria (LAB) such as *Lactobacillus* on milk. The pH of the milk generally lies within a narrow range of 6.5-6.7 (slightly acidic).

To prepare curd, a small amount of curd is added to the milk as inoculum; the lactic acid bacteria (LAB) present in the inoculum (curd) start multiplying by feeding on the lactose (sugar) present in the milk. These bacteria anaerobically breakdown lactose to form lactic acid. As the bacteria multiply, the lactic acid concentration increases, thereby reducing the pH of milk to 4 or less within a few hours.

At around pH 4 (highly acidic pH), the milk protein casein starts to coagulate/aggregate to precipitate as curd. Thus, option d is the correct answer.

The pH 7 is considered to be neutral and 8.7 is considered to be alkaline pH. Curd is not formed at neutral or alkaline pH values by *Lactobacillus.*

10. Renuka's mother made dosa batter. Instead of storing it in the fridge, she left the container with the batter in the kitchen overnight. While making breakfast in the morning, when Renuka opened the container, the batter was puffed up. What is the reason behind this?

- ✗ **A.** The batter must have absorbed moisture from the air and puffed up
- ✗ **B.** Renuka's mother must have added extra water in the batter
- ✓ **C.** Release of carbon dioxide by fermentative microbes growing in the batter must have caused the batter to puff up
- ✗ **D.** Renuka's mother must have added salt and extra rice in the batter

Many household food items like curd, dosa, idli, are made with the help of the fermentative activities of microbes.

Renuka's mother left the dosa batter (dosa batter is prepared by finely grinding the soaked rice and black gram) in a container overnight, before preparing the dosa, to allow it to ferment. Storing it in the fridge would have stalled microbial growth.

The microorganisms naturally present in the batter grow rapidly which ferment the sugars present in the batter and release carbon dioxide. The released carbon dioxide rises through the batter causing it to increase in volume and puff up.

The warmer room temperature causes faster fermentation due to the rapid growth of the microbes.

The addition of extra water or rice to the batter will disturb the right consistency that is needed to make the dosa but will not cause it to puff up.

Addition of extra salt would affect the taste of the batter but will not cause it to puff up.