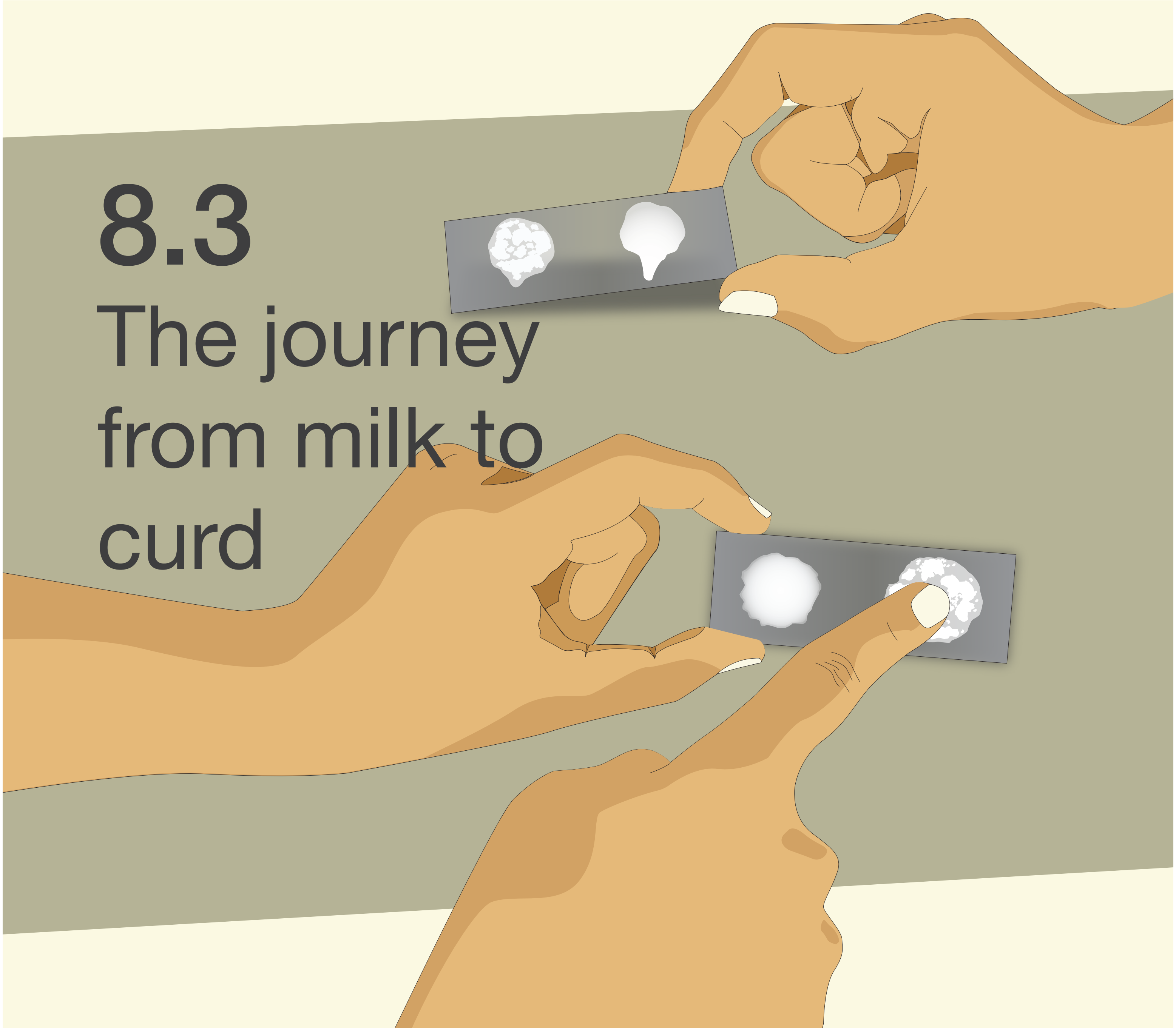
# 8.3
# The journey from milk to curd



# 8.3. The journey from milk to curd

## Overview

This Learning Unit is designed to enable students to explore the process of curd formation from milk. The tasks require students to come up with a method which could turn milk into curd in the least possible time. At the end of the task, students will understand the significance of experimental controls, variables and more importantly, the role of observations in science.

## Unit-specific objectives

- To understand that the process of curd formation requires specific conditions
- To understand that very high and low temperatures are not favourable for curd formation, indicating the role of microbial action in the process
- To understand that alkaline conditions do not favour curd formation and that this fact is widely used in milk preservation
- To understand the method of experimental design, including the controls needed to draw reliable conclusions from an experiment
- To develop observation and recording skills

### Minimum time required

Task 1 and setting up task 2 require 30 min. Task 2 requires five minutes of observation at regular intervals of 30 to 40 mins, for about five to six hours. It would be best to start at the beginning of the school day, and conduct observations till the end of school hours. Discussion of this task requires 30-45 min, and can be conducted on a subsequent day.

### Type of Learning Unit

Laboratory

## Links to curriculum

- Microorganisms: Friend and Foe (NCERT, Class 8)
- Changes Around Us (NCERT, Class 6)
- Acids and Bases (NCERT, Class 7)

The textbook for Class 8 mentions that a small amount of curd is to be added to warm milk so that curd is formed the next day. This Learning Unit goes a little further to determine the optimum conditions of temperature, some physical processes like stirring, and how presence of some easily available chemicals/foods speed up, slow down, or even prevent the process of curd formation.

## Introduction

Have you seen the process of curd formation at home? You might have also tried doing it yourself. Have you ever wondered why we always need to add that small amount of curd to milk so that milk turns into curd? Can the same process be done using lemon juice? You might also have seen spoiling of milk. How can one differentiate between spoiled milk and curd? How can milk be transported over long distances without getting spoiled?

In this Learning Unit, you will study curd formation from milk under different conditions and try to understand the associated changes taking place in it. At the end of the unit, you should be able to come up with the best combination of conditions that might favour curd formation, and also convert milk into curd in very little time.

**Before you begin with the main task, your teacher will conduct two small games for the class.**

## The process of curd-making

Curd formation is an age old process and has been commonly practiced in many parts of the world. We know that curd formation requires certain environmental and physical conditions. Presence of some chemicals may affect this process. Although these conditions may slightly vary from one place to another and may also depend on the user's preference for a certain kind/taste of curd, there are some essential features of its formation process. In this unit, students go through the process (of curd formation) and find out the suitable conditions required for curd formation and what these conditions teach about the process. This Learning Unit helps in understanding the process through the use of carefully designed and controlled experiments.

It is important here that the students understand the difference between curd and spoiled milk, although both appear thick and both are the result of microbial action. They should be able to explain why one is fit for consumption and the other is not based on physical observations (including smell). If possible, the teacher may try bringing and showing to the students spoiled milk in addition to milk and curd, to help students differentiate between the three.

**A look at the basics**

- Fermented milk products, e.g., buttermilk (*chhaas*), curd (*dahi*), and cheese, are commonly used in India and are good sources of nutrients and healthy bacteria, and boost immunity.
- In these products, fermentation occurs due to lactic acid bacteria (LAB), which convert the lactose in milk to lactic acid. Thus, for preparing these products, a small amount of 'starting material' or 'starter culture' (as microbiologists call it) is added. This starting material acts as the source of lactic acid bacteria.
- 'Lactic acid bacteria' is the name of a group of bacteria. *Lactobacillus, Lactococcus, Streptococcus* are examples of this group.
- Products such as *paneer* are made by a direct-set method, which involves adding a small amount of an acid to milk instead of microbial fermentation. For preparing *paneer* from milk, a bacterial source is not required.
- Addition of an acid to milk will result in the coagulation or 'clumping' of milk proteins. The resulting product is NOT the fermented 'curd' or '*dahi*' we eat. In India, the term 'curd' is used for the **fermented product which is obtained after the addition of a small amount of existing curd or buttermilk.**
- In the western countries, the word 'yogurt' is used for 'curd'.
- The word 'curdle' or 'curdling' refers to any form of coagulation of milk or milk proteins, and is commonly used to describe spoilage of milk. In this Learning Unit, we will be using the term 'curd formation' for the desirable fermentation of milk, which is used as food (*dahi*).
- Spoiled milk also appears thick, and is also a result of microbial action. However, it is an undesired and uncontrolled process, which occurs due to the microbes growing in milk. Whereas, when we add a small amount of curd to milk, we ensure that lactic acid bacteria multiply, produce acid, lower the pH, and do not allow other food-spoiling bacteria to grow.
- If we try to convert milk to curd **without** the addition of a source of lactic acid bacteria, the resulting thick or semi-solid milk is likely to be spoiled milk, rather than 'set' curd.

## Tasks

The first task consists of two small games to engage the students and to prepare them for the main task (task 2). Time required for both the games is ~5 min.

### Preparing for Task 1

The first game is called **Racing the knowns**. Take a drop each of milk and curd on a glass slide, and ask the students to find ways in which the two can be identified. **Anything opened in the lab should not be tasted by anyone, no matter how edible it is.** This task can be given on a glass slide, or on any other smooth surface.

If the students struggle to answer, the teacher may suggest the students to tilt the slide at a certain angle and observe the flow. Note the distance the drop moves in unit time. The flow rate would be different for the two substances.

### Materials

For one setup: 200 mL fresh milk, 20 mL curd (prepared at home), sodium bicarbonate, lemon juice, dilute acid (HCl or vinegar), baker's yeast, beakers, glass rod, glass slides, thermometer, gas burner or electric hot plate, refrigerator

The second game is called **Smudge It!** and is also used to differentiate between milk and curd. Take a drop of each liquid on glass. Ask the students to smudge the drops by placing their forefingers on the drop and moving it 5 times in clock-wise direction.

The teacher can then ask if students know any other ways to differentiate. A possible answer could be the difference in smell, appearance, or consistency.

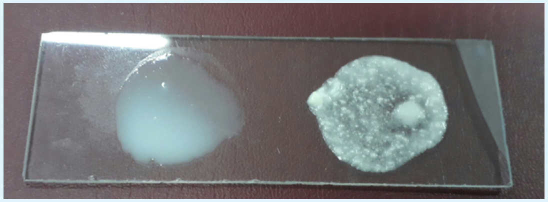


**Figure T1** *A typical outcome of the smudging experiment with milk (left) and curd (right).*

# Task 1: Two Games

1. **Racing the Knowns:** Place a drop each of milk and curd on a glass slide, slightly tilt the slide. Find the ways in they can be differentiated.
2. **Smudge It:** Place a drop of each liquid on glass. Smudge each drop with your forefinger and answer the following questions:

- How does it spread - uniformly/evenly or disperses into clumps?
- Does the mass spread to the outer region of the smudged area or does it concentrate at the centre?

**Preparing further for the task**

a) In the games you played, how did you differentiate between milk and curd?

_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

b) Have you seen the process of making curd at home? What are the steps involved?

_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

## Preparing for Task 2

This is the main task where the students design an experiment to determine the set of conditions that speed up the process of curd formation. They will also look at how certain additives like lemon juice or baking soda affect curd formation.

***Discussion for preparing students for the task***

The teacher could begin with the question, "How is curd formed?" to understand what students already know about the process.

Students may typically respond, *"Add curd to warm milk."*

The teacher can then ask additional questions which are to do with the temperature of milk: "What should be the temperature of the milk before adding curd?"

- "Can you add curd to boiling milk?"
- "Will you expect curd to form if you add a little curd to cold milk?"

The next round of questions could be - "What will happen if you don't add curd to milk and keep it for more than a day? If it appears thick, will you call it curd?" and "Suppose you don't have any curd, what will you add to the milk to form curd?

Possible student responses to the last question may be: "Adding lemon juice/ tamarind/ chilli with stalk/ dilute acid."

After this, the students can be encouraged to design their own experiments. Typically, different groups can look at parameters like effect of temperature, addition of lemon juice, vinegar, dilute HCl, baking soda, etc. An important aspect about designing an experiment is knowing how to formulate experimental controls.

## Experimental controls

To introduce students to 'experimental controls', a discussion can be held around the following points.

*What is a control?*

In any scientific experiment, it is important to prove that the intervention (here, a small amount of curd) causes the desired effect, and that the effect may not be observed when the specific intervention is absent. A positive control is the setup with full intervention. In this case, a beaker with a small amount of curd is the positive control, which gives a 'known outcome'. Similarly, a setup with no intervention is negative control. Here, a beaker with milk but no curd is negative control, as it will not turn into curd. This also proves that the outcome of the experimental setup is a result of the intervention only.

The teacher may want to ask, "Suppose you want to check if addition of lemon juice leads to curd formation, how will you design the experiment?"

Students may answer, "Add lemon juice to milk in a beaker and see."

**In such a situation, the teacher should probe further using the following questions:**

- *So, if I add lemon juice to milk and I see milk turning clumpy, can I call it curd?*
- *How can I be sure whether it IS or IS NOT curd?-*
- *Is one beaker with milk and lemon juice enough to lead to any conclusion?*
- *Think of taking another beaker with milk. What can you add to this beaker so that you can be sure whether the clumpy mass IS or IS NOT curd?*

At this point, students may say that they can add curd. The teacher may explain that the beaker to which curd has been added helps us to know what to expect and whether the product with lemon juice and milk is curd. The beaker with curd and milk is our positive control.

*Now, it is important for students to think what can be an appropriate 'negative control'?*

Ans- A beaker with just milk, no additions. So, we will be sure that this beaker will never lead to curd formation, as nothing was added.

We suggest allowing the students to choose their own variations in the experiment, including appropriate controls. This will enable them to make their own experimental design or plan. A few suggested variations are mentioned in table 1. Teachers may fill in the first row and encourage the students to fill in the rest.

Typically, an experimental setup may be as follows:

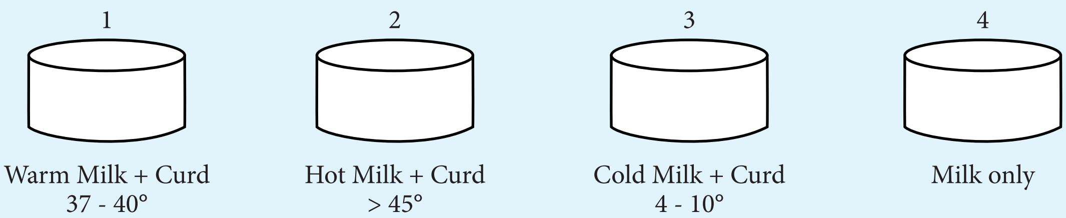



**Figure T2** *Experimental design for the effect of temperature on curd formation*

| Beaker No. | Volume of milk | Temperature of milk | Volume of curd added | Extra additions* | Incubation temperature |
|---|---|---|---|---|---|
| **Temperature conditions** | | | | | |
| 1. | 20 mL | 37°C | 2 mL | _ | Warm place |
| 2. | 20 mL | about 80°C | 2 mL | _ | " |
| 3. | 20 mL | 37°C | 2 mL | _ | 4°C/ fridge |
| **Chemical conditions** | | | | | |
| 4. | 20 mL | 37°C | 2 mL | _ | Warm place |
| 5. | 20 mL | 37°C | 2 mL | Any one of: Baking soda, lemon juice, dilute acid, yeast | " |
| 6. | 20 mL | 37°C | No curd | " | " |
| 7. | 20 mL | 37°C | No curd | - | " |
| **Physical conditions** | | | | | |
| 8. | 20 mL | 37°C | 2 mL | Stir | " |
| 9. | 20 mL | 37°C | 2 mL | No stirring | " |
| 10. | 20 mL | 37°C | 2 mL | - | " |

* Extra additions could be any one of baking soda, lemon juice, vinegar or a few granules of yeast, or anything else if students wish to try. For 20 mL of milk, the following quantities are recommended: baking soda (0.4 g), lemon juice/dilute acid (1 mL), yeast (3-4 granules).

**Table T1** *Experimental design for task 2*

It is essential to compare all these beakers with each other and with the controls to determine if the presence of the additive affected the process of curd formation.

The students may be asked to fill in the student worksheet (next page).

## Task 2: Will it form curd?

Now, design an experiment to determine how temperature, chemicals, and stirring might affect the process of curd formation. Note the details in table 1, and the time when these were set up. If you wish to check the presence of any other substance or the effects of any other processes on curd formation, you may do so.

| Beaker No. | Volume of milk | Temperature of milk | Volume of curd added | Extra additions | Incubation temperature |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

**Table 1** *Experimental setup*

- Keep the tubes/beakers in a warm place and observe the tubes for any physical changes, every hour for up to six hours.
- As soon as you observe any change in the milk samples, like thickening or clump formation, record the time, i.e., how many hours after adding curd did you see the change? These observations can be recorded in table 2.
- Observe these samples further for changes in consistency. Use a litmus paper to monitor the changes in acidity or basicity.
- Also, record any additional changes like change in smell, colour, or texture.

| Sr. No. | Condition | After how many hours do you see any changes? | What kind of changes do you see? |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

**Table 2** *Observation table*

For 'conditions', student groups may write the various conditions they tested, e.g., milk at 10°C, 37°C, 60°C, etc., or mixture stirred/not stirred after addition of curd, and so on.

When all observations have been recorded, allow the student groups to share their observations with the class. In this way, everyone knows about all the conditions tested. The teacher could also make a master table on the board for this purpose.

## Let's discuss

Q1. What changes did you observe in the beakers for the conditions you tested?

____________________________________________________________

____________________________________________________________

____________________________________________________________

Q2. Which condition that you tested showed the fastest curd formation, and in how many hours?

_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

Q3. Did you observe any change in the milk to which no curd was added? Do you think it will remain the same? Why?

_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

Q4. Which conditions favoured curd formation?

_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

Q5. Why do you think a small amount of curd is to be added? Can curd formation occur even without adding that small amount of curd?

_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

Q6. In which season, do you think, will curd formation happen the fastest?

Q7. Other than curd, which substances did you add to milk? Did it speed up or slow down the process of curd formation? Why?

Q8. Observe the beakers to which lemon juice or dilute acids were added. Did you see curd being formed in them? Describe what you see.

Q9. Did you observe the beakers in which a few granules of yeast were added? What can you infer from the experiment?

Q10. Did your group or any other group check if the process of stirring affects the curd formation? If yes, how did it affect?

_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

Q11. In this experiment, we turned milk into curd. Can you turn curd into milk? Why or why not?

_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

During the discussion of observations, the teacher should raise the following points in addition to the main inferences:

1. Each group must list as many learnings as they can they learnt from this exercise.
2. Why did we take a beaker with milk only, without any curd or additive?
3. Did you compare any beaker with any other, while recording your observations? Why so?

**Response of students from different backgrounds:** In warmer areas, students may be able to see curd formation happening faster compared to students in schools in cooler areas. Curd formation will also depend on the type of milk brought by the students (fresh milk, boiled milk, pasteurised milk, which students will bring as per availability). Students who are familiar with occupations such as farming/cattle-raising/dairy might be aware of certain concepts beforehand, and may want to contribute their answers to the class. Let them share their experiences and discuss these in light of the results obtained in this experiment.

### Possible extensions

If teachers and students are interested, they may try out more/additional experiments to understand the effect of the following on curd formation:

- milk from various sources (e.g., cow, buffalo, sheep, goat, horse)
- processing of milk (e.g., pasteurised, fresh, boiled milk)
- additives such as health supplements, excess sugar (which usually acts as a preservative)

## Suggested readings

- How is yogurt different from curd? Times of India. Feb.11, 2016. Accessed on Feb 24, 2020 from https://timesofindia.indiatimes.com/life-style/health-fitness/diet/How-is-yogurt-different-from-curd/articleshow/46702468.cms
- A milk curdling activity. Scientific American, Feb, 2017. \https://www.scientificamerican.com/article/a-milk-curdling-activity/
- Lactic Acid Bacteria: http://www.encyclopedia.com/science/encyclopedias-almanacs-transcripts-and-maps/lactic-acid-bacteria

## References


- Matthews, K. R., Kniel, K. E., & Montville, T. I. (2017). Lactic acid bacteria and their fermentation products. Food microbiology: An introduction (pp311-335). Washington, D.C.: ASM Press.
- This unit has appeared as an article in a slightly different version in *iwonder - Rediscovering school science* magazine (August 2019). It can be found at the following link - https://azimpremjiuniversity.edu.in/SitePages/pdf/Publications/I-Wonder/Sub-PDFs/resources-iwonder-issue-3-Aug-2019/Article_7_A_milky_way_to_learn_biology.pdf

**Title:** The journey from milk to curd
**Main Author:** Rohini Karandikar
**Contributing Author:** Ritesh Khunyakari
**Reviewer:** V. G. Gambhir
**Creative Commons Licence:** CC BY-SA 4.0 International

VIGYAN PRATIBHA
विज्ञान प्रतिभा