# My Food, My Choice

## Overview

This Learning Unit is designed to help students understand the concept of food spoilage and the changes that occur in food items over time. They are able to understand that food processing and preservation techniques may affect the appearance, palatability (taste) and nutritional value of the food. Students will be asked to bring different foods from their home and keep the food items in transparent petri-dishes or watch-glasses. They will observe and record the changes happening in these food items over time. Students will compare the changes that occur in raw foods as well as processed food items. This will help them to understand the effect of food preservation techniques. Then, students will explore certain food labels of packaged food and what information the labels provide. Reading food labels is an important skill which enables the learner to make a choice between different packed foods available around them. They will then have a discussion on how television advertisements promote certain packed food and how to look at them critically rather than getting carried away!

This unit is not about stopping students from consuming any food. It is about what choice to make when one thinks about questions like "*Which food should I buy? How much of this preserved food can I eat? Can I eat it everyday? Can I make the same food at home to retain some of its nutritional value*?" The Learning Unit makes students think about their own choices of packed food and the ways in which they could harm/benefit us. Food packets are a good source of information, often ignored by the consumer. This information includes nutrients, ingredients, packaging and storing information, certification, allergy alerts, etc. Finally, students get to know of this as a resource and can also use it to make healthier choices when they are in the consumer's shoes.

## Time required

Preparation of the Learning Unit begins 5 days ahead. Only 5 minutes are required on day 1. Students observe their plates everyday for 10 – 12 minutes and record their observations. Total time required (excluding preparation and daily observation) on the day of conducting the Learning Unit – Three sessions of 40 minutes each.

## Type of Learning Unit

Laboratory and classroom. In case of unavailability, laboratory part can also be done at home.

**Important note**: We request teachers to mention this to students right at the beginning that this Learning Unit is NOT to stop them from consuming/buying the food of their choice. It is aimed at creating awareness about certain factors we ignore while trying to satisfy our taste buds!

## Learning Objectives

- This Learning Unit will make students understand-
- Changes that occur in foods over a period time.
- Undesirable changes in food leading to food spoilage and the causes of food spoilage
- The impact of food processing and food preservation techniques on the nutritional value of food.
- Food packaging as a preservative technique
- Reading and exploring food labels as a skill
- Influence of advertisements on our food choices.
- Comparing food labels of the same kind of food and see how food labels can inform the choice of buying.

## Links to the curriculum

| NCERT Class 6 Science | NCERT Class 7 Science | NCERT Class 8 Science | NCERT Class 9 Science |
|---|---|---|---|
| Food: Where does it come from?<br>Components of Food<br>Living organisms and their surroundings | Nutrition in animals | Micro-organisms: Friend and Foe<br>Reaching the age of adolescence | Why do we fall ill? |

## Introduction

We obtain nutrition from a variety of food items. The food items start with raw forms obtained from plants or animals. By the time these reach our plate they look completely different. Raw foods are not always easy to digest by the human body. Hence, these raw foods are processed to make them easier to digest, or to enhance their taste.

Foods are also processed to prevent spoilage and store them for long time. Both raw and processed food items undergo a variety of changes with time. These changes sometimes enhance the taste and nutritional value of the food. Some nutrients also decrease in foods with time, even with the use of preservation techniques.

In this unit, we shall look at a few foods we observe around us and how they change with time. Then we shall look at packaging and advertisements and understand how these may affect our choices of foods we eat.

## Task 1: What spoils first?

You may have come across many methods of food processing.

Q1. Can you give some examples of food processing methods?

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Grinding, cooking, drying, washing, cleaning, milling, cutting, chopping, heating, pasteurizing, blanching, cooking, canning, freezing, drying, dehydrating, mixing, etc.

Q2. How is food processing different from preservation of food?

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Food preservation is a general term for treating food products to reduce or stop its spoilage, thus making it last longer. Food processing, on the other hand, is transformation of food into another kind of food and other intermediate products, mainly for ease in digestion & enhancing its taste. Any kind of processing leads to loss in the food's nutrient content. Later in the LU, we will look at these aspects more closely.

Now we shall take a few food items, some of which have been processed by different methods and study changes in them over a few days.

### Materials required:

A slice of tomato, a slice of cooked potato, a spoonful of tomato ketchup or *chutney*, a potato chip, a spoonful of wheat flour and a piece of bread or *chapati*, petri-dishes or watch glass.

- This is to be done 3-4 days before the actual task. Teacher can divide students in groups of 3-4 members and ask each group to bring 6 kinds of foods- a tomato slice, tomato ketchup or chutney, a cooked potato slice, potato chips, wheat flour, biscuits and a piece of bread.
- Each of these samples can be placed in petri-dishes or watch-glasses (covered) and labelled.
- Everyday, starting from day 1, students record changes in the food with respect to color, appearance, texture and smell, if any. Details can be recorded in the table given below.

- Different groups can take different food items and the whole class can keep entering the details in a common journal.

### What will you do?

Keep all the food items in plates or watch glasses separately and label them. Make sure you cover the plates with a lid or a beaker (in case of watch glass). Observe them everyday for change (if any) in color, appearance or smell. You can record the observations in the table below. Repeat this for 3-4 days or until your teacher asks you to record.

**Note:** The spoilt foods can be put in composting piles or discarded as 'wet waste' after the end of the activity.

**Table 1**: What changes do you see in the food samples you are observing? Record in the table below

| **Tomato / Potato / Wheat** | **Day 1** | **Day 2** | **Day 3** | **Day 4** |
|---|---|---|---|---|
| Colour | | | | |
| Appearance/ Texture | | | | |
| Smell | | | | |
| | | | | |
| | | | | |
| **Ketchup / Chip / Bread or Chapati** | **Day 1** | **Day 2** | **Day 3** | **Day 4** |
| Colour | | | | |
| Appearance/ Texture | | | | |
| Smell | | | | |
| | | | | |
| | | | | |

While you observe changes in food items you kept, think about the following questions.

Q3. What do you understand by ‘spoilt food’? What’s the difference between spoilt and unspoilt food?

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> Food that is generally considered unfit for human consumption is termed as spoilt food. Spoilt food may develop an unpleasant smell, taste or texture.

Based on your observations recorded in the table above, answer the following questions.

Q4. Which all foods have spoilt? How do you know they are spoilt?

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Q5. Which food was the first to spoil? Is that food item raw/preserved/processed?

_____

_____

Q6. Which foods are still fresh and why have they not spoilt?

_____

_____

Q7. What is DIFFERENT in the food on the right side from those on the left side. What additional ingredients are added to foods on the left side to make the product on the right?

| | |
|---|---|
| **Tomato** | **Ketchup/chutney** |
| **Potato slice** | **Potato chip** |
| **Wheat flour** | **Bread/*Chapati*** |

**Table 2**

## Task 2: Analyzing Changes in Food

Food spoilage can occur due to various processes within food. These processes may happen due to internal changes within the food or due to environmental conditions. A few of them are discussed in the table below:

| Process | Changes which occur in this process |
|---|---|
| Drying | Skin becomes dry and wrinkled, rough texture (e.g dried carrot or radish) |
| Absorbing moisture from air | Food becomes watery or soft. (e.g., chips becoming soft in humid air) |
| Hardening | Rough texture, becomes hard. (e.g. ladyfinger/bhindi becomes hard with time) |
| Microbial action | Smells different, fluids come out of the food, change in structure (becomes soft/slimy/clumpy) and colour of food, e.g. green mould developing on orange or apple peels. |
| Ripening/over ripening | Smells different. Food becomes softer/pulpy. E.g. ripe banana become brownish and watery if kept for days |

**Table 3**

The teacher can encourage students to add more processes corresponding changes and examples of these processes on food items. More details about the processes discussed in Table 3 are given below.

| **Process** | **Mechanism of food spoilage** |
|---|---|
| Drying | Loss of water content from food. Can be due to osmosis or evaporation. |
| Absorbing moisture from air | Can be due to osmosis |
| Hardening | Can happen due to crystallization of some components of food, polymerization of some compounds, e.g. because of cooling or certain sugars |
| Microbial action | Action of microorganisms absorbing nutrients from the food for themselves, breaking down food components |
| Ripening/over ripening | Release of enzymes and other biochemical changes from the food itself. Not consuming food within a certain time causes the enzymatic action to continue leading to over ripening. |

**Table T1**

The processes and corresponding changes discussed in Table 3 are desirable in some cases and unwanted in other situations. Complete the following table with appropriate examples.

| **Process** | **Example when it increases the taste or quality of food** | **Example when it spoils food (makes it unfit for consumption)** |
|---|---|---|
| Drying | | |
| Absorbing moisture from air | | |
| Hardening | | |
| Microbial action | | |
| Ripening | | |
| Freezing | | |
| Heating | | |

**Table 4**

| Process | Example when it increases the taste or quality of food | Example when it spoils food (makes it unfit for consumption) |
|---|---|---|
| Drying | Sun-dried tomatoes, dried fish (sukath), dry fruits like raisins | Bread, roti, naan |
| Absorbing moisture from air | Bread becomes soft when your cover it with cloth immediately after baking. | Chips, crisps, biscuits, namkeen |
| Hardening | Chikki/burfi on cooling and leaving after preparation | Cakes and pastries |
| Microbial action | Fermentation (Dosa, Idli, Dhokla bread, etc.), Curd | Fungal growth (mould) |
| Ripening | Mangoes | Vegetables like ridge gourd |
| Freezing | Ice cream | Leafy vegetables |
| Heating | Soups | Mayonnaise |

Food spoilage can occur due to physical, chemical, or biological factors. Physical processing could be gaining or losing moisture, heating or cooling, and crystallization. Chemical processes can be like rancidification (oxidation of fats and oils) and enzymatic degradation of nutrients like proteolysis (breakdown of proteins). Whereas biological processes could be growth of different microorganisms like yeast, bacteria and mold in food. Microorganisms may break down the nutrients in the food to consume them for their growth, thereby decreasing the nutrients in the food. While there may be decrease of important nutrients in some of these processes, in some cases, few other nutrients may also increase.

Any preservative or preservation method can only slow down the rate of spoilage by inhibiting one or more of these processes. It is not possible to inhibit or stop all different processes at the same time by one preservation method.

Q1. Can storage of food for long time cause any change in the nutritional composition of food? If so, what could be the possible reasons for these changes?

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Q2. How do you think preservation helps in preventing undesirable changes in food. Does no change in food appearance and taste mean no change in the nutritional quality of food?

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In some cases like fermentation, favourable changes can make the food more nutritious while in some cases it could make the food undesirable for consumption. This includes changes like black spots on banana peels, excessive ripening of fruits or change in the texture, smell, consistency and taste of the food which is not related to micro-organisms.

Even after using preservatives to store food, the nutrients present in the food can change over time due to physical, chemical, and enzymatic changes that occur in the food item.

Q3. What effects do preservation techniques or preservatives have on the nutrient quality of food?

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The objective of using food preservation techniques is to stop or slow down the changes which could lead to food spoilage. But it can also negatively impact the nutrients present in the food. For example, boiling of milk reduces ascorbic acid (vitamin C) content in it.

## Task 3: Packaging – Explore the labels

> **Material needed:** Empty packets of biscuits, chips or namkeen. To maintain uniformity, you may ask all students to get empty packets of biscuits. If you feel appropriate, you may also ask students to bring an empty packet of ANY food item.

Packaging is also a technique which aims at preservation of food, because it reduces damage or spoilage to food item due to environmental agents, and increases the shelf life of the food items.

Q1. What kinds of food packing have you seen?

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Q2. Can you think of some advantages and disadvantages of packaging with 2 examples?

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> A typical answer for the 1st question would be packaging helps in preventing spoilage of food. The teacher can probe the students by asking how do they think this happens.
> 1.Does packed food taste the same as the fresh food?
> 2.Do packed foods have the same level or nutrition as the same food when fresh?

Besides preservation, packaging also allows some information & messages to be carried about the food. Have you ever CAREFULLY observed a packet of chips or *namkeen or* biscuit? Take a look at the food packet that you have brought or your teacher gives.

Q3. What information does it provide?(about the food, brand etc.)

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Q4. Some information is printed in very small size letters and some information is printed in bigger size letters. Which information is printed in small size letters?

_____

_____

Q5. Which nutrients are present in the food packet you explored?

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_____

Q6. After reading the information labels on the food packet, is there anything that surprised you?

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_____

Q7. Any other information which is NOT on the label but you think it should be added to the label?

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## Task 4 – I crave...

> This task requires students to think about factors which affect their choices of packed food. While students are working on this part, teacher would choose one advertisement from the links below to engage students in a discussion. Teacher can also bring newspaper clippings of food related advertisements.

We discussed about role of packaging and the information it carries.

We may like certain packed foods. It may be a crisp like chips or biscuit, a chocolate, a drink, a *namkeen* or some other packed food.

Q1.Which is your favourite packed food?

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Q2. What makes you buy that food? Tick whichever is applicable (You can tick more than one).

☐ I like its taste ☐ My friends like it ☐ It comes with a special gift ☐ I like its smell

☐ It is advertised by my favourite celebrity ☐ like its sound while eating it (crunchy)

☐ I like its texture & mouthfeel ☐ Its nutritious & provides health benefits ☐ Any other reason

Please state your reason

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Q3. Is the packed food of your choice also advertised on the television/newspapers?

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Now, your teacher will show you a video of a packed food/drink. Following is a list of links from which teachers can choose OR you may choose an advertisement according to students' popular choice. We suggest you choose anything within most of the students' experience.

> 1) https://www.youtube.com/watch?v=NoYdJbjgZq8 (Boost ad.)
> 2) https://www.youtube.com/watch?v=TpZ-QWX6Prw (Complan latkeram)
> 3) https://www.youtube.com/watch?v=fWsarvI4LHo (Horlicks)
>
> **Questions for discussion** (You may add your own questions too)
>
> 1. Name some things that you liked and did not like about the advertisement.
> 2. What are the benefits of consuming this food?
> 3. Are there any risks of consuming this food?
> 4. Would you buy it? Why or why not?
> 5. What factors will you consider before buying it?
> 6. After consumption of the food, how will the empty packet be disposed? Will the disposal process affect the environment?
> 7. Can the packaging be reused instead of disposing?
> 8. Will these questions influence your choice of buying such products in future?

You will then have a class discussion. After the discussion, watch the advertisement you showed them again.

Q4. Is there anything that surprised you about the advertisement?

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Q5. Now if you look at any food advertisement or information given on a food packet, what information you will look at to decide if you wish to buy that food item or not?

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Note: Apart from the list of ingredients and nutrients, food packets also contain information about the calories present in the food item. Generally, the recommended daily calorie intake is 2,000 calories a day for women and

2,500 for men. This value is not same for every individual as an ideal daily intake of calories varies depending on age, metabolism and levels of physical activity, among other things.

### Classroom activity

Usage of packed food also leads to increase in amount of waste generated. Students can begin by making a chart which can be kept in your classroom near the dustbin, so that students enter details of an empty packet before it lands into the dustbin. Every week or every month, students can record how many packets of which kind of snack were dumped. Towards the end of the year, they can make a graph/chart to see if there is any drop in the amount junk food consumed or waste generated due to packed food. We provide a template as follows:

### Monthly log of empty food packets

Class _____ Month _____

| **Date** | **Type of food** chips/biscuit/namkeen/liquid | **No. of packets** | **Type of packaging** plastic/foil/paper/tetra-pack? | **Other contents** plastic straws/stickers/toys |
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## Possible Extension

In order to survive and work, our body needs energy. We get this energy from the food we eat. The amount of energy we get from each food item is measured in calories. Technically, one calorie is defined as the amount of energy needed to raise the temperature of 1 gram of water by 1 degree Celsius at standard atmospheric pressure. On many food packets, calorie typically written is actually a “kilocalorie.” In other words, it is the amount of energy needed to raise the temperature of one kilogram of water by one degree.

The calories present in packaged food items is usually mentioned on its food label. Have you ever wondered how these calories are calculated or measured? Originally, the calories in food were measured using a Bomb Calorimeter. This involved placing the food item in a sealed container surrounded by water. The food item was then ignited and allowed to burn completely. The resultant rise in the temperature of the surrounding water was measured. The number of degrees of rise in the temperature of the water was correlated to the number of calories generated by the burning of the food item. Even though useful, this technique had a few drawbacks. This technique measures the calories produced by the complete food item, but not all the components of food produce energy in our bodies. For instance, the fibre present in food is not utilized by our body to generate

energy rather it is important for the process of excretion. Hence, the calories measured using this technique will be higher compared to the actual calories produced by the food item in our bodies.

Currently, the Atwater system is used commercially for determining the calories in food. In this system, calories are not determined directly by burning the foods. Instead, the total caloric value is calculated by adding up the calories provided by the energy-containing nutrients: protein, carbohydrate, fat and alcohol. Because carbohydrates contain some fibre that is not digested and utilized by the body, the fibre component is usually subtracted from the total carbohydrate before calculating the calories. The Atwater system uses the average values of calories per gram of protein, carbohydrate, fat and alcohol. These values were originally determined by using Bomb Calorimeter and then getting an average of the values obtained for different food items. The average values used by the Atwater system are as follows: 4 kcal/g for protein, 4 kcal/g for carbohydrate, 9 kcal/g for fat, 7 kcal/g for alcohol and 3kcal/g for organic acids.

Q. Using the above information, calculate the calories in different food items.

You can refer the nutritional labels on the packaged food items for information on the amount of proteins, carbohydrates, fats and other components present in the food item.

http://www.merckmanuals.com/home/diso...

http://www.ars.usda.gov/SP2UserFiles/...

## References

Dana Zeidler and Sami Khan. It’s Debatable: Using socio-scientific issues to promote scientific literacy K-12 NSTA Press