

### *Keywords*

- ◆ Traditional medicine
- ◆ Modern medicine
- ◆ Complementary medicine
- ◆ Misuse of medicine
- ◆ Free radical
- ◆ Oxidation of food
- ◆ Active ingredient

What are the common medical treatments in Malaysia?

What type of medicine is generally given to treat patients?

Do you know what free radicals mean?

What is the effect of antioxidant substance on free radicals?

What does active ingredient in health products refer to?



## Science Digest

### **Kitab Tib**

*Kitab Tib* is an ancient Malay handwritten traditional medical manuscript. This book is a reference for the Malay society in ancient times to cure various diseases. This book contains methods to treat diseases such as stomach aches, cough and eye sore using natural substances from trees and plants mixed with herbs. *Kitab Tib* is named after the Arabic language medical manuscript, *Al-Qanun Fi Al-Tibb* by *Ibnu Sina*.

Source: [www.pnm.gov.my/manuskrip/melayu/03koleksi/306\\_perubatan.htm](http://www.pnm.gov.my/manuskrip/melayu/03koleksi/306_perubatan.htm)  
(Access on 19 August 2019)

### You will learn about:

- traditional medicine, modern medicine and complementary medicine
- free radicals
- antioxidant substances
- health products

When we are sick, we need to get medical attention and take medication to heal ourselves. What are the medical options available to us?

### Criteria of Traditional, Modern and Complementary Medicine

There are three medical options you need to know, namely **traditional medicine**, **modern medicine** and **complementary medicine**. Can you distinguish these three types of medicine?

**Traditional medicine** is a medical treatment that uses plants, animals and natural substances that are specifically applied or combined for diagnosis and treatment of diseases. Each race in Malaysia practises their own traditional medicine. Figure 10.1 shows the criteria of traditional medicine.

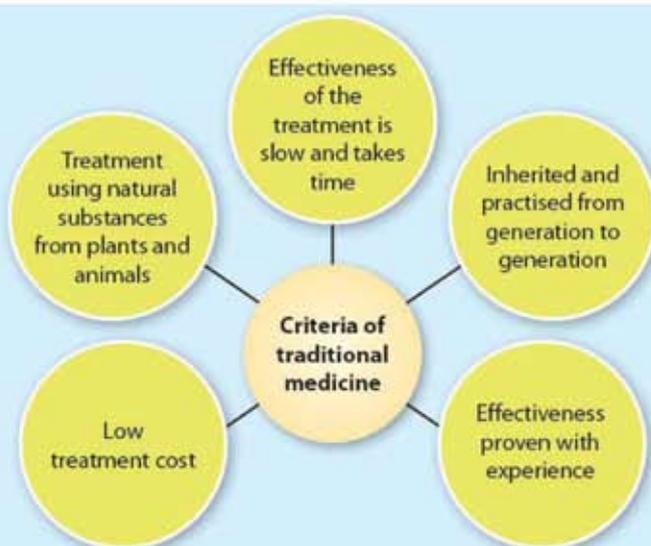


Figure 10.1 Criteria of traditional medicine



### Activity 10.1

Result Showcase

**Aim:** To gather information on traditional medicine practise among the people of Malaysia.

**Instructions:**

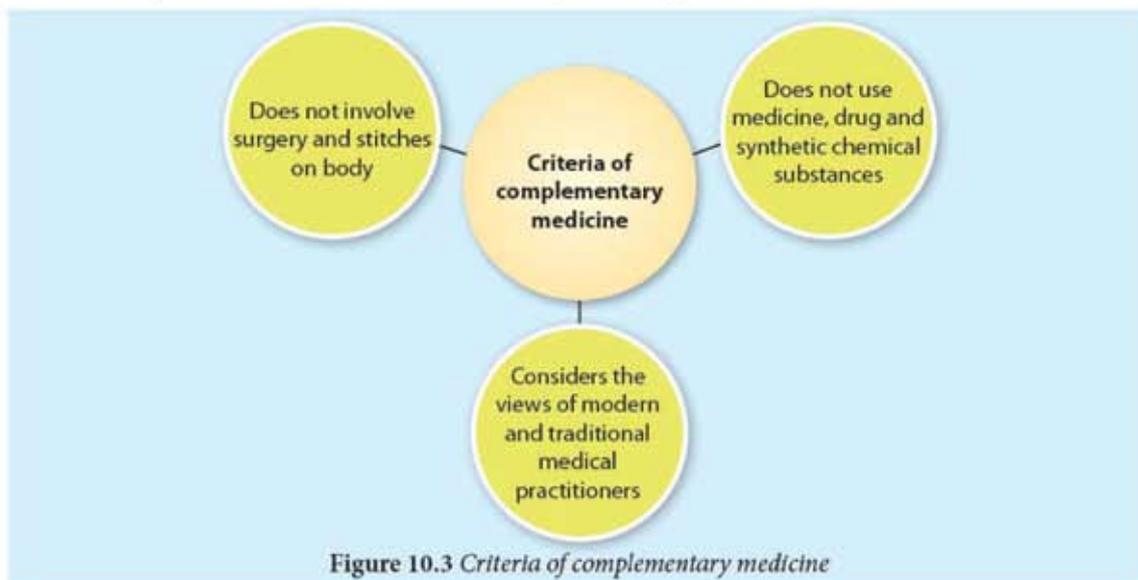
1. Carry out this activity in groups.
2. Gather information from various sources about traditional medicine practised among the people of Malaysia.
3. Present the information in the form of multimedia presentation.

21<sup>st</sup> Century Skills

**Modern medicine** refers to the combination of the art of medicine in various fields of sciences that relate to health science and biomedical such as clinical medicine, medical research and surgery in the treatment of ailments. Figure 10.2 shows the criteria of modern medicine.



**Complementary medicine** refers to various methods of health care that originates from many cultural backgrounds. This method covers two main parts; natural product, and mind and body practices. This method is sometimes used with the modern treatments to treat diseases such as cancer. Figure 10.3 shows the criteria of complementary medicine.





## Science Career

### Pharmacist

A person who is trained in the field of pharmacology and is qualified to prepare and dispense medicinal drugs.

## Medicines used in Traditional, Modern and Complementary Medicine

Now that you have read about the three medical approaches to treatment, let us find out more about the medicine used in traditional, modern and complementary medicine. **Medicines** are drugs or substances taken to control health, treat or prevent diseases. These drugs and treatments need to be obtained from accredited bodies.



Medicines

[http://bukatekskssm.my/Science/F4/Pg206\\_1](http://bukatekskssm.my/Science/F4/Pg206_1)



Medicinal Plants

[http://bukatekskssm.my/Science/F4/Pg206\\_2](http://bukatekskssm.my/Science/F4/Pg206_2)

**Traditional medicine** is medicine derived from natural sources such as plants and animals without being processed chemically. This medicine has been used since ancient times. How is a plant or animal used to treat diseases? Name some examples of traditional medicine you know.



### Aloe vera

The gel from the leaves can be applied on the skin to reduce pain due to sunburn or exposure to hot objects.



### Ginseng

A popular herb used in Chinese traditional medicine to maintain good health.



### Ginger

Relieves swelling, bodily pain and bloatedness.



### Hibiscus plant

The leaves relieve headache and prevent hair loss.



### Quinine

The bark of *Cinchona* sp. is used to make medicine for malaria.

Photograph 10.1 Traditional medicines

**Modern medicine** is a drug manufactured in the laboratory for consumers and is widely marketed. Modern medicine is available in many forms such as pills, capsules, paste, suspension and solution. Modern medicine is classified into three types, which are **analgesics**, **antibiotics** and **psychotherapeutic**.



Paracetamol  
<http://bukutekskssm.my/Science/F4/Pg207>

### Analgesics

- This medicine relieves pain.
- Examples of analgesics are aspirin, paracetamol and codeine.

### Antibiotics

- This medicine kills or inhibits the growth of infectious bacteria.
- This medicine is produced from microorganisms such as fungi or bacteria that can fight the bacteria that cause diseases.
- This medicine can be produced by synthesis of chemical substances.
- This medicine should be taken according to prescription to ensure that the bacteria are destroyed.
- Examples of antibiotics are penicillin and streptomycin.

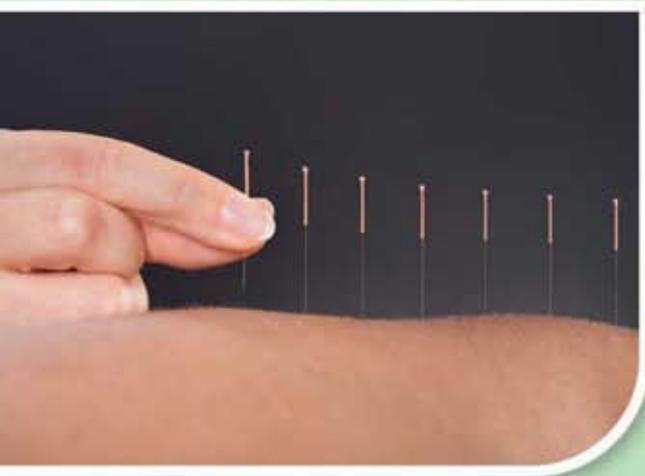


### Psychotherapeutic

- This medicine is used to treat psychiatric patients.
- This medicine should not be taken arbitrarily and need to follow the dosage prescribed by the doctor because it can cause mood swings, thought disorder and changes in a person's behaviour.
- These medicines can be classified into three types:
  - stimulants** – these medicines stimulate and activate the brain activity, body and feelings of the patient; example, amphetamine
  - antidepressants** – these medicines treat depression; examples, imipramine and amitriptyline
  - antipsychotics** – these medicines have sedative effects; examples, tranquiliser, barbiturates, doxepin and haloperidol

Photograph 10.2 Types of modern medicines

**Complementary medicine** does not focus solely on the treatment of diseases but also ensures that the patient is holistically, physically, mentally and emotionally healthy. Complementary medicine is an additional treatment performed with modern medicine to treat diseases. What are some of the common complementary medical practices used in Malaysia?



### Acupuncture

Sterile needles are inserted into specific points on the skin, called acupuncture points. They are inserted slowly and gently to stimulate the nervous system to relieve pain.

### Chiropractic

Chiropractic does not use medicine. Instead a chiropractor uses his hands to make adjustments to the bone position. Chiropractic is effective for back and neck pain, joint pain, headaches and sports injuries.



### Traditional massage

Massage is a method of manipulating soft tissues in the body using the hands, fingers and the fist. Massage soothes anxiety, pain, fatigue, muscle tension and nerve problems.

## Homeopathy

Proper medication is given to patients based on the symptoms shown or complaints by patients such as fever, pain or cough. The medicine given strengthens the body's immunity against infectious disease, rather than killing the germs that cause the disease.



## Herbal therapy

Herbal therapy uses plants or parts of the plants that cure diseases. Consumers have the confidence in using these herbs because they do not have any side effects and do not contain drugs which are harmful to health.



Photograph 10.3 Types of complementary medicines

## The Use of Traditional Medicine, Modern Medicine and Complementary Medicine

Traditional medicine, modern medicine and complementary medicine complement one another. Each method has its own strengths and weaknesses. As a student, can you explain the strengths and weaknesses of the three methods? Carry out Activity 10.2 with your friends.



### Activity 10.2

Result Showcase

**Aim:** To discuss the effectiveness of traditional, modern and complementary medicine.

21<sup>st</sup> Century Skills

**Instructions:**

1. Carry out this activity in groups.
2. Choose one medical method, whether traditional medicine, modern medicine or complementary medicine.
3. Gather information from various sources on the effectiveness of the selected medical method and discuss the information obtained.
4. Present the information obtained in the form of multimedia presentation.

## The Use of Man-made Medicines and Medicines from Natural Resources

Medicines are from two sources, either **man-made (synthetic)** or from **natural resources**. Traditional medicines are usually derived from natural resources, while most modern medicines are produced by preparing the chemical compounds that have the same molecular structure or similar molecular structure to the active ingredient in a traditional medicine. Table 10.1 shows the comparison of properties between the medicines.

**Table 10.1** Comparison of properties between man-made medicines and medicines from natural resources

Man-made medicines	Medicines from natural resources
Made in the lab and commercialised for the use of consumers (Example: Vitamin C sold as pills in pharmacies)	Derived from plants and animals (Example: Vitamin C from fruits)
Must be taken regularly (usually for chronic diseases) or stopped when the sickness has healed	Must be taken or used continuously for a long time to be effective
Evidence of healing is based on clinical tests	Evidence of healing is by trust and past experiences
There is a risk of side effects if: <ul style="list-style-type: none"><li>used without the advice of a doctor</li><li>the patient does not follow the correct dosage</li></ul>	There is a risk of side effects if: <ul style="list-style-type: none"><li>used without the advice of a doctor</li><li>the patient does not follow the correct dosage</li></ul>



### Activity 10.3

Gallery Walk

**Aim:** To study man-made medicines and medicines from natural resources.

**21<sup>st</sup> Century Skills**

**Instructions:**

1. Carry out this activity in groups.
2. Gather information from the Internet, reference books, magazines and articles related to:
  - advantages and disadvantages of vitamin C from natural and man-made resources
  - side effects of natural and man-made medicines
3. Present your findings by conducting a Gallery Walk.

## The Effects of Misuse of Medicine

Medicines must be used for the right purpose, which is to **cure diseases**. Misuse of medicine occurs when a person does not use medicine for its intended purpose or does not follow the doctor's prescription. This creates a risk of side effects. **Side effects** are undesirable effects of drug use.



Figure 10.4 The effects of misuse of medicine



### Activity 10.4

Gallery Walk

**Aim:** To discuss the effects of misuse of medicine.

21<sup>st</sup> Century Skills

**Instructions:**

- Carry out this activity in groups.
- Gather information from the Internet, reference books, magazines and articles on the effects of the misuse of medicine due to:
  - drug abuse
  - dependence on medicines
  - consumption of medicines not according to the age specified
  - consumption of medicines not according to the dosage prescribed such as antibiotics, cough syrup and paracetamol
- Create a mind map to show the cause and effect of the misuse of medicine.
- Paste your group work on the notice board of your class.



Misuse of  
Medicine  
[http://  
bukatekskssm.my/  
Science/F4/Pg211](http://bukatekskssm.my/Science/F4/Pg211)



## FORMATIVE PRACTICE 10.1

- State three methods of medicine currently in practice.
- Name three types of modern medicine and give examples.
- Lai Yee and her family went for a vacation at Pulau Perhentian. After returning from the vacation, her skin was red and painful. Which traditional medicine is able to relieve her condition? Explain your answer.
- Give two examples of complementary medicine and two reasons why some patients choose complementary medicine.

## 10.2 Free Radicals

### Definition of Free Radicals

The term 'free radicals' often appear in newspapers, magazines, television advertisements and is debated in health talks. Do you know what free radicals are? What are the effects of free radicals on human health?

**Free radicals** are atoms or molecules that **lack** one electron which makes the atoms or molecules unstable, reactive and tend to attack other atoms or molecules.

### The Effects of Free Radicals on Human Health

Oxidation is a chemical reaction that occurs when a substance loses electrons in its reaction. The oxidation process occurs naturally inside a body to produce free radicals. This situation triggers a chain reaction to produce more free radicals. Metabolism and inflammation are two internal factors that produce free radicals in the body (Figure 10.5). There are also external factors which affect the amount of free radicals in the body such as cigarette smoke, exposure to radiation, sunlight and air pollution (Figure 10.6). Too many free radicals in the body will affect human health.

Free radicals damage our DNA structure by removing electrons from molecules that build DNA. Then, it forms carcinogenic substances that may cause mutations and cancer. Free radicals also:

- cause diseases such as cardiovascular disease and infertility
- damage the kidneys, liver and lungs
- cause premature aging conditions such as wrinkles and grey hair

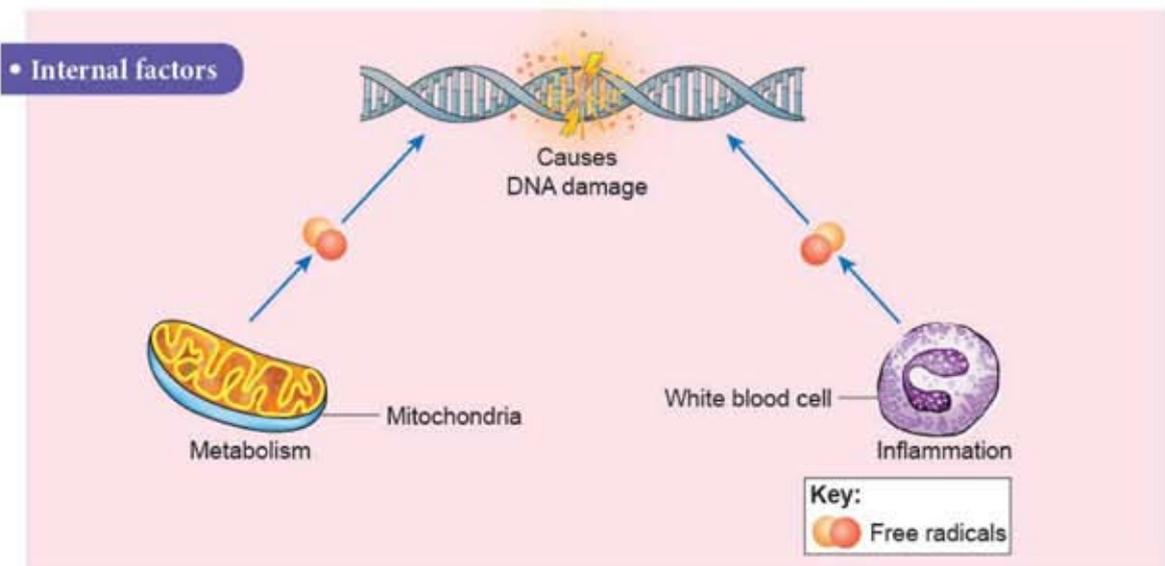


Figure 10.5 Internal factors that produce free radicals in the human body

### External factors

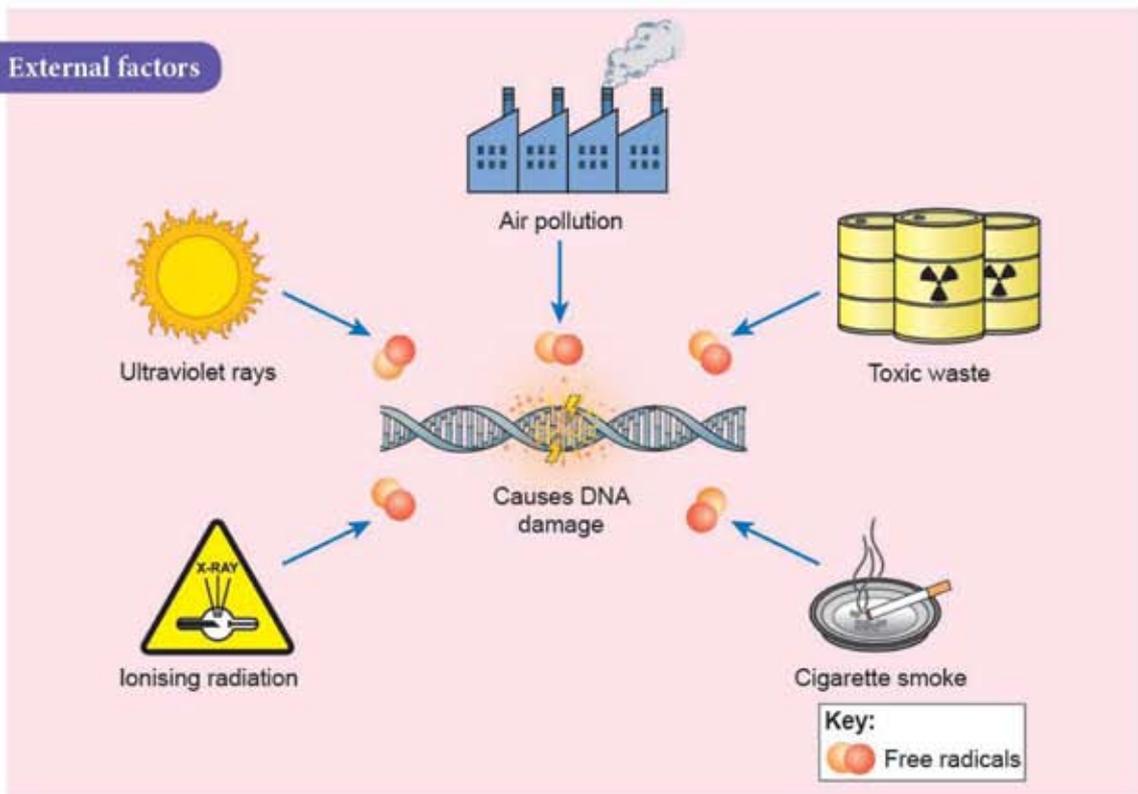


Figure 10.6 External factors that produce free radicals and attack the cells of the human body



## Activity 10.5

Writing Report

**Aim:** To gather information on free radicals.

21<sup>st</sup> Century Skills

**Instructions:**

1. Carry out this activity in groups.
2. Gather information from the Internet, reference books, magazines and articles on:
  - the formation of free radicals
  - how free radicals can be found in the body
  - how free radicals act on body cells
  - the importance of free radicals in the human body
3. Write a report based on your findings.



## FORMATIVE PRACTICE 10.2

1. What are free radicals?
2. Explain how free radicals are formed.
3. Give two reasons why there are free radicals in the body.

## 10.3 Antioxidant Substances

### Definition of Antioxidant Substances

**Antioxidants** are chemical substances that are needed by our body to **slow down or to stop the oxidation process**. This substance protects body cells from damage by free radicals and is considered as a defensive line against diseases. Our bodies are capable of producing antioxidant substances, but as we grow old, this ability decreases. Therefore, we need to get antioxidants from food. What are the examples of antioxidants found in foods?

**Beta carotene** is commonly found in most red, yellow or orange coloured food such as carrots, mangoes and sweet potatoes.



**Lutein** is often associated with healthy eyes. These antioxidants are found in high quantities in green leafy vegetables such as spinach, cabbage and broccoli.



**Lycopene** is an antioxidant substance found in fruits such as papaya, guava, watermelon, tomato, apricots, grapefruit and oranges.



**Vitamin C** is a water-soluble vitamin which is also known as ascorbic acid. This antioxidant is found in citrus fruits, spinach, broccoli, kiwi fruit, strawberries, cranberry, cabbage, green pepper and cereals.



**Vitamin E** which is also known as alpha-tocopherol is an antioxidant found in many types of oil including palm oil, wheat germ oil, corn oil and soybean oil. It is also found in apricots, broccoli, legumes and mangoes.



Photograph 10.4 Antioxidant substances in food

## The Action of Antioxidants on Free Radicals

Antioxidants are chemical compounds that can be obtained from chemical synthesis or natural plants. When antioxidants react with free radicals, more stable compounds will be produced and this stops the oxidation process.



### Activity 10.6

Think-Pair-Share

21<sup>st</sup> Century Skills

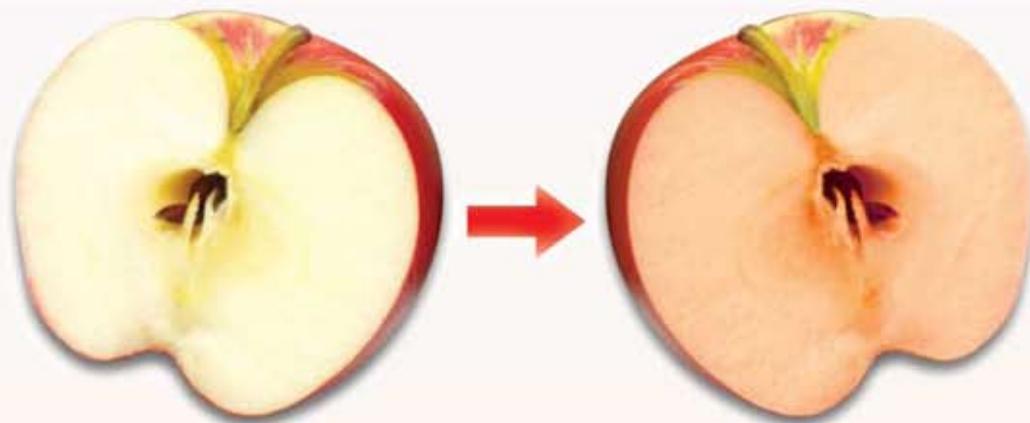
**Aim:** To watch a video on the action of antioxidants against free radicals.

**Instructions:**

1. Watch a video presentation about the action of antioxidants against free radicals.
2. Discuss the action of the antioxidant seen in the video in pairs.

### Factors Affecting Food Oxidation

Oxidation can be seen when **foods are exposed to the air**. This process causes fruits such as apples and bananas to become brown when left exposed to the air.



Freshly cut apple

Apple which is left exposed to the air

Photograph 10.5 Oxidation on apple

Based on your knowledge of antioxidants, how can the oxidation process be slowed down? Let us carry out Experiment 10.1.

## Experiment 10.1

**Aim:** To study the effects of different types of solution on the oxidation of apples.

**Problem statement:** What can slow down the oxidation process on apples?

**Hypothesis:** Solutions containing antioxidant can slow down the oxidation process on apples.

**Variables:**

- (a) manipulated: The type of solution
- (b) responding: Colour changes on apple slices
- (c) constant: Surrounding temperature, size of apple slice

**Materials:** Apple, sugar solution, lime juice, sodium bicarbonate solution, common salt solution

**Apparatus:** Petri dishes, beakers, forceps

**Procedure:**

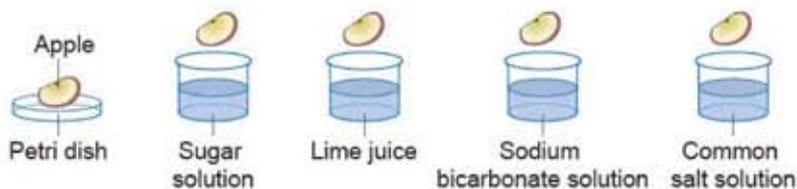


Figure 10.7 Setup of apparatus

1. Prepare four types of solutions as shown in Figure 10.7.
2. Cut an apple into five equal slices. Put one of the apple slices in a Petri dish as a control.
3. Use a forceps to soak each apple slice into sugar solution, lime juice, sodium bicarbonate solution and common salt solution as shown in Figure 10.7.
4. After 1 minute, place the apple slices from the four solutions into a Petri dish and leave them to be exposed to air for 15 minutes.
5. After 15 minutes, observe the changes to the apple slices in the four types of solution with the apple not soaked in any solution.

**Result:**

Type of solution	Colour changes on apple slices
Sugar solution	
Lime juice	
Sodium bicarbonate solution	
Common salt solution	

**Conclusion:** Is the hypothesis of this experiment accepted? What is the conclusion of this experiment?

**Questions:**

1. Which apple slice did not turn brown?
2. Why did the apple slices become brown?
3. Which substances can slow down the oxidation process?

## FORMATIVE PRACTICE 10.3

1. What is meant by antioxidant substances?
2. Give three examples of antioxidant substances found in food.

## 10.4 Health Products

There is an increase in the number of health products manufactured and sold in the market nowadays.

However, are all of these products good for health and help in curing sickness? What is the content in the products? How do we know the effectiveness of the products to our health?



### Active Ingredients in Health Products

All health products, whether in the form of pills, powders or lotions contain active ingredients that play a role in improving health. What is the meaning of active ingredients?

**Active ingredients** are specific components of a product that have effects on the cure or prevention of disease.



Ingredient	
Active Ingredient	Purpose
Vitamin C .....	Antioxidant
Ascorbic acid .....	Antioxidant
Ascorbyl-2-Palmitate 10% .....	Antioxidant
Inulin 5.0mg .....	Antibiotic
Hydrolyzed Gelatin .....	Binding agent

Figure 10.8 Example of a health product labelled with active ingredient

The active ingredient will have the same effect or purpose even when used in products of different brands. Sometimes, two or more active ingredients cannot be used together because they can react and cause harm to health.

## The Use of Health Products Available in the Market

Currently, the demand for health products is increasing. Why is this happening?

Sometimes, health products such as supplements are taken to treat diseases and to maintain our health.

Good health products can guarantee normal growth and prevent diseases. For example, multivitamins promote growth among children.

More people are relying on health products for better health due to their busy lifestyle and unbalanced diet.

However, people need to be more careful in choosing the right health products. Therefore, we need to seek medical advice and always check the label first before buying or using any health product to avoid unwanted effects.



### Activity 10.7

Research-based Learning

21<sup>st</sup> Century Skills

**Aim:** To gather information on health products available in the market.

**Instructions:**

1. Carry out this activity in groups.

There is an abundance of health products in local market nowadays. Students are encouraged to gather information of these health products. By referring to the official website of the Ministry of Health Malaysia, identify the active ingredients found in the products and their effects on health.

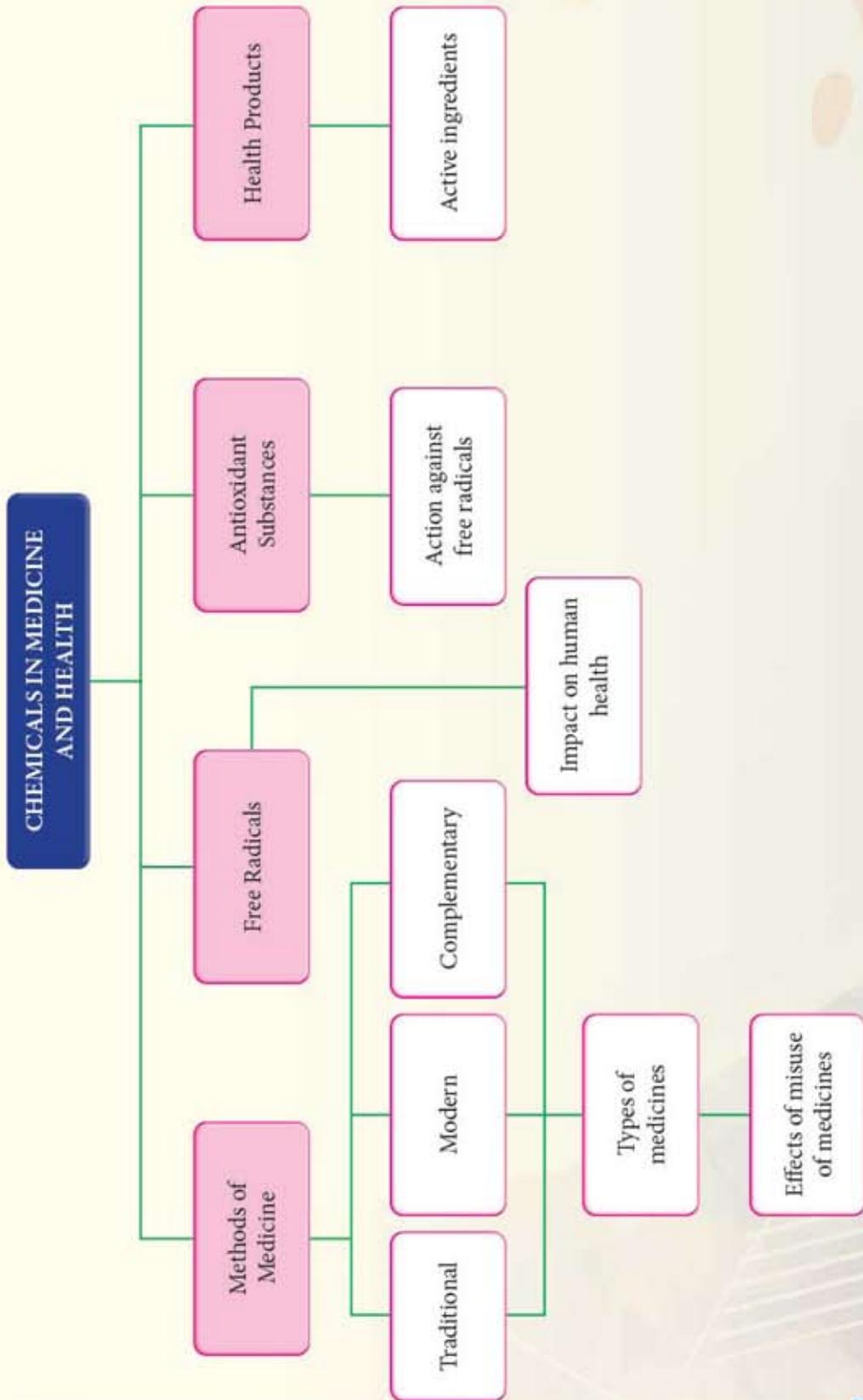
2. Find different products with different active ingredients.
3. Present the findings of the project as posters or brochures to be pasted on the notice board around the school and in the classroom.



### FORMATIVE PRACTICE 10.4

1. What is meant by active ingredients in health products?
2. Give two reasons for the use of health products in Malaysia.

# Summary



## Self-reflection

After studying this chapter, you are able to:

### 10.1 Traditional Medicine, Modern Medicine and Complementary Medicine

- Explain the criteria of traditional medicine, modern medicine and complementary medicine.
- Explain the medicines used in traditional, modern and complementary medicine.
- Justify the use of traditional, modern and complementary medicine.
- Justify the use of man-made medicine and medicine from natural resources in treatments and healthcare.
- Conclude the effects of misuse of medicine.

### 10.2 Free Radicals

- Define free radicals.
- Discuss the impact of free radicals on human health.

### 10.3 Antioxidant Substances

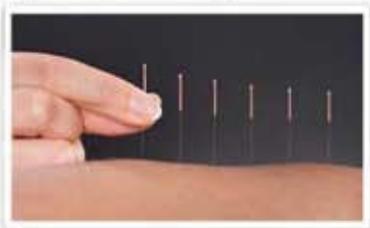
- Describe antioxidants.
- Explain the action of antioxidants on free radicals.
- Carry out an experiment to investigate the factors that affect the oxidation of food.

### 10.4 Health Products

- Explain the meaning of active ingredients in health products.
- Justify the use of health products available in the market.

## Summative Practice 10

1. Photograph 1 shows two types of medical methods.



Method M



Method N

Photograph 1



Objective Questions  
[http://bukutekskssm.  
my/Science/F4/Q10](http://bukutekskssm.my/Science/F4/Q10)

QUIZ

- (a) What are the types of medical approaches of *M* and *N*?
- (b) Give one health problem which can be treated using method *M*.
- (c) Give three types of medicines used in method *N* and their respective uses.
- (d) Method *M* is said to be used together with the method *N* under certain conditions. Justify the use of method *M* together with method *N* and give one appropriate example. 🍄

2. Free radicals cause health problems among individuals.

- (a) Describe how free radicals are formed.
- (b) State two factors of free radical formation.
- (c) Explain why free radicals are not a problem for some individuals but can cause health problems for others. 🍄

3. Photograph 2 shows fruits that are rich in antioxidants.



Photograph 2

- (a) What is meant by antioxidants?
- (b) Explain the role of antioxidants in the human body.
- (c) Give three types of antioxidants and their natural resources.

4. Figure 1 shows one of the complementary medical treatment methods.



Figure 1

Describe the massage method used in this medical method.

## Mind Challenge

5. A Form 4 student has dry and dull skin. This is because of several factors related to poor dietary intake of antioxidants. Describe how this problem can be avoided.

Your description should contain:

- (a) statement of the problem
- (b) the cause of the problem
- (c) three solutions

6. Currently, there are many health products in the market. Explain the justification for an individual to consume the health products.

7. Hasnah is a factory worker who works 12 hours a day. In your opinion, what are the health problems she may experience and how does she overcome them without changing her job?

Your description should contain:

- possible health problems
- solutions for every health problem stated above