Unit 8

ACID AND ALKALI

Why do their facial expressions change after tasting lemon and coffee without sugar?

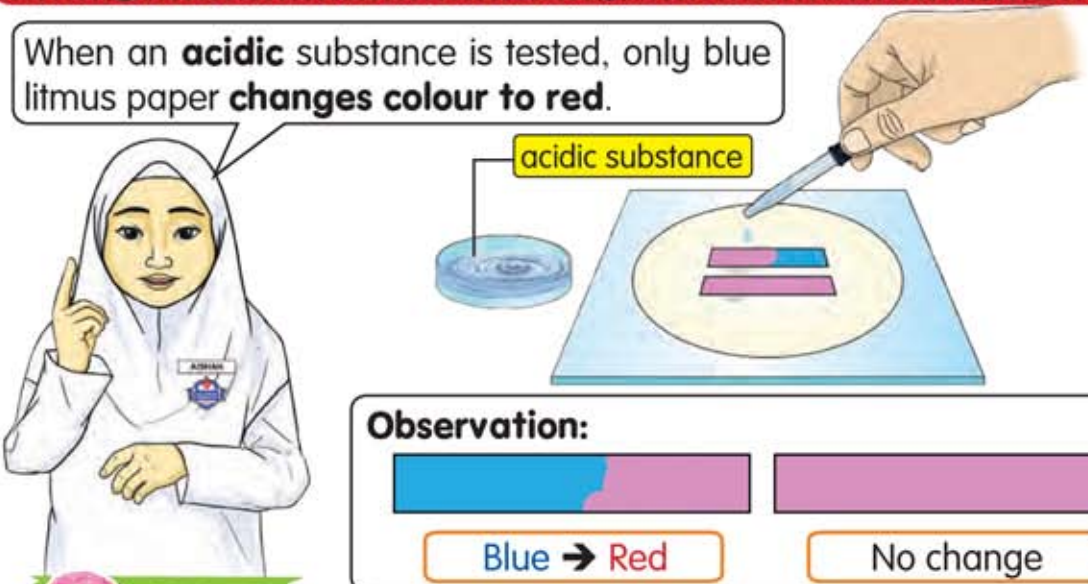
Acidic, Alkaline, and Neutral

There are substances around us that have acidic, alkaline, and neutral properties. The properties of these substances can be tested using litmus paper. Litmus paper is an indicator that changes colour when tested.

red litmus paper

blue litmus paper

Change in Colour of Litmus Paper with an Acidic Substance



Observation:

Blue → Red

No change

HOTS

Can litmus paper be dipped directly into the substance to be tested? Explain.

8.1.1

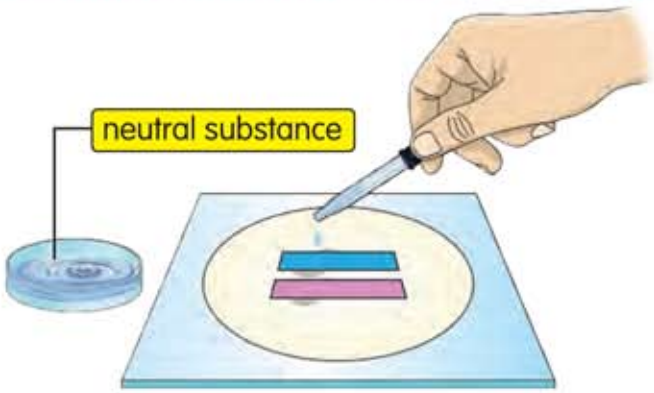
Change in Colour of Litmus Paper with an Alkaline Substance

When an **alkaline** substance is tested, only red litmus paper **changes colour to blue**.

Observation:

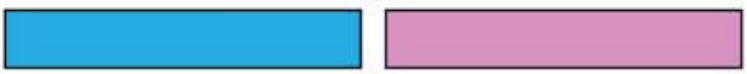
No change | Red → Blue

Change in Colour of Litmus Paper with a Neutral Substance



When a **neutral** substance is tested, there is **no change in colour** for both types of litmus paper.

Observation:



No change | No change

Which indicator is used to test substances for acidic, alkaline or neutral properties?

Activity Book Pages: 69-71

Let's Test — Testing a Substance Using Litmus Paper

ACTIVITY GROUP

Apparatus and Materials

- red and blue litmus papers
- filter paper
- funnel
- dropper
- beaker
- petri dishes
- tile

- vinegar

- drinking water

- orange juice

- sugar solution

- slaked lime solution

- sodium bicarbonate solution

Steps

1. Pour the vinegar into a labelled petri dish.

2. Test the vinegar with the red and blue litmus papers.

3. Observe the change in colour of the litmus papers and record the results as in Table A.

Table A

Substance	Change in colour of blue litmus paper	Change in colour of red litmus paper
Vinegar	Blue →	Red →
Drinking water	Blue →	Red →

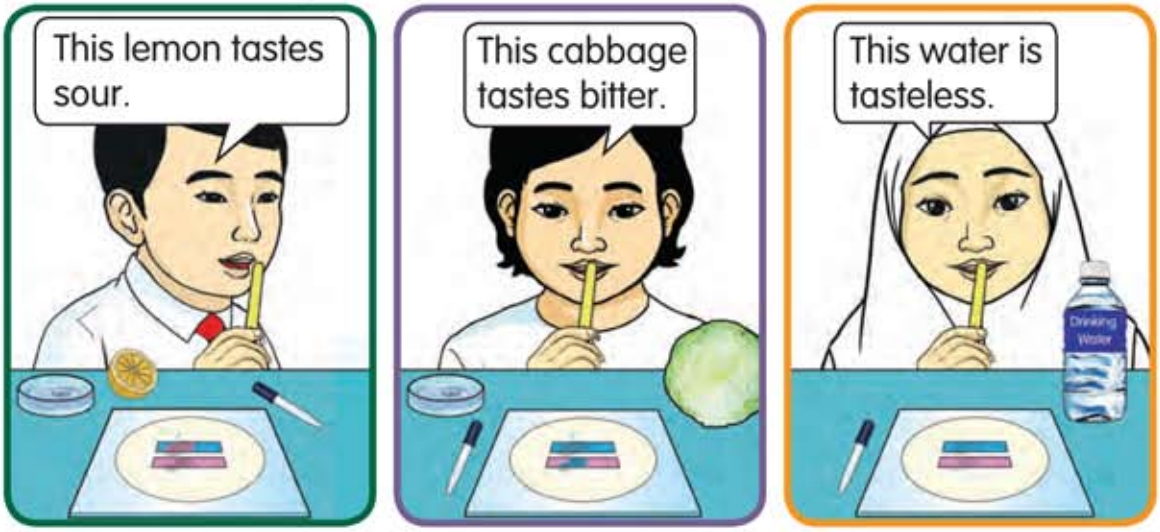
4. Repeat steps 1 to 3 using other substances.

Question

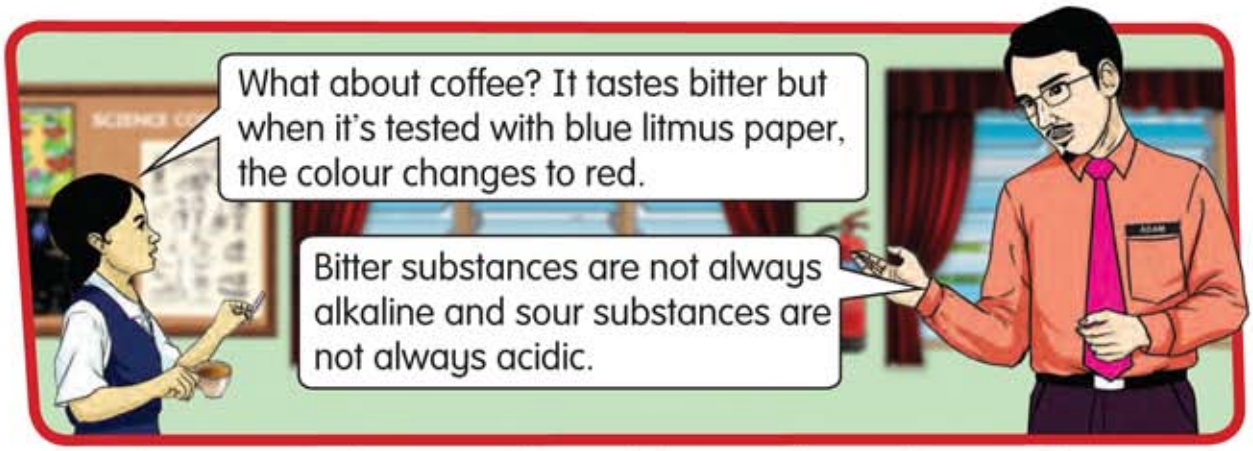
What is the property of a tested substance based on the change in colour of litmus paper?

Acidic, Alkaline, and Neutral Substances

Besides litmus paper, we can also test the properties of substances using our senses of taste and touch.



Most acidic substances taste sour and have a burning sensation when touched, while most alkaline substances taste bitter and feel slippery when touched. Neutral substances have different tastes such as tasteless, sweet, and salty. Neutral substances may feel slippery or coarse when touched.



Can the senses of taste and touch be used as indicators for acidic, alkaline, and neutral properties of substances? Why?

8.1.2

Activity Book Pages: 72-74

KPM

Let's Test Testing Acidic, Alkaline, and Neutral Properties

ACTIVITY GROUP

Apparatus and Materials

- red and blue litmus papers
- filter papers
- ice cream sticks
- dropper
- petri dishes
- tile

- fresh milk

- salt solution

- ketchup

- grapes

- egg white

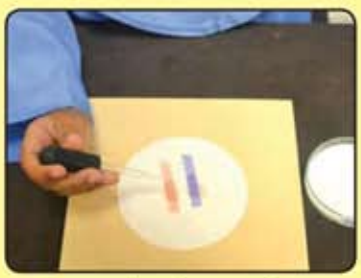
- toothpaste

Steps

1. Put the substances to be tested into labelled petri dishes.

2. Taste the first substance with your tongue.

3. Touch the first substance with your finger.



4. Test the first substance with red and blue litmus papers.

5. Repeat steps 2 to 4 with the other substances.
6. Record the results as in Table A.

Table A

Substance	Taste	Touch	Change in litmus paper	Property of substance
Fresh milk			Blue → Red →	
Salt solution			Blue → Red →	

Question

What are the properties of acidic, alkaline, and neutral substances when tasted and touched?

8.1.2
8.1.4

TEACHER'S NOTES

- Teachers may use other suitable substances for the test. Examples are cooking oil, honey, tamarind, rice water, and others.

Acidic, Alkaline, and Neutral Substances Around Us

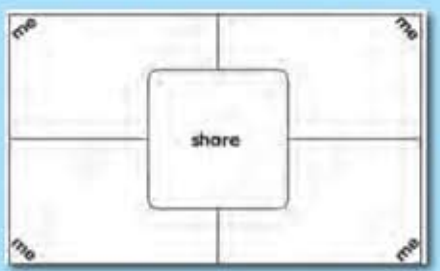
There are acidic, alkaline or neutral substances around us other than food. These substances are used in the fields of agriculture, medicine, health, and industry.

Fun Activity — Me-Share-Agree

ACTIVITY GROUP

Apparatus and Materials

- three situation cards



- example of Placemat Consensus

Steps

1. Form groups of four. Decide on a leader.
2. Each group prepares a Placemat Consensus.
3. The group leader chooses one situation card to be discussed with the other group members.
4. Each group member writes his/her ideas in the "me" space on the uses of acidic, alkaline, and neutral substances based on the situation card chosen.
5. After five minutes, discuss the ideas written down with other members in the group.
6. The results of the discussion are written in the "share" space.
7. Present the ideas for discussion in front of the class.

Question

What are other uses of acidic, alkaline, and neutral substances in our daily life? Discuss.

8.1.4

TEACHER'S NOTES

- The activity above is carried out using the Placement Consensus of the 21st Century Learning Skills.

Activity Book Page: 76

KPM

Litmus Paper Substitutes

Besides litmus paper, we can also test acidic or alkaline properties of substances using other substances as indicators.

Let's Test — Exploring Substitutes for Litmus Paper

ACTIVITY GROUP

Apparatus and Materials

- dropper
- petri dishes
- lime
- sodium bicarbonate

- turmeric extract

- purple cabbage extract

- hibiscus extract

Steps

1. 

Add 5 mℓ of lime extract to one petri dish and 5 mℓ of sodium bicarbonate solution to another.

2. 

Put a drop of turmeric extract in both petri dishes and observe the colour changes. Record your observation.

3. Repeat steps 1 and 2 using purple cabbage and hibiscus extracts.
4. Test all acidic and alkaline substances other than the lime extract and sodium bicarbonate solution.
5. Record the observations of any colour change. Discuss.

Questions

1. Which tested extract is only affected by alkaline?
2. Other than lime extract and sodium bicarbonate solution, what other test substances can be used?
3. Are turmeric, purple cabbage, and hibiscus extracts suitable to be used as indicators for the properties of acidic and alkaline substances?

8.1.3

TEACHER'S NOTES

- pH paper may be used as a substitute for litmus paper.
- The methods to prepare extracts of turmeric, purple cabbage, and hibiscus can be seen by scanning the QR Code.

Activity Book Page: 75

Leisure Science — An Acidic, Alkaline, and Neutral Tree

Steps

1. Create an acidic, alkaline, and neutral tree craft by decorating its branches and twigs using pictures of acidic, alkaline, and neutral substances.
2. Add an empty space at the bottom of the tree craft for your stationery.

Let's Remember

1. Acidic, alkaline or neutral properties can be tested using litmus paper.
2. Litmus paper has two colours which are blue and red.
3. The change in colour of litmus paper during testing is as follows:

Litmus paper colour	Acidic substances	Alkaline substances	Neutral substances
Blue	Changes to red	No change	No change
Red	No change	Changes to blue	No change

4. Examples of acidic, alkaline, and neutral substances:

Acidic substances	Alkaline substances	Neutral substances
Lime	Soap	Salt solution
Tamarind	Slaked lime	Sugar solution

5. The acidic, alkaline, and neutral properties of a substance can also be tested using the senses of taste and touch, although these are not scientific indicators.
6. Acidic substances usually taste sour, while alkaline substances taste bitter and are slippery when touched. Whereas, neutral substances have many types of taste, such as tasteless, salty, and sweet.
7. Other substances that can be used to test acidic, alkaline or neutral substances are:
   - turmeric extract
   - hibiscus extract
   - purple cabbage extract
8. Acidic and alkaline substances are widely used in agriculture, medicine, and the manufacture of household products.

Let's Answer

Answer all the questions in the Science exercise book.

1. What is the indicator used to test acidic, alkaline or neutral substances?

2. (i) What are the properties of X, Y, and Z based on the change in the colour of litmus paper?

Properties of **X** _____

Properties of **Y** _____

Properties of **Z** _____

(ii) What are examples of X, Y, and Z?

3. Besides litmus paper, acidic and alkaline substances may also be tested using extracts of _____, _____, and _____.

4. Amar tested bitter gourd extract and recorded the results as in Table A.

Table A

Taste	Bitter
Touch	Slippery
Change in litmus paper	(i) Blue → red (ii) Red → no change

Based on the results above, can the senses of taste and touch be used as scientific indicators for the properties of bitter gourd? Why?

HOTS

Why does toothpaste have alkaline properties?