

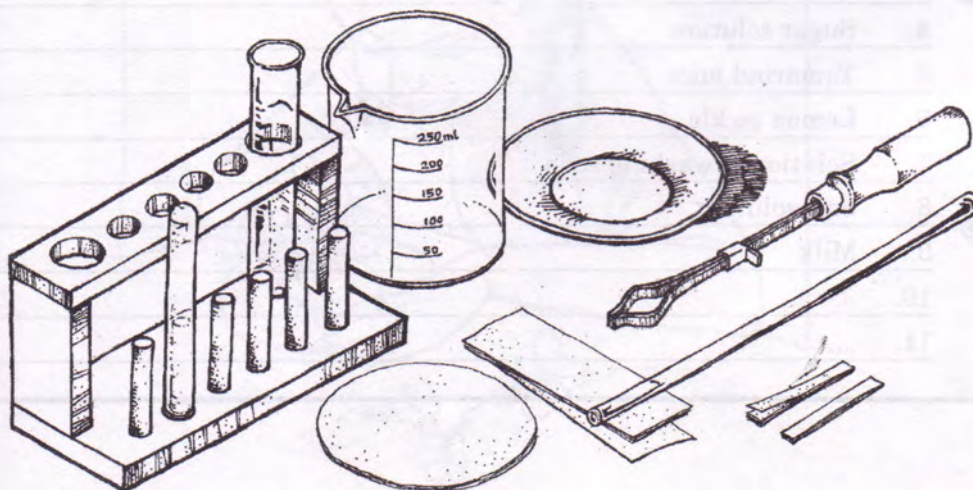
IDENTIFICATION OF ACIDS AND BASES

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One day, while eating, some vegetable curry fell on Ramesh's white shirt. It left a big yellow stain. So Ramesh decided to clean the stain with soap. To his surprise, he saw the stain turning red when he rubbed soap on it. "Why did this happen?" he asked his mother. She told him that the turmeric in the vegetable, which caused the yellow stain, had turned red on applying soap. Ramesh wondered whether turmeric would change colour with other substances as well. He decided to investigate.

He collected turmeric and several other substances for testing. The names of these substances are given in Table 1. Ramesh made a solution of turmeric in water, dipped a strip of paper in it and dried the paper in the sun. He then cut the paper into strips. He used these strips of turmeric-coated paper to test the substances one by one.

Using a glass tube, Ramesh put a drop of the first substance listed in the table on a bit of turmeric paper. He then washed the glass tube with water and repeated the process with



every substance in his list, using a fresh strip of turmeric paper each time.

TURMERIC CHANGES COLOUR

EXPERIMENT 1

Do you want to perform this interesting experiment of changing colours? You will need to bring some turmeric and the other substances listed in Table - 1 from your home. You will also have to learn to make solutions from your teacher.

Prepare the strips of turmeric paper which you will use for testing.

PREPARING TURMERIC PAPER

Take a teaspoon of well ground turmeric powder and add some water to it so as to make a thick paste-like solution. Rub this paste on the filter paper and dry the paper.

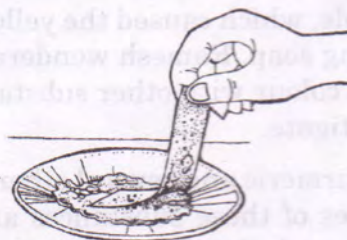
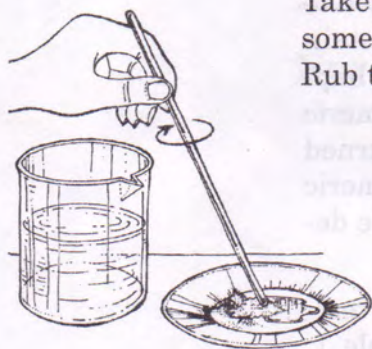


TABLE 1

No.	Substance	Did turmeric change colour?
1	Solution of baking soda	
2	Lemon juice	
3	Slaked lime	
4	Sugar solution	
5	Tamarind juice	
6	Lemon pickle	
7	Solution of washing soda	
8	Salt solution	
9	Milk	
10	...	
11	

Cut the filter paper into strips about 1 cm wide and 3 cm long. Your turmeric paper is ready.

Test all the substances one by one and note whether they change colour or not. Fill in these details in Table 1. (1)

If you wish, you could test other substances as well and find out whether they change the colour of the turmeric paper.

Ramesh wondered whether there were other things besides turmeric which changed colour like chameleons in the presence of various substances.

You will be surprised to know that, indeed, there are many such things which change colour in this manner. Let us repeat this experiment with a few such things.

CHANGE THE COLOUR OF FLOWERS

EXPERIMENT 2

We will perform the experiment with the substances listed in Table 1. Instead of turmeric, we will add flowers of various colours to these substances and see whether these flowers change colour.

Collect some colourful flowers such as China Rose (*gudhal*), Ipomea (*besharam*), Bougainvillea (preferably red-coloured) etc from your home or on your way to school.



Pluck the petals of one of the flowers. Rub them on a filter paper so that the filter paper absorbs their colour. To colour the filter paper fully, you will need the petals of at least three to four flowers. Now cut this coloured filter paper into strips, like you did earlier with the turmeric paper. Test these strips of flower-coloured filter paper with the substances you have.

Record your observations in Table 2. (2)

TABLE 2

No.	Substance	Effect on China Rose paper	Effect on Ipomea paper
1.	Solution of baking soda		
2.	Lemon juice		
3.	Slaked lime		
4.	Sugar solution		
5.	Tamarind juice		
6.	Lemon pickle		
7.	Solution of washing soda		
8.	Salt solution		
9.	Milk		
10.	...		

Do all the substances change the colour of the China Rose paper? List those substances which changed the colour of this paper. (3)



List the substances which changed the colour of Ipomea paper. (4)

Which substances change the colour of Bougainvillea paper? (5)

You can do this experiment with other flowers too, and also conduct the test with other substances.

Ramesh did this experiment with a large number of flowers and became completely absorbed in this magic of changing colours. But a thought struck him. Was it possible to restore the original colour of the turmeric paper or the flowers, after they had changed colour?

Can you suggest a method by which the original colour of turmeric can be restored? (6)

LITMUS

Litmus is a special type of paper. There are two types of litmus paper - red and blue.

We will first test all the substances in Table 1 with blue litmus paper and then with red litmus paper.

Before starting the tests, copy Table 3 in your exercise book. Enter your observations in this table.

TESTING WITH BLUE LITMUS

EXPERIMENT 3

Take a small piece of blue litmus paper in your hand and put a drop of the substance to be tested on it.

Note what effect this substance has on the colour of the litmus paper. Test the other substances one by one in the same way.

Don't forget that you have to wash the glass tube you use for putting drops of the substance on the litmus paper before testing each new substance.

Record your observations in Table 3. (7)

TESTING WITH RED LITMUS

EXPERIMENT 4

Repeat what you did in Experiment 3 with red litmus paper.

Test all the substances one by one.

Record your observations in Table 3. (8)

TABLE 3

No.	Substance
1	Solution of salt
2	Lemon juice
3	Staked lime
4	Sugar solution
5	Tamarind juice
6	Lemon pickle
7	Solution of washing soda
8	Salt solution
9	Milk
10	...
11	...

TABLE 3

No.	Substance	Test with blue litmus		Test with red litmus	
		Turned red	Remained blue	Turned blue	Remained red
1.	Solution of baking soda				
2.	Lemon juice				
3.	Slaked lime				
4.	Sugar solution				
5.	Tamarind juice				
6.	Lemon pickle				
7.	Solution of washing soda				
8.	Salt solution				
9.	Milk				
10.	...				
11.				

You can now divide these substances into three groups.

Substances which turn blue litmus red are said to be acidic.

Substances which turn red litmus blue are said to be basic.

Some substances do not affect either blue or red litmus paper. That means, when they are tested, the blue litmus paper remains blue and the red litmus remains red. These substances are called neutral.

On the basis of your observations recorded in Table 3, make groups of acidic, basic and neutral substances and record these in your exercise book. (9)

On the basis of these groupings and with the help of your observations recorded in Table 1, answer the following questions.

What is the effect of basic substances on turmeric paper? (10)

What is the effect of acidic substances on turmeric paper? (11)

What is the effect of neutral substances on turmeric paper? (12)

The turmeric stain turned red when it was washed with soap. On the basis of this observation, which group would you place the soap solution in? (13)

INDICATORS - SUBSTANCES WHICH CHANGE COLOUR

In the above experiment, you used litmus paper to find out which substances are acidic and which are basic. This means that litmus tells us what is acidic and what is basic. Substances which provide such an indication are called indicators. Besides litmus, there are many other indicators which show one colour with acidic substances and another with basic substances.

Can flowers and turmeric paper also be called indicators? (14)

Indicators have another property. They can change their colour repeatedly. For example, blue litmus turns red with acid and this red litmus can again be turned blue on contact with a base. If you wish, you can test this.

Can you say what should be done to restore the original colour of turmeric paper once it has changed to red? (15)

There are many other indicators which are used to identify acids and bases. You will come across another such indicator in your higher classes.

QUESTIONS FOR REVISION

1. On the basis of Table 3, can we say that all sour things are acidic in nature?

Test the following sour substances and verify your answer:

Curd, buttermilk, unripe mango, tomato.

2. It is not known whether a certain substance is acidic, basic or neutral. When 2-3 drops of this substance were put on red litmus paper, there was no change. On observing this, Ajay said the substance is certainly neutral. But Rehana said, perhaps, it is acidic. How can we find out whether the substance is acidic or neutral?
3. You are given three solutions. One is acidic, another basic and the third neutral. You are also given blue litmus paper. Can you use it to identify which solution is which? Explain how you arrived at your answer.
4. A particular solution does not affect yellow turmeric paper. On the basis of this, which of the following statements is correct:

Table 3

No.	Substance
1	Solution of ...
2	...
3	...
4	...
5	...
6	...
7	...
8	...
9	...
10	...
11	...

- a. The solution is acidic.
- b. The solution is basic.
- c. The solution is not basic.
- d. The solution is neutral.

Can you guess what effect this solution will have on red litmus paper?

NEW WORDS

indicator acidic basic
 neutral litmus