

Milk curdles if something sour is put into it. If you put a little curd in milk, all the milk slowly converts to curd. The water in the milk separates from the solids. When a candle is lit, it burns and goes up in smoke. In these examples, something new is formed. Every day a number of such processes take place in which one thing is converted into another.

We often mix or dissolve things. Is something new formed every time we do this? When we dissolve sugar in water or switch on a bulb or mix water in milk, is a new substance formed?

Sometimes, a substance forms a new substance if it is heated, or even if it is just left standing. For example, sugar turns black when it is heated.

Think of other such examples where a new substance is formed from a single substance or by mixing more than one substance. Each group in the class should give at least one example. You should explain how you found out that something new was formed. (1)

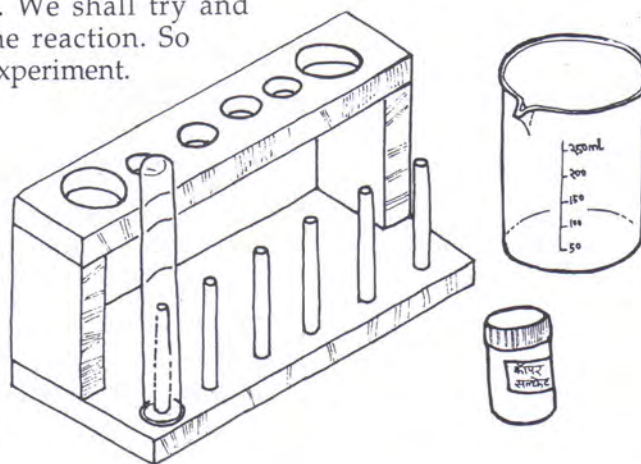
There are many ways in which we can tell whether a new substance is formed. But there are also some cases in which we may not even know that a new substance has been formed.

Processes in which new substances are formed are called chemical reactions. In this chapter, we shall perform some experiments to study chemical reactions. We shall try and identify the changes that occur during the reaction. So carefully observe all that happens in each experiment.

Experiment 1

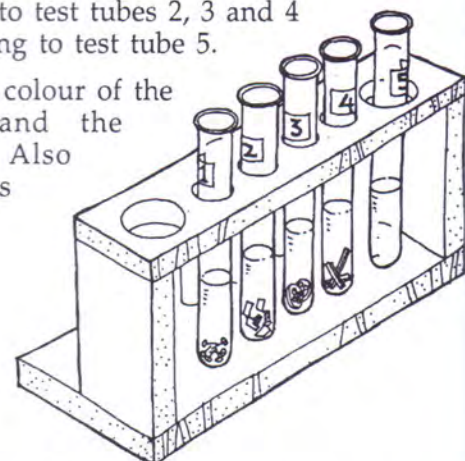
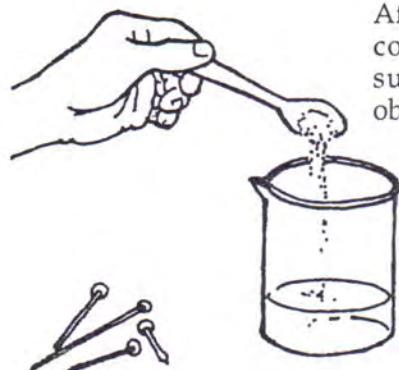
Copper electroplating

Pour 50 ml of water in a beaker and dissolve about half a teaspoon of copper sulphate in it. Add 1 ml of sulphuric acid to the solution. Take five test tubes and label them 1 to 5. Pour equal amounts of copper sulphate solution into each test tube. Add iron nails or pins to test tube 1. Similarly, add aluminium foil, a plastic



substance and a piece of wood to test tubes 2, 3 and 4 respectively. Do not add anything to test tube 5.

After half an hour, observe the colour of the copper sulphate solution and the substances in each test tube. Also observe whether these substances



have undergone any change in colour or whether any new substance is deposited on them.

Record your observations in Table 1. (2)

In which test tubes did the copper sulphate solution become lighter in colour? (3)

In which test tubes did you observe any change in the substances they contain? (4)

On the basis of your observations, can you explain in which test tubes a chemical reaction occurred? Give reasons for your explanation. (5)

Can you guess what new substance was formed in these chemical reactions? (6)

Table 1

Test tube No	Object added to solution	Change in colour of solution	Changes in object
1	Iron nails or pins		
2	Aluminium foil		
3	Plastic		
4	Wood		
5	Nothing		

A problem to ponder over

Is there any test tube in which the colour of the solution changed, but nothing happened to the substance it contained? (7)

Is there any test tube in which the substance was affected, but the colour of the solution did not change? (8)

Is there a relationship between the change in colour of the solution and the effect on the substance it contains? (9)

Experiment 2

Let us now see another example of a chemical reaction. In this experiment we shall mix solutions of two different substances and see whether a new substance is formed.

Fill one-third of a test tube with water. Dissolve about half a teaspoon of urea in it and shake well.

Take another test tube with the same amount of water and dissolve half a teaspoon of oxalic acid in it and shake well.

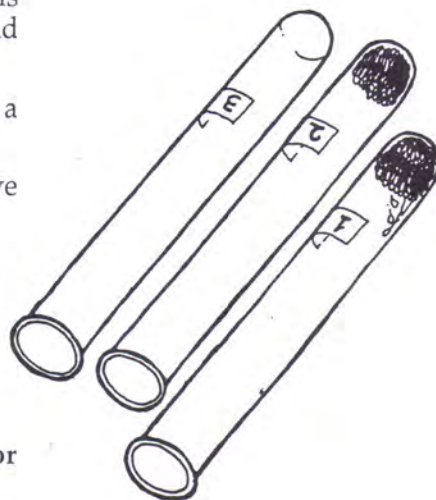
Are both substances, urea and oxalic acid, soluble in water? (10)

Pour the oxalic acid solution into the urea solution. Explain what happens when the two solutions are mixed. (11)

Did an insoluble substance form when the two solutions were mixed? (12)

Can we say that a new substance was formed? Give reasons for your answer. (13)

How is the new substance different from urea and oxalic acid? (14)



Experiment 3

Rusting of iron

In the earlier experiments, we learned how to recognise whether a new substance had formed during a chemical reaction. Let us now see another example. You may have observed that a coating of rust forms on iron. We shall perform an experiment to see what changes take place when iron rusts. This experiment will take some time so you should be patient and make arrangements to ensure that the apparatus is not disturbed for the duration of the experiment.

Take three test tubes, two beakers and an iron brush used for cleaning utensils. Label the test tubes 1 to 3. Pull out two strands of wire from the brush, each about half a metre long. Roll these wires into two small balls. Dip one ball in water and drop it in test tube 1. Put the other dry ball in test tube 2. The balls should be large enough to be packed at the bottom of the test tubes so that they don't fall out if the test tubes are inverted. Nothing should be done to test tube 3.

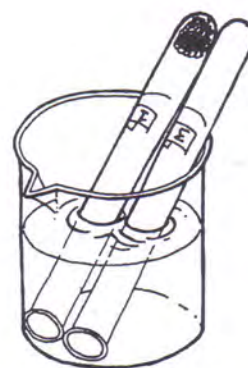
Fill one-fourth of a beaker with water. Invert test tubes 1 and 3 in the beaker. Test tube 2 should be inverted in another dry beaker.

Note the water level in test tubes 1 and 3. You will see that the water level is the same as that in the beaker. Place the two beakers with the test tubes in a safe place where they can remain undisturbed. Observe the test tubes every day for the next three days. Don't take them out of the water to make your observations. Note the changes you see in the iron balls and the water level in the test tubes.

Record your observations in Table 2. (15)

In which test tube did you notice a change in the iron ball? (16)

In which test tube did the water level change? (17)



What could be the reason for the change in water level? Discuss with your teacher before writing your answer. (18)

Table 2

Sr. No.	Test tube	Changes in water level in test tube	Effect on iron
1.	Wet iron		
2.	Dry iron		
3.	No iron		

In which test tube did you find evidence of a chemical reaction and what was the evidence? (19)

In the above three experiments, we saw that there were different indicators to show that a chemical reaction was taking place or a new substance was being formed.

In the chapter "Our food", you tested various substances to find out if they contained fat, protein and starch.

In which of these tests was a new substance formed? Give reasons for your answer. (20)

Take some lime water in a test tube. Blow air into the lime water using a glass tube.

Did you notice any changes in the lime water after you blew air into it for some time? (21)

Does your breath cause a chemical reaction to take place in the lime water? (22)

Which of the following can be called a chemical reaction?

- Extraction of lime juice
- Burning of wood
- Breaking of glass
- Tearing paper into pieces
- Ripening of a mango (23)

In the chapter "Gases", you will perform experiments in which chemical reactions take place to form gases and you will test the properties of these gases. Next year you will learn how to measure the rate of a reaction. You will also see what factors affect chemical reactions.

Questions for revision

- Which of the following processes are chemical reactions? How would you conclude that they are chemical reactions?
 - Making a salt solution
 - Evaporation of water
 - Adding hydrochloric acid to marble
 - Melting of wax
 - Separating colours by chromatography
 - Melting of ice
 - Colourless phenolphthalein indicator solution turning pink
- In the chapter "Respiration", you learned the difference between inhaled and exhaled air. On the basis of what you learned, explain whether a chemical reaction takes place inside our body during respiration.
- In Experiment 3, we used three test tubes. Would we face any problem in drawing conclusions if we use only one test tube? Give reasons for your answer.