

Physical And Chemical Changes

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INTRODUCTION

Everyday you see many changes in your surroundings such as change of milk into curd, cheese; ripening of fruits etc.

In this chapter we shall perform some activities and study the nature of these changes.

These changes are of two kinds physical and chemical.

Physical Change

A change in which a substance undergoes a change in its physical properties is called a physical change. A physical change is generally reversible. In physical change no new substance is formed.

For example

1. Melting of ice into water and freezing of water into ice
2. Change of iron piece into wire or sheet
3. Lighting of bulb
4. Preparation of sugar or salt solution



Melting of ice

Chemical Change

A change in which one or more substances are formed is called a chemical change. It is an irreversible reaction.

Chemical changes are very important in our life. All new substances are formed due to chemical changes. Plastic and detergents are formed by chemical changes.



Milk in bowl



Curd

In addition to new products, the following may accompany a chemical change.

- Sound may be produced
- The colour may change
- A gas may be formed
- A change in smell may take place or a new smell may be given off.

Examples of Chemical Changes

- Burning of coal and other fuel products.
- Burning of paper
- Ripening of fruits and vegetables
- Making of curd from milk

Let us do Some Activity in which New Substances are Formed

Take small piece of a thin strip like ribbon of magnesium.

Clean its tip with paper bring tip near a candle flame.

It burns with a bright white light. When it is completely burnt it, leaves a powdery ash.

This process can be represented by following reaction :



Mix this powdery ash with water and stir when we take 3-4 drops of it on red litmus it turns red litmus into blue litmus.

So it is a base. Therefore a new substance is formed



After burning of magnesium a new substance magnesium oxide is formed.

Magnesium hydroxide is another new substance formed by mixing magnesium oxide with water. Dissolve about a teaspoonful of copper sulphate. It is called also neela thotha. Take a half cup of water in a glass tumbler or a beaker. Pour neela thotha in it. Add a few drops of dilute sulphuric acid to the solution.

You should get a blue coloured solution. Save a small sample of the solution in a test tube or a small glass bottle. Take a shaving blade and drop it into the remaining solution. Wait for 30 minutes or so. Observe the colour of the solution. Compare it with the colour of the sample solution saved separately.

The changes that you observe are due to a reaction between copper sulphate and iron. The change of colour of the solution from blue to green is due to the formation of iron sulphate, a new substance.

We can write the chemical reaction as :



Take about a teaspoonful of vinegar in a test tube. Add a small quantity of baking soda to it. You would see bubbles of a gas with hissing sound coming out from it. Pass this gas through lime water. This gas turns lime water milky. It shows that this is a carbon dioxide (CO₂) gas.

So, a new substances is formed on passing this gas to lime water then also a new substances is formed.



RUSTING OF IRON

Rusting is one change that affects iron particles and slowly destroys them. Since iron is used in making bridges, ships, cars, truck bodies and many other articles. The monetary loss due to rusting is huge.

This process of rusting can be represented by the following equation



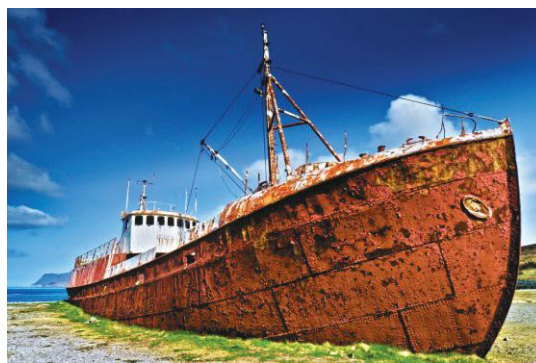
The presence of water and oxygen is essential for rusting prevent iron articles from coming in contact with oxygen, or water or both. One simple way is to apply a coat of paints or grease.



These coats should be applied regularly to prevent rusting. Another way is to deposit a layer of a metal like chromium or zinc on iron.

One another method to prevent rusting is galvanisation. You know ships are made of iron and a part of them remains under water.

On the part above water also, water keeps clinging to the ship's outer surface. The water of sea contains many salts. The salt water makes the process of rust formation faster. Therefore ships suffer a lot of damage from rusting in spite of being painted. So a fraction of ship's iron has to be replaced every year.



CRYSTALLISATION

The salt obtained from the sea by evaporation method, is not pure, its crystals are small.

However, the large crystals of pure substances can be formed from their solutions. This process is called crystallisation.



Sugar crystals



Alum crystals

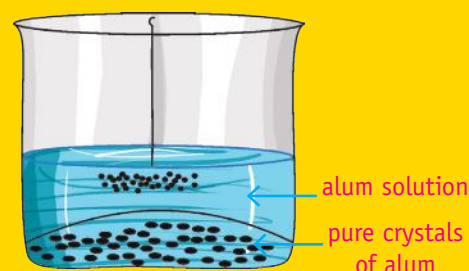


Activity Time

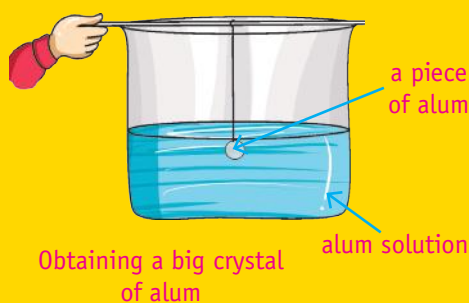
To show the formation of crystals.

Take a beaker, half filled with water. Dissolve alum in it as much as you can, by constant stirring. When you cannot dissolve any more alum by stirring, heat the solution and go on dissolving the alum till it stops dissolving. Filter the solution to remove undissolved impurities.

Now, allow this solution to cool. After some time you will find crystals of alum at the bottom of the beaker.



Crystallization



The crystals so obtained are small in size. To obtain a big crystal of alum, hang a small crystal of alum in the hot and concentrated solution with the help of a thread.

You will observe that the crystal slowly begins to grow. After a few days, a big crystal of alum is obtained.

You may get big crystals of sugar in the same way.



Know the Keywords :

Chemical changes : A change in which one or more substances are formed.

Physical changes : Physical changes are reversible and no new substances is formed only physical properties change.

Rusting : Rusting of iron is due to presence of both water and air.

Point to Remember

- A change in which a substances under goes a change in its physical properties is called a physical change.
- A change in which one or more substances are formed is called a chemical change.
- Rusting is one change that affects iron particles and slowly destroy them.
- The large crystals of pure substances can be formed from their solution. This process is called crystallisation.

EXERCISE TIME

A. Answer the following questions :

1. What are physical changes ? Give two examples of it.
2. Write two methods to prevent iron from rusting.
3. Explain why rusting of iron objects is faster in coastal areas than in deserts?
4. What is chemical change ?
5. What is crystallisation ?

B. Write 'T' for true and 'F' for false statements :

1. The chemical name of baking powder is sodium bicarbonate.
2. Burning of paper is a physical change.
3. Rusting of iron is a chemical change.
4. Melting of ice is a physical change.
5. Lighting of bulb is a physical change.

C. Classify the changes involved in the following processes as physical or chemical change :

- | | |
|----------------------|------------------------------|
| 1. Burning of candle | 5. Melting of ice |
| 2. Cutting of cloth | 6. Lighting of tube |
| 3. Melting of wax | 7. Dissolving sugar in water |
| 4. Digestion of food | 8. Photosynthesis |

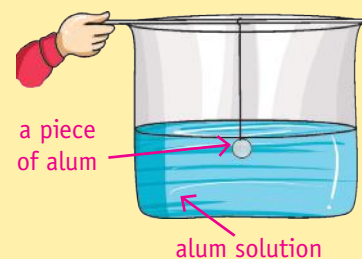
D. Tick (✓) the correct option :

- Melting of ice into water and freezing water into ice is a :
(i) chemical change (ii) artificial change (iii) physical change
- A change in which one more substance is formed is called a :
(i) physical change (ii) chemical change (iii) crystallisation
- Copper sulphate is called neela :
(i) salt (ii) thotha (iii) shertha
- The large crystals of pure substances can be formed from their solution, this process is called :
(i) rusting of iron (ii) crystallisation (iii) none of these



Creative Work

- **Prepare crystals of alum. You can get the alum at any shop on which you normally go, to buy your kitchen things.**
- **Take a cup of water in a pan and add powdered alum with constant stirring in it till no more of it dissolves. Start heating and add more alum till a saturated solution is produced in hot water. Keep this solution of alum undisturbed for a few hours till well shaped crystals of alum are formed.**



To get a large size crystal of alum; a small crystal of alum can be tied with thread and suspended in the saturated solution of alum. Crystallization will start taking place on the suspended crystal and it will grow into a large crystal in a few days.