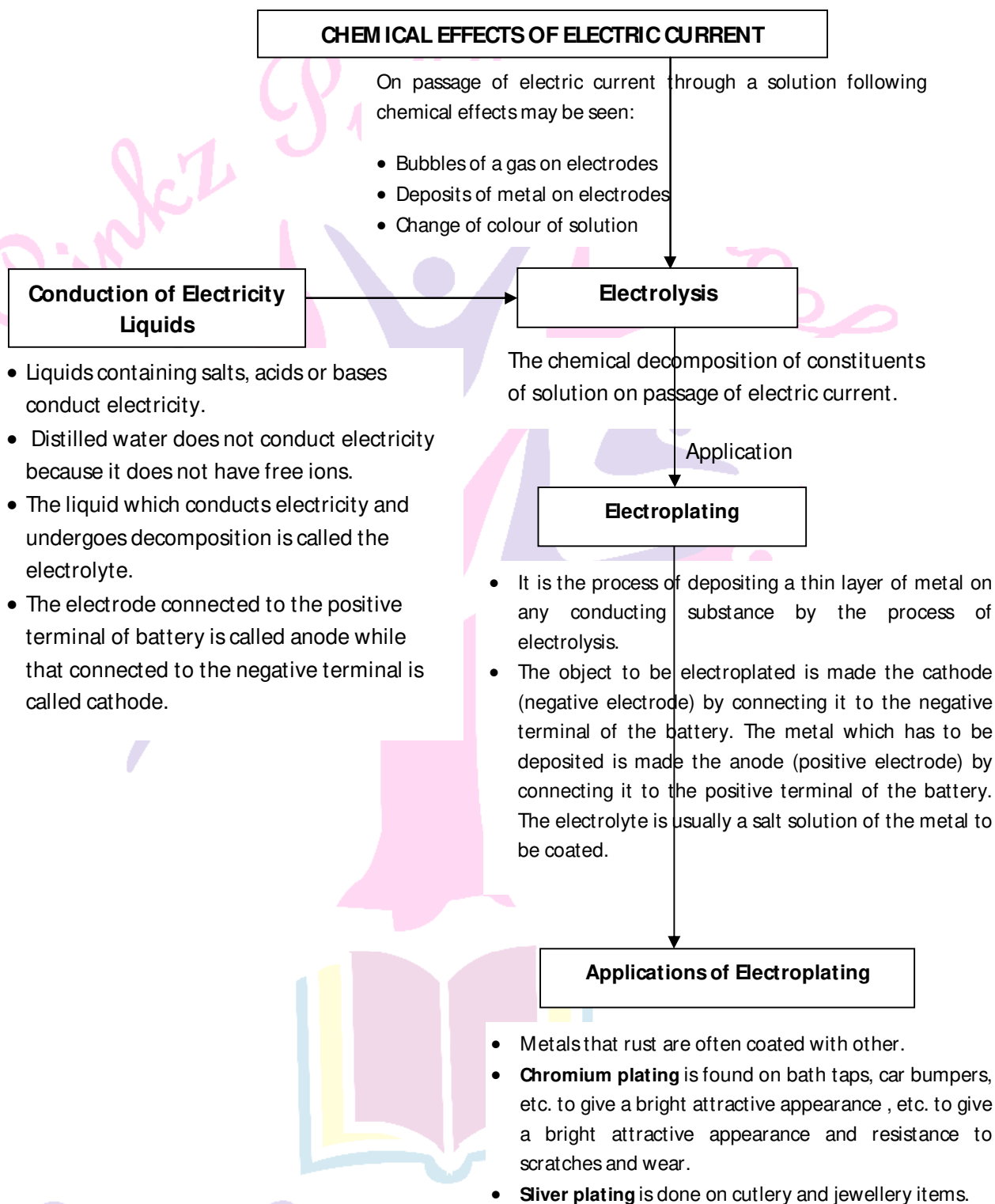


Lesson 14. Chemical Effects of Electric Current

Grade VIII

Basic concepts – A Flow Chart



Know the Terms

- **LED (Light Emitting Diode):** The device which is used in the tester in place of bulb is called LED. It is used when a weak electric flows through it and it starts to glow in weak current.
- **Electroplating :** The process of depositing a layer of any desired metal on another material by means of electricity is called electroplating. It is the most common application of chemical effects of electric current.
- **Electrolyte :** An electrolyte is a liquid which conducts electricity e.g., a solution of copper sulphate salt in water is an electrolyte.
- **Electrode :** It is a solid electrical conductor through which an electric current enters or leaves something like a dry cell or an electrolytic cell. Electrodes are of two types i.e., anode and cathode.
- **Electrolytic Cell :** An electrolytic cell is an arrangement having two electrodes > **Electrolysis :** The chemical decomposition produced by passing an electric current through an electrolyte is called electrolysis, e.g., acidified water decomposes into hydrogen and oxygen on passing an electric current through it.
- **Tester :** The instrument used to test whether any material is good conductor or not is called tester.
- **Circuit :** The closed path through which electric current passes from one part to another part is called electric circuit.

Objective Type Questions

(1 Marks)

I. Multiple Choice Questions

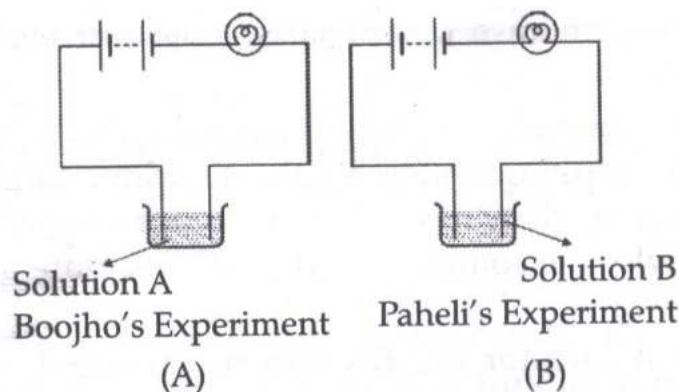
1. An electric current can produce :

(NCERT Exemplar)

- (a) heating effect only
- (b) chemical effect only
- (c) magnetic effect
- (d) chemical, heating and magnetic effect

Next Generation School

2. Boojho and Paheli performed experiments taking similar bulb and cells but two different solutions A and B as shown in Fig. (NCERT Exemplar)



They found that the bulb in the set up A glows more brightly as compared to that of the set up B. You would conclude that :

- (a) higher current is flowing through the circuit in set up A
- (b) higher current is flowing through the circuit in set up B
- (c) equal current is flowing through both the circuits
- (d) the current flowing through the circuit in the two set ups cannot be compared in this manner.

3. Boojho's uncle has set up an electroplating factory near his village. He should dispose of the waste of the factory : **(NCERT Exemplar)**

- (a) in the nearby river
- (b) in the nearby pond
- (c) in the nearby cornfield
- (d) according to the disposals guidelines of the local authority

4. When electric current is passed through a conducting solution, there is a change of colour of the solution. This indicates : **(NCERT Exemplar)**

- (a) the chemical effect of current
- (b) the heating effect of current
- (c) the magnetic effect of current
- (d) the lightning effect of current

5. Which one of the following solutions will not conduct electricity ? **(NCERT Exemplar)**

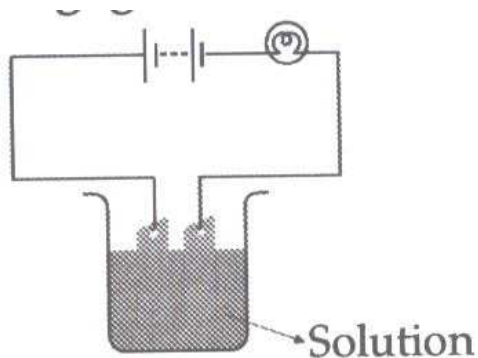
- (a) lemon juice
- (b) vinegar
- (c) tap water
- (d) vegetable oil

6. Which of the following metals is used in electroplating to make objects appear shining?

(NCERT Exemplar)

- (a) iron
- (b) copper
- (c) chromium
- (d) aluminium

7. Which of the following solutions will not make the bulb in Fig. glow ? (NCERT Exemplar)



(a) sodium chlorides

(b) copper sulphate

(c) silver nitrate

(d) sugar solution in diluted water

1. (d)	2. (d)	3. (d)	4. (a)	5. (d)	6. (c)	7. (d)
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II. Multiple Choice Questions

1. Plastic wire is

a. An insulator

b. A conductor

c. Both of these

d. None of these

2. Electroplating is based on

a. Magnetic effect of electricity

b. Chemical effect of electricity

c. Heating effect of electricity

d. Physical effect of electricity

3. Adding common salt to distilled water makes it

a. Good conductor

b. Insulator

c. None

d. Both a and b

4. An electrolyte is

a. A metal

b. A solution

c. A liquid that conducts current

d. All of above

5. Copper wire is a

a. Good conductor

b. Poor conductor

c. Both a and b

d. None of these

6. Poor conductors are

a. Plastics

b. Clothes

c. Wood

d. All of these



7. Distilled water is

- a. Poor conductor
- b. Good conductor
- c. Both a and b
- d. None

8. Flow of electrons is called

- a. Electroplating
- b. Electric current
- c. Electrodes
- d. Electrolyte

9. Electroplating prevents

- a. Current
- b. Chemical effect
- c. Rusting
- d. All

10. All electric lamp glows due to

- a. Chemical effect
- b. Magnetic effect
- c. Heating effect
- d. None

1. a	2. b	3. a	4. c	5. a
6. d	7. a	8. b	9. c	10. c

I. Fill in the blanks

1. The object to be electroplated is taken as _____ electrode.
2. One of the most common applications of chemical effect of electric current is _____.
3. Small amount of a mineral salt present naturally in water makes it a _____ of electricity.
4. Electroplating of _____ is done on objects like water taps and cycle bells to give them a shiny appearance.
5. Most liquids that conduct electricity are the solution of _____, _____, and _____.
6. The passage of an electric current through a solution causes effects.
7. If you pass current through copper sulphate solutions, copper gets deposited on the plate connected to the _____ terminal of the battery.
8. The process of depositing a layer of any desired metal on another material by means of electricity is called _____.
9. _____ is an example of an electrolytic solution.



10. _____ water is a poor conductor of electricity.
11. An electric lamp glows due to _____ effect of electric current.
12. _____ does not corrode easily.

1. negative	2. electroplating	3. good conductor	4. chromium
5. acids, bases, salts	6. chemical	7. negative	8. electroplating
9. Copper sulphate solution	10. Distilled	11. heating	12. plastic

II. Fill in the blanks

- The closed path through which the current flows is called _____.
- The deflection in _____ shows that current is passing.
- Distilled water is an _____ of the electricity.
- Flow of negatively charged electrons is called _____.
- Most of the conducting liquids are the solutions of _____, _____ and _____.
- An electric lamp glows due to _____ effect of electric current.
- Metals such as copper and aluminium conduct _____.
- _____ does not corrode easily.
- Electrodes are _____.
- An electrolyte is _____.

1. Circuit	2. Magnetic compass	3. Insulator	4. Electric current	5. Acids, bases, salts
6. Heating	7. Electricity	8. Chromium	9. Metal	10. Liquid

Next Generation School

I . Match the following

1. Match the items given in Column A with those in Column B suitably.

Column A		Column B	
(i)	Insulator	(a)	Electric circuit
(ii)	Conductor	(b)	Conduct current
(iii)	Closed path	(c)	Prevents rusting
(iv)	Solution of distilled water and salt	(d)	Rubber
(v)	Electroplating	(e)	Copper

(i) . (d)	(ii) . (e)	(iii) . (a)	(iv) . (b)	(v) . (c)
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2. Match the items given in Column A with those in Column B suitably.

Column A		Column B	
(i)	Copper and aluminium	(a)	Electrodes
(ii)	A tester	(b)	Good conductor
(iii)	Carbon rod	(c)	Detect the current
(iv)	Electroplating	(d)	Good conductor
(v)	Lemon juice	(e)	Prevents rusting

(i) . (d)	(ii) . (c)	(iii) . (a)	(iv) . (e)	(v) . (b)
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Next Generation School

II. Match the following

Column I	Column II
1. Insulator	(i) Electric circuit
2. Conductor	(ii) Conducts current
3. Closed path	(iii) Prevent rusting
4. Solution of distilled water	(iv) Rubber and salt
5. Electroplating	(v) Copper
6. Copper and aluminium	(vi) Electrodes
7. A tester	(vii) Good conductor
8. Carbon rod	(viii) Detect the current
9. Lemon juice	(ix) Good conductors

1. (iv)	2. (v)	3. (i)	4. (ii)	5. (iii)	6. (i)	7. (viii)	8. (vi)	9. (vii)
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I. True or False

1. Plastics are the good conductors of electricity.
2. Flow of electrons is called electric current.
3. Materials that do not allow electric current to pass through them easily are good conductors of electricity.
4. Only solids can conduct electricity.
5. Distilled water is poor conductor of electricity.
6. Tester is used to test the conductivity of liquid.
7. Electric bulb glows due to chemical effect of electricity.
8. The bulb gets heated to a high temperature and it starts glowing when electric current passes through it.
9. Poor conductors also allow electricity to pass under certain conditions.
10. Lemon juice shows deflection means that it is a good conductor.

1. False	2. True	3. False	4. False	5. True	6. True	7. False	8. True	9. True	10. True
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II. True or False

1. Plastics are the good conductor of electricity.
2. Flow of electrons is called electric current.
3. Distilled water also conducts the electric current.
4. Circuit is the closed path through which current flows.
5. Electric bulb glows due to chemical effect of electricity.
6. Copper wire is poor conductor of electricity.
7. LED is an electric bulb which is used in a tester.
8. Electricity shows magnetic effect.
9. When salt is dissolved in distilled water, it does not conduct electricity.
10. Electroplating is based on the heating effect of electricity.

1. False	2. True	3. False	4. True	5. False
6. False	7. True	8. True	9. False	10. False

Quiz Time

1. What are the benefits of electroplating?
2. What are the uses of tester?
3. How will you make distilled water as super conductor?
4. What is electric current?
5. What happens to a compass needle kept nearby when current flows in a wire? What does it prove?
6. Do liquids conduct electricity?
7. What are electrodes and electrolyte?
8. Expand the term LED.
9. While connecting LED to a circuit which wire should be connected to positive terminal of the battery and which wire to negative terminal?
10. Is our body a conductor or insulator of electricity?



Answers:

1. Electroplating prevents corrosion of metals, metals look shiny for a long time and foods do not get spoilt.
 2. It tests whether a particular material allows the electric current to pass through it or not.
 3. We will make it conductor by adding a pinch of salt to it.
 4. The flowing of charge from positive to negative terminal.
 5. The deflection of the magnetic needle can be seen. It proves that electric current produces a magnetic effect.
 6. Yes, mostly liquids conduct electricity.
 7. A metal rod used in a battery is called an electrode and liquids used are called electrolytes.
 8. Light Emitting Diodes.
 9. The longer lead should be connected to the positive terminal of the battery and the shorter lead to the negative terminal of the battery.
 10. Conductor of electricity.
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NCERT CORNER

Intext Questions

1. After doing the electroplating activity Paheli interchanged the copper plates and repeated the activity. What do you think she will observe this time ?

She will observe the gas bubbles.

2. Boojho wonders whether we can do electroplating to build up the thickness of tiny parts which are undersized ?

No, for deposition of metal, we require electrodes of desired size, while undersized particles cannot be used as electrodes.

3. Why is it dangerous to touch an electrical appliance with wet hands ?

Small amounts of mineral salts present naturally in water are beneficial for human health. However, these salt make water a good conductor. So, we should never handle electrical appliances with wet hands or while standing on a wet floor.



4. Why does the bulb glow when electric current passes through it?

Due to the heating effect of current, the filament of the bulb gets heated to a high temperature and it starts glowing. However, if the current passing through a circuit is too weak, the filament does not get heated sufficiently and it does not glow.

5. Does distilled water conduct electricity?

When salt is dissolved in distilled water, we obtain salt solution. This solution conducts electricity. The water that we get from sources such as taps, hand pumps, wells and ponds is not pure. It may contain several salts which are naturally present in it. This water is thus a good conductor of electricity. On the other hand, distilled water is free of salts and is poor conductor of electricity.

6. What effect does the current produce when it flows through a conducting solution?

An electric current through a conducting solution causes chemical reactions. e.g., bubbles of a gas may be formed on the electrodes. Change of colour of solutions may occur. The reaction would depend on which solution and electrodes are used.

Textbook Questions

1. Fill in the blanks :

(i) Most liquids that conduct electricity are solutions of _____, _____, and _____.

(ii) The passage of an electric current through a solution causes _____ effects.

(iii) If you pass current through copper sulphate solution, copper gets deposited on the plate connected to the _____ terminal of the battery.

(iv) The process of depositing a layer of any desired metal on another material by means of electricity is called _____.

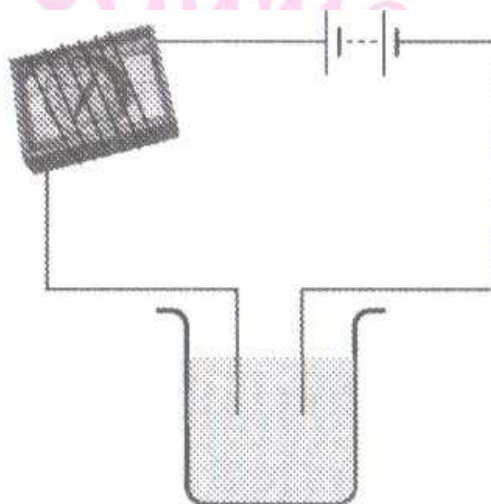
(i) acids, bases and salts	(ii) chemical	(iii) negative	(iv) electroplating
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2. When the free ends of the tester are dipped into solution, the magnetic needle shows deflection. Can you explain the reason?

As the free ends of the tester are dipped into solution, the liquid between the two ends allows the electric current to pass and the circuit of the tester becomes complete. When the

current passes through the tester, it establishes a magnetic effect and hence magnetic needle shows deflection. In other words, we can say that the solution is a good conductor of electricity, so the needle gets deflected.

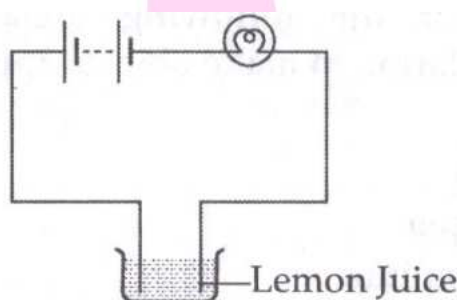
3. Name three liquids which when tested in the manner as shown in figure, may cause the magnetic needle to deflect.



The three liquids are as follows :

- (i) Tap water
- (ii) HCL or Hydrochloric acid
- (iii) Sodium hydroxide

4. The bulb does not glow in the setup shown in figure. List the possible reason. Explain your answer.



We surely conclude that the liquid does not conduct the electricity because when the liquid between the two ends of the tester allows the electric current to pass, the circuit of the tester becomes complete. The current flows in the circuit and the bulb glows. When the liquid does not allow the electric current to pass, the circuit of the tester is not complete and the bulb does not glow. However, sometimes even though the liquid allows the electric current to pass and the circuit is complete bulb does not glow. Due to the heating effect of current, the filament of the bulb gets heated to such a high temperature that it starts glowing. However, if



the current through a circuit is too small, the filament of the bulb does not get heated to a high temperature and it does not glow.

- 5. A tester is used to check the , conduction of electricity through two liquids, labelled A and B. The bulb of tester glows very brightly for liquid A. It is found that the bulb of the tester glows very dimly for liquid B. Which liquid is better conductor of electricity?**

Liquid A is better conductor of electricity because it can pass the electricity very easily due to which bulb glows very brightly.

- 6. Does pure water conduct electricity ? If not, what can we do to make it conducting ?**

To make the pure water conducting we have to dissolve some acid, base or salt in it due to which solution of acid, base or salt is obtained respectively, which are good conductors of electricity.

- 7. In case of any fire, before the firemen use the water hoses, they shut off the electrical supply for the area. Explain the reason why they do this.**

Water used by fireman is collected from the sources like wells, ponds, which is not pure but it is solution having few amounts of mineral salts and is conductor of electricity. So to prevent the electrocution, the firemen shut off the main electricity supply.

- 8. A child staying in the coastal region tests the drinking water and also the seawater with his tester. He finds that the compass needle deflects more in case of seawater. Can you explain the reason ?**

In seawater, amount of mineral salts is more than the drinking water. So the seawater can conduct the electricity more easily than drinking water, that is why the compass needle deflects more in case of seawater.

- 9. Is it safe for the fireman to carry out electrical repairs during heavy downpour ?**

Explain.

As water is not pure but a solution of salts thus a good conductor of electricity, so, handling of electrical circuits during heavy downpour may increase the risk of electrocution. So, never handle the electrical appliance with wet hands or surroundings.

Next Generation School

- 10. Paheli knew the rainwater is as pure as distilled water. So she collected some rainwater in a clean glass tumbler and tested it using a tester. To her surprise she found that the compass needle showed deflection. What could be the reasons ?**

Natural water may contain the small amount of mineral salts and compass needle can show the deflection even when the flowing current is too small. So, due to presence of small amount of mineral salts, the rainwater conducts the electricity, as a result of which the needle compass shows deflection.

- 11. Prepare the list of objects around you that are electroplated.**

Bath taps, kitchen gas burners, bicycle handle bars and wheel rims have electroplating of chromium. Artificial jewellery has electroplating of silver or gold on less expensive metal. Tin cans are made by electroplating a layer of tin on iron. Iron is electroplated by zinc to protect iron from the corrosion and the formation of rust.

- 12. The process that you saw in activity is used for purification of copper. A thin plate of pure copper and a thick rod of impure copper are used as electrodes. Copper from impure rod is sought to be transferred to the thin copper plate. Which electrode should be attached to the positive terminal of the battery and why ?**

The impure rod of copper should be attached to the positive terminal of the battery and pure copper plate should be attached to the negative terminal of the battery. When the electric current is passed through the copper sulphate solution, copper sulphate dissociates into copper and sulphate ions. The free copper gets drawn to the electrode connected with negative terminal of the battery and starts depositing on it.

From the other electrode, a thick rod of impure copper, an equal amount of copper gets dissolved into the solution. Hence, the loss of copper from the solution is restored and the process continues. Thus, copper gets transferred from one electrode to the other.

I. Very Short Answer Type Questions.

- 1. What are good conductors?**

The materials which allow electric current to pass through them are called good conductors of the electricity.

- 2. Give two examples of good conductors of electricity.**

Copper , Iron



3. Why is it dangerous to touch an electrical appliance with wet hands?

Wet hands act as good conductors. So we feel electric shocks when we touch electric appliance with wet hands.

4. What are insulators (poor conductors) of electricity?

The materials which do not allow electric current to pass through them are called poor conductors.

5. Give two examples of poor conductors of electricity.

Dry wood, Rubber

6. What is electric current?

The flow of charges (electricity) is called electric current.

7. Do liquids conduct electricity?

Yes, liquids also conduct electricity.

8. How can you check current?

We check current by using tester.

9. Give any liquid conductor.

Tap water

10. Can distilled water conduct electricity?

No, distilled water cannot conduct electricity.

11. How can we test that liquids conduct electricity?

We use tester to check that the liquids conduct electricity.

12. Name some substances which make the liquids good conductor of electricity.

Acids, Bases and Salts.

13. Name two liquid substances other than water which conduct electricity.

(i) Lemon Juiced (ii) Vinegar

14. Sometimes even though the liquid is conducting, the bulb may not glow. Give reason.

Sometimes the bulb does not glow because the current through it is too weak to make the bulb glow.

15. Which effect of current causes the bulb to glow?

Heating effect.

16. Name the part of bulb which glows?

Filament.



17. What is LED?

LED is a device or bulb which glows even at low or small current.

18. Write full form of LED.

Light Emitting diode

19. What are the three effects of electric current?

There are three effects of electric current - heating, magnetic and the chemical effect.

20. What is magnetic effect of electric current?

The electric current also produces the magnetic effect by which a current carrying wire behaves like a magnet.

21. What happens when a compass needle is brought near a wire in which current is flowing?

The needle deflects.

22. How can we check magnetic effects of current?

By using magnetic compass.

23. Does distilled water conduct electricity?

No, distilled water does not conduct electricity.

24. How can we make distilled water a good conductor of electricity?

By adding some salt in distilled water.

25. What is distilled water?

The water which is free of salts is called distilled water.

26. Name a salt which makes distilled water a good conductor of electricity.

Common salt.

27. What are electrodes?

The metal rods dipped in liquids to which cells are attached are called electrodes.

28. Name the gases which release when current is passed through water.

Hydrogen and oxygen.

29. Name the gas deposited on negative electrode.

Hydrogen.

30. Name the gas deposited on a positively charged electrode.

Oxygen.

31. Name the process that shows the chemical effect of electricity.

Electroplating.



32. Define electroplating.

The coating of a layer of desired metal on other metallic surface by passing electric current is called electroplating.

33. Is air a conductor or an insulator?

Insulator.

34. What is tester?

The device which is used to check current is called tester.

35. Does lemon juice conduct the electricity?

Yes lemon juice is a good conductor of electricity.

36. What is the ill effect of electroplating?

The used conducting solution is a polluting waste.

II. Very Short Answer Type Questions.

1. Explain, why a layer of zinc is coated over iron. (NCERT Exemplar)

Layer of zinc is coated over iron because zinc prevents it from rust and corrosion.

2. Will the solution of sugar in distilled water conduct electricity? (NCERT Exemplar)

The sugar solution in distilled water will make it a good conductor of electricity and current can easily pass through it.

3. Name the effect of current responsible for the glow of the bulb in an electric circuit (NCERT Exemplar)

Heating effect of electric current is responsible for the bulb to glow in an electric circuit.

4. Why is tin electroplated on iron to make cans used for storing food? (NCERT Exemplar)

Electroplating is done on the iron to prevent it from rust and corrosion and it is cheap.

5. What are good conductors of electricity?

The materials that allow electric current to pass through them are called good conductors of electricity.

6. Give two examples of good conductors.

Silver, copper.

7. Why is it dangerous to touch electrical appliances with wet hand?

Our body is a good conductor of electricity and wet hands are also good conductors. Hence, by touching electrical appliances with wet hands electricity passes through our body and we feel a shock.

8. What is electric current?

The flow of electric charge is called electric current.

9. Which effect of current causes the bulbs to glow?

Heating effect.

10. What is the magnetic effect of electric current?

The electric current flowing in a wire produces the magnetic field around it. A current carrying conductor behaves like a magnet.

11. What is distilled water?

The water that does not contain salts is called distilled water.

12. What are electrodes?

The metal rods dipped in liquid to which a cell is attached are called electrodes.

13. How can we check magnetic effects of current?

By using magnetic compass.

14. Does distilled water conduct electricity?

No, distilled water does not conduct electricity.

15. What is the ill effect of electroplating?

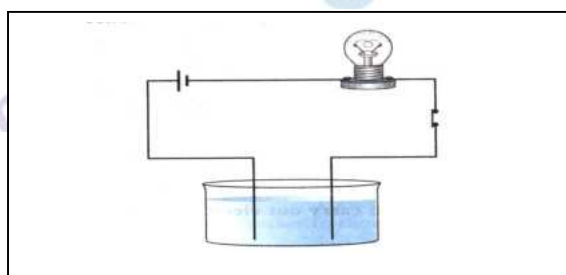
The used conducting solution causes pollution.

16. What is a tester?

The device which is used to check current is called tester.

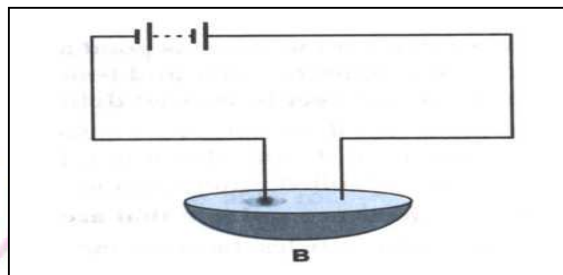
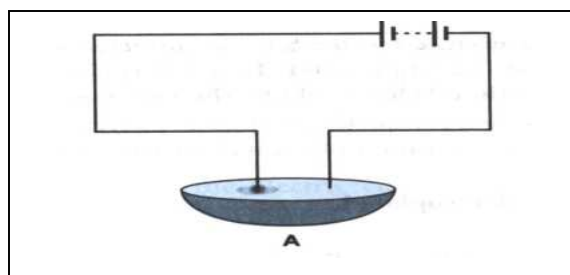
III. Very short Answer Questions

- Boojho made the circuit given in figure and observed that the bulb did not glow. On Paheli's suggestion he added one more cell in the circuit. The bulb now glows. Explain.



Addition of another cell increased the current through the bulb sufficiently to make it glow.

5. Observe the figure given below.



Which of these two circuits A or B shows the correct observation?

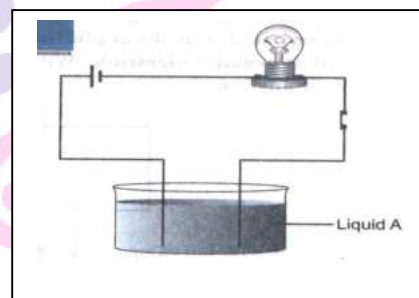
Circuit A shows the correct observation.

6. During electrolysis of water is formed at anode?

Hydrogen

I. Short Answer Type Questions.

1. Paheli set up an experiment using liquid A in the beaker as shown in figure alongside. She observed that the bulb glow. Then she replaced the liquid A by another liquid B, this time the bulb did not glow, Boojho suggested replacing the bulb by an LED. They observed that the LED glows, Explain.



The current through liquid B could be weak and therefore unable to make the bulb glow. However, it was strong enough for the LED to glow.

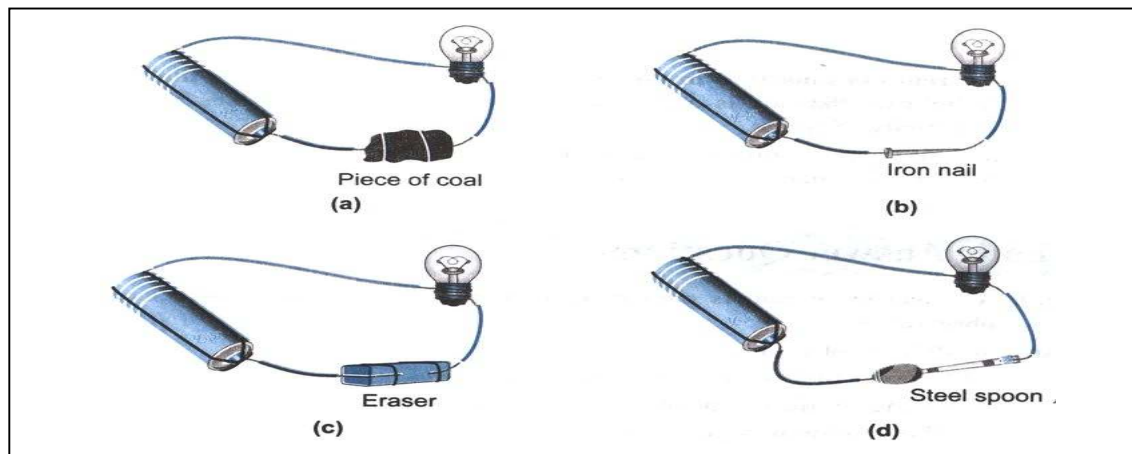
2. Paheli wants to deposit silver on an iron spoon. She took silver nitrate (AgNO_3) solution in a beaker and set up a simple circuit for electroplating. Which terminal of the battery should the spoon be connected to? What material should the other electrode be made of?

The spoon should be connected to the negative terminal of the battery. The other electrode should be made of silver.

3. Why is tin electroplated on iron to make cans used for storing food?

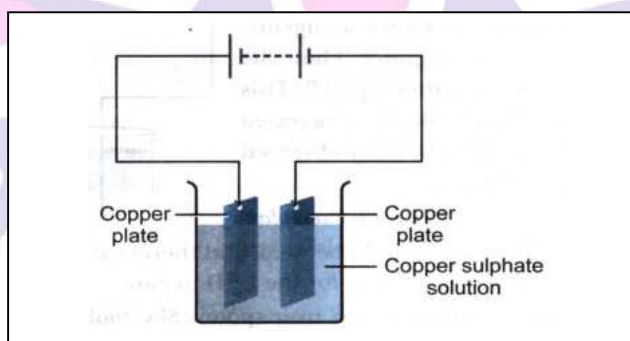
Tin is less reactive than iron. Tin coating prevents food from coming in contact with iron and thus prevents it from getting spoiled.

4. Observe the following circuits carefully. In which circuit will the bulb glow?



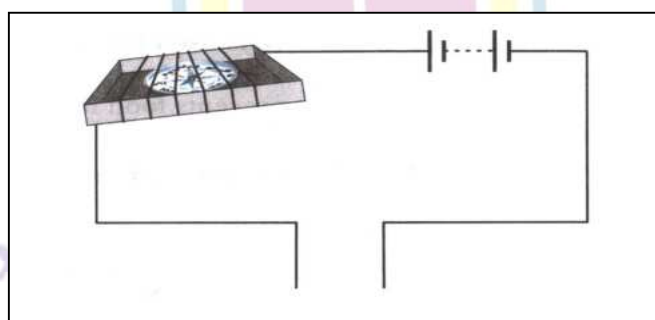
In circuit (b) and (d)

5. In the circuit given, Booja observed that copper is deposited on the electrode connected to the negative terminal of the battery. Paheli tried to repeat the same experiment. But she could find only one copper plate. Therefore she took a carbon rod as negative electrode. Will copper be still deposited on the carbon rod? Explain.



Yes, copper from the copper sulphate solution will be deposited on the carbon rod. Copper from the copper plate will be dissolved into the copper sulphate solution for electroplating.

6. Observe the following circuit given below.





Current does not flow in the circuit if there is a gap between the two wires. Does it indicate that air is a poor conductor of electricity? Does air never conduct electricity? Explain.

Yes, air is a poor conductor of electricity. No, under certain conditions, such as during lightning, air may conduct electricity.

II. Short Answer Type Questions.

1. What do you mean by electric current?

The continuous and directional flow of charges (electrons) is called electric current. It is denoted by I and its unit is ampere.

2. What is a tester?

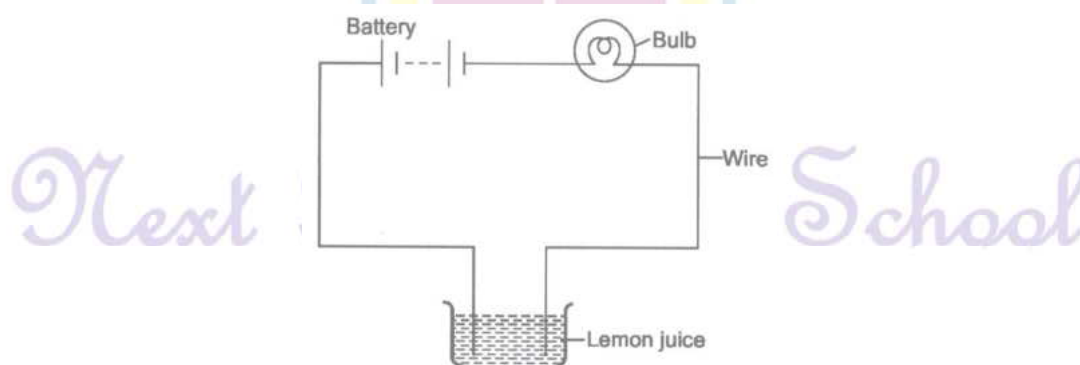
The instrument which is used to check the flow of electric current is called tester. It is attached to the terminals of the electric circuit. If the bulb of tester glows, it confirms that current is flowing through the circuit.

3. How can you test whether the liquids conduct or do not conduct the electricity?

Some liquids are the good conductors of electricity while some are poor conductors. The liquids can be tested for conductor of electricity. The free ends of a tester are dipped in liquid to be tested and then observe the bulb, if it glows, it confirms that the liquid is good conductor otherwise liquid is a poor conductor.

4. Show that lemon juice and vinegar are good conductors of electricity.

Collect a few plastic or rubber caps of bottles. Pour one teaspoon of lemon juice or vinegar in one cap. Bring the tester over the cap and let the ends of the tester dip into lemon juice or vinegar. We see that bulb starts to glow. It indicates that lemon juice and vinegar are good conductors of electricity.



Testing conduction of electricity in lemon juice or vinegar

5. Explain the mechanism of glowing of bulb in liquid.

When the liquid between the two ends of a tester allows the electric current to pass, the circuit of the tester becomes complete. The current flows in the liquid circuit and the bulb glows. When the liquid does not allow the electric current to pass, the circuit of the tester is not complete and the bulb does not glow.

6. There are some situations in which even though liquid is conducting, bulb may not glow.

Give reasons.

The possible reasons may be;

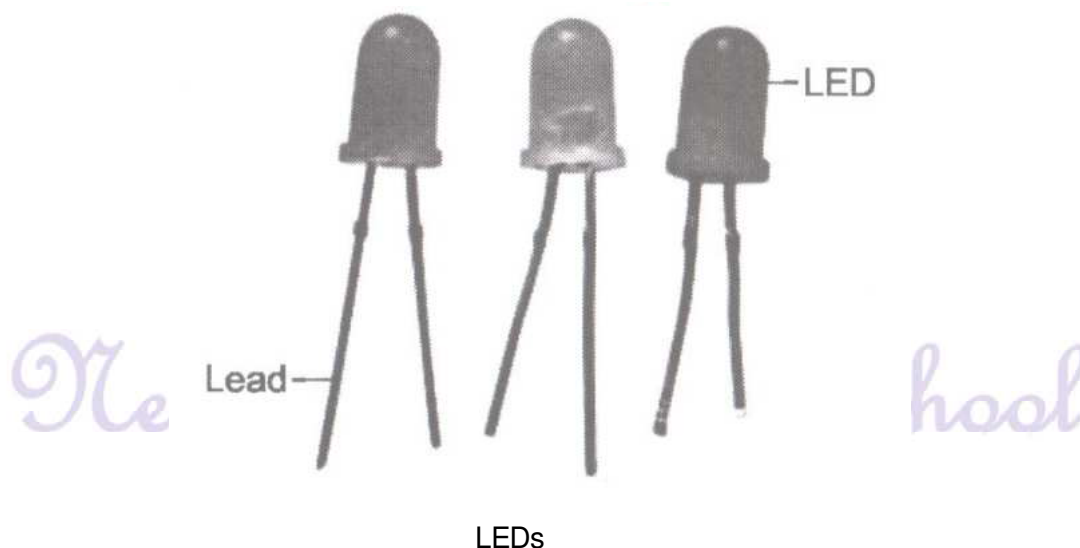
- (i) The current may be weak
- (ii) Bulb may be fused
- (iii) Incomplete circuit

7. Explain why a bulb glows on passing current.

When the current passes through bulb, the filament of the bulb gets heated to a high temperature due to the heating effect of current. The bulb starts to glow. Sometimes the current is too weak and filament does not get heated sufficiently and bulb does not glow.

8. What is LED? Why is it most important source of light?

The device which is used in the tester in place of bulb is called LED. It glows even at very small current. There are two wires called leads attached to the LED. One lead is longer than the other. A long wire is connected with the positive terminal and shorter lead is connected to the negative terminal of battery.





9. What do you mean by magnetic effect of electricity?

When electric current is passed through a coil or wire, then it behaves like a magnet. This is called magnetic effect of current. The strength of magnetic field depends on the amount of current passing through a coil or wire. The coil or wire shows magnetism till current is passed.

10. The ordinary water can conduct electricity while distilled water does not. Explain why.

The water that we get from various sources like taps, hand pumps, wells and ponds is not pure. It may contain several salts dissolved in it. This water is thus a good conductor of electricity. Distilled water is free of salts due to which it is a poor conductor.

11. Why do we need magnetic compass to test the conduction of electric current?

Sometimes the bulb does not glow on passing electric current. This is because the electric current flowing through a conductor is so small, that the filament of the bulb does not get heated up to the temperature where it starts glowing. So, in case of small current we need magnetic compass to test the conduction.

12. What is chemical effect of electricity? Give some examples of chemical effects of electricity.

The process in which a chemical reaction or change takes place in a solution on passing electricity is called chemical effect of electricity. The passage of an electric current through a conducting solution causes chemical reactions. For example, change in colour of solutions and electroplating.

13. Why we should not experiment with electric supply from mains?

We should not experiment with electric supply from mains. The electric supply from mains is very strong and of a high voltage. It is because that not to do experiment with such current. It may be very dangerous. We should experiment with electric cells only.

14. What happens when electricity is passed through ordinary water?

When the two terminals of battery are combined with negative and positive electrodes which are immersed in water. The water is dissociated into its components oxygen and hydrogen. Oxygen is collected on positive electrode and hydrogen is collected on negative electrode.

III. Short Answer Type Questions- I

1. Boojho made the entire circuit and observed that the bulb did not glow. On Paheli's suggestion, he added one more cell in the circuit. The bulb now glows. Explain.

(NCERT Exemplar)

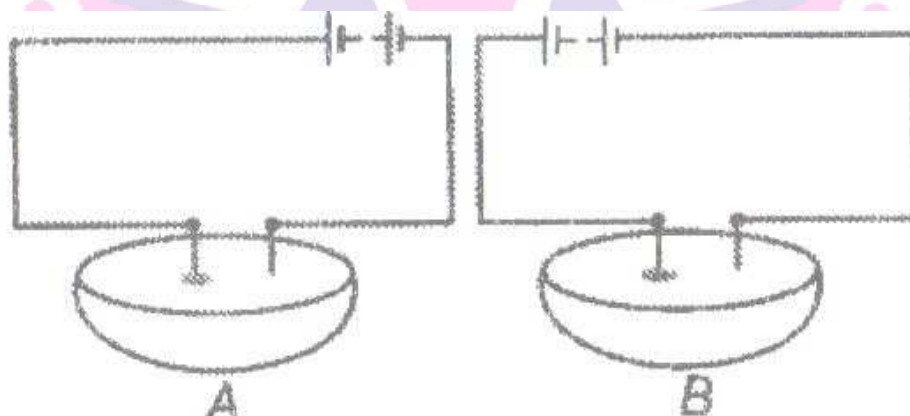
Initially, the bulb was not glowing because the voltage required to make the bulb glow was not sufficient. When the voltage increases more than a particular value, the bulb starts glowing because it gets sufficient energy to heat its filament.

2. Paheli wants to deposit silver on an iron spoon. She takes silver nitrate (AgNO_3) solution in a beaker and sets up a simple circuit for electroplating. Which terminal of the battery should the spoon be connected to? What material should the other electrode be made of?

(NCERT Exemplar)

Spoon should be connected to the negative terminal of the battery. The other electrode should be of silver so that silver ions get deposited on the iron spoon.

3. Observe figure :



Which of these two circuits A or B shows the correct observation?

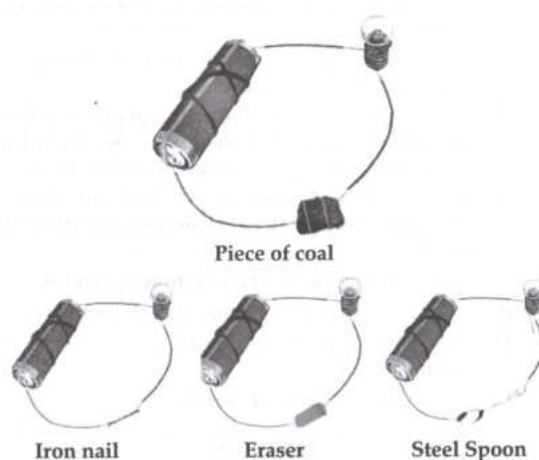
(NCERT Exemplar)

It is not clear from the diagram which is A and B. So, we cannot predict the actual solution. But if we compare with NCERT activity, this seems to be a potential and correct diagram is A because positive terminal makes the green spot on the potato.

Next Generation School

4. Observe the following circuits carefully. In which circuit will the bulb glow. Write 'Yes' or 'No' in the blank space provided along each of the circuits given in fig.

(NCERT Exemplar)



5. The ordinary water can conduct electricity while distilled water cannot. Explain why?

The ordinary water we get from the tap, river, lakes and ponds is not as pure as distilled water. It contains so many impurities in the form of the salts. These impurities make it good conductor of electricity. As distilled water is free from salt, it is unable to conduct electricity.

6. Write a short note on LED.

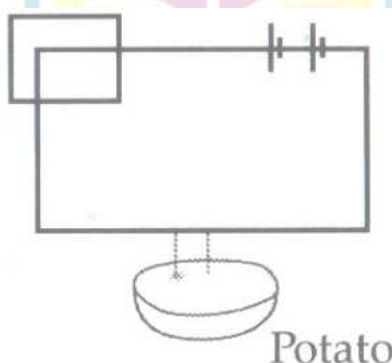
LEDs are light Emitting Diodes. They are used to check electric current. Even when a weak electric current flows through it, it glows. These are available in many colours such as red, green, yellow, blue and white. LED has two wires, one is longer and the other is shorter. Larger wire is connected with +ve terminal and -ve to the shorter terminal. Q

7. When do you need magnetic compass to test the conduction of electricity?

If current is small, the bulb does not glow on passing electric current through the tester. Hence to check the small current we need magnetic compass to test the conduction.

8. Can some fruits and vegetables conduct electricity? Explain with an example.

Some fruits and vegetables also conduct electricity. It is explained with the following example.



- (i) Cut a potato into two halves.
- (ii) Insert the copper wires of a tester into it.
- (iii) Keep it for an hour.
- (iv) There appears a greenish blue spot on the potato around the wire.
- (v) It is because the current produces a chemical effect on potato.
- (vi) Hence, it is clear that vegetables conduct electricity.

III. Short Answer Type Questions- II

1. An electric current is passed through a conducting solution. List any three possible observations. (NCERT Exemplar)

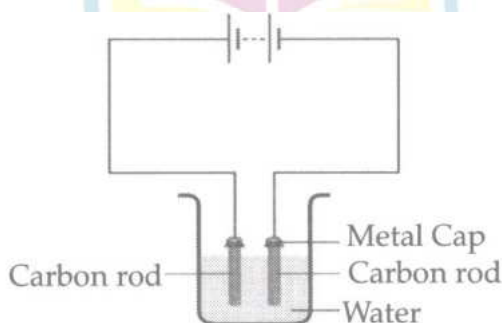
Three possible observations are :

- (i) The colour of the solution may change depending upon the electrodes.
- (ii) The temperature of the solution may increase.
- (iii) Bubbles near the electrodes can be seen.

2. Paheli set up an experiment using liquid A in the beaker. She observed that the bulb glows. Then, she replaced the liquid A by another liquid B. This time the bulb did not glow. Boojho suggested replacing the bulb by an LED. They observed that the LED glows. Explain. (NCERT Exemplar)

Liquid A is a good conductor of electricity and it allows the maximum current to pass through it which is sufficient to glow the bulb. But when it is replaced by another liquid B, bulb does not glow because liquid B is not a good conductor of electricity. But the small current which is passing through B is sufficient to glow a low voltage LED, so it glows.

3. Boojho made the circuit as shown in fig. He wanted to observe what happens when an electric current is passed through water. But he forgot to add a few drops of lemon juice to water. Will it make any difference to his observation? Explain.

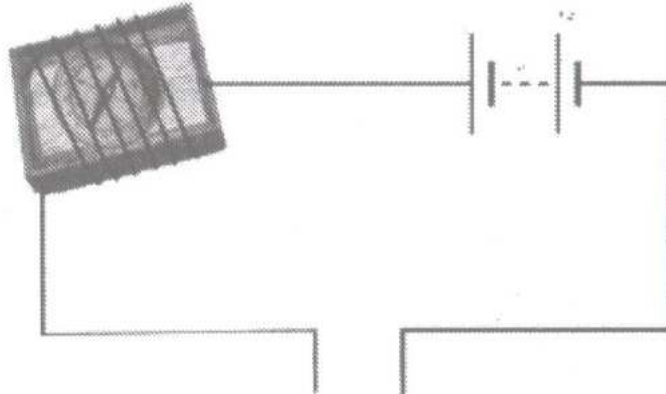




Adding few drops of lemon juice in water will increase the conductivity of the solution. The current will flow in both the cases but adding of lemon juice makes the flow of current easy.

4. Observe the following circuit given in Fig.

(NCERT Exemplar)



Current does not flow in the circuit if there is a gap between the two wires. Does it indicate that air is a poor conductor of electricity? Does air never conduct electricity? Explain.

Yes, if current is not flowing through the air gap between the wires, it means that air is a poor conductor of electricity. Air conducts electricity only when there is great voltage or there is some moisture in air.

5. Experimentally prove that the solutions of acids, bases and salts conduct electricity.

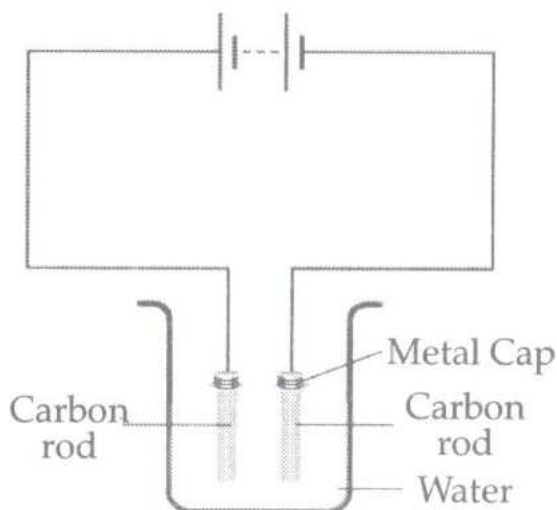
The solutions of acids, bases and salts conduct electricity. This can be experimentally proved by following methods :

- (i) Take three clean plastic or rubber caps of bottles.
- (ii) Pour about two teaspoonfuls of distilled water in each of them.
- (iii) Add few drops of lemon juice in one cap.
- (iv) Add few drops of base as caustic soda in second cap.
- (v) Add little salt to third cap to form salt solution.
- (vi) Now conduct electricity through each. An electric current flows through all the conducting solutions thus indicating that acids, bases and salts conduct electricity.

6. What are the chemical effects of electric current? Explain with an example.

Chemical effects of electric current can be explained by following experiment :

- (i) Take two carbon rods with metal caps. Clean their metal caps.

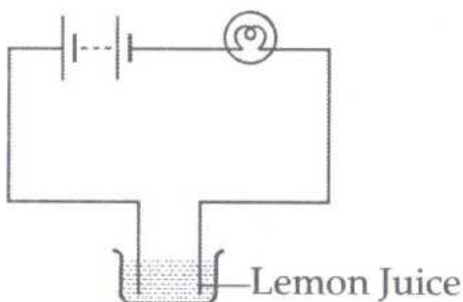


- (ii) Wrap copper wires around the metal caps of the carbon rods and join them to a battery.
- (iii) Pour a full cup of water in a glass bowl and add a teaspoon of salt.
- (iv) Immerse the electrodes in solution but metal caps should be out of the water.
- (v) Wait for 5 min.
- (vi) Observe the electrodes.
- (vii) The passage of electric current through a conducting solution causes chemical reaction. As a result, bubbles of gas are formed near the electrodes. Deposits of metal may be seen on electrodes. Change of colour of solution may occur. These are some of the chemical effects of the electric current.

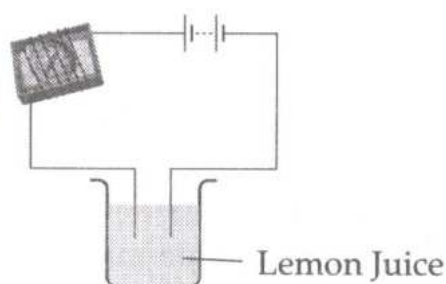
7. Discuss two methods of testing a conductor or an insulator.

The following methods are used to test the conduction :

- (i) The conductivity of substance can be checked by using electric bulb. When the liquid between the two ends of the tester allows the electric current to pass, the circuit of the tester becomes complete. The current flows in the circuit and the bulb glows. If the circuit of tester is not complete the bulb does not glow. This method does not work when current is very small.



(ii) We can use another effect of electric current to test the conduction. A magnetic tester is also used to test conductivity. When current is allowed to pass through it, it creates a magnetic field and the compass shows that the current is passing through circuit.



8. Why should we not experiment with the electric supply from mains?

We should not experiment with electric supply from mains as supply is very strong and of a high voltage. It may be very dangerous. We should experiment with electric cells only.

9. What happens when electricity is passed through ordinary water?

When the two terminals of battery are combined with negative and positive electrodes which are immersed in water, the water is dissociated into its components oxygen and hydrogen. Oxygen is collected on positive electrode and hydrogen is collected on negative electrode.

I. Long Answer Type Questions

1. Observing that the bulb does not glow in the circuit shown in Fig. A, Boojho changed the circuit as shown in Fig. B. He observed deflection in the magnetic compass.

(NCERT Exemplar)

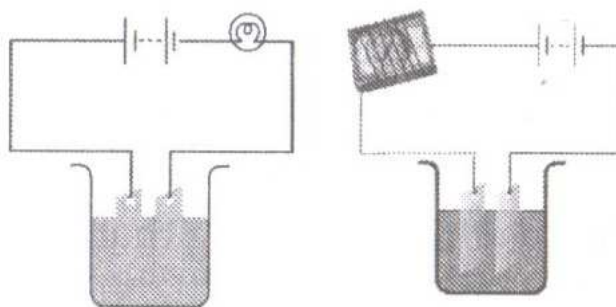


Fig. A

Fig. B

(i) What does the deflection in magnetic compass indicate?

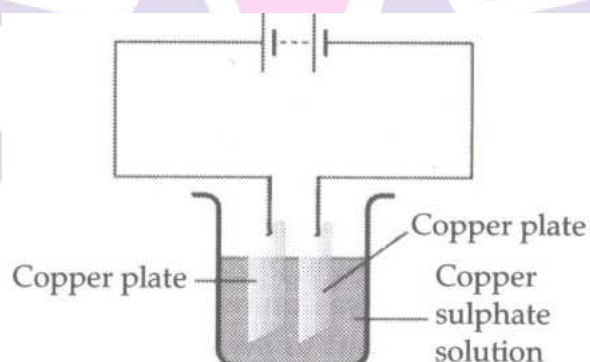
(ii) Why did the bulb not glow in Fig. A?

(iii) What would be the effect of increase in the number or turns in the coil around the magnetic compass in Fig. B?

(iv) What will be observed if the number of cells are increased in the circuit shown in Fig. B?

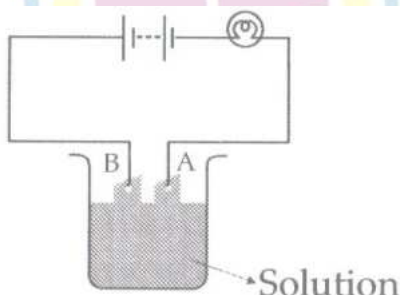
- (i) The deflection in the magnet compass shows that the current is flowing in the circuit.
- (ii) The bulb did not glow in Fig A; it may be because of the current passing through the circuit being weak. Also, it may happen because of other reasons like due to bulb being fused or the connections may be loose.
- (iii) Increase in the number of turns in the coil wound around the magnetic compass would increase the magnetic field around the magnetic compass which will result in the flowing of large amount of current through the circuit.

2. In the circuit as given in Fig. Boojho observed that copper is deposited on the electrode connected to the negative terminal of the battery. Paheli tried to repeat the same experiment but she could find only one copper plate. Therefore, she took a carbon rod as negative electrode. Will copper be still deposited on the carbon rod? Explain your answer. (NCERT Exemplar)



Copper will not be deposited on the carbon rod because carbon rod is a poor conductor of electricity. For electroplating, the circuit must be completed and that can be completed only by using the conducting material. Instead of carbon rod, it should be any metal, then only it can be electroplated.

3. Observe the circuit given in Fig.



Boojho set up this circuit for purification of copper. What will be the nature of :

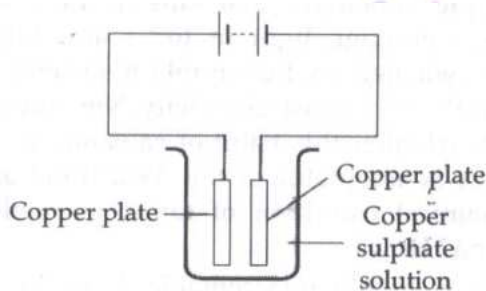
(i) plate A = Cathode

(ii) plate B = Anode

(iii) solution = Copper sulphate Explain the process of purification. (NCERT Exemplar)

We take CuSO_4 solution and dip a pure copper plate as cathode (-ve) and impure copper plate as anode (+ve). Due to voltage of battery, the impurities from the impure sample slowly deposit at the bottom and the copper plate becomes purified.

4. What is electroplating? What are its advantages?



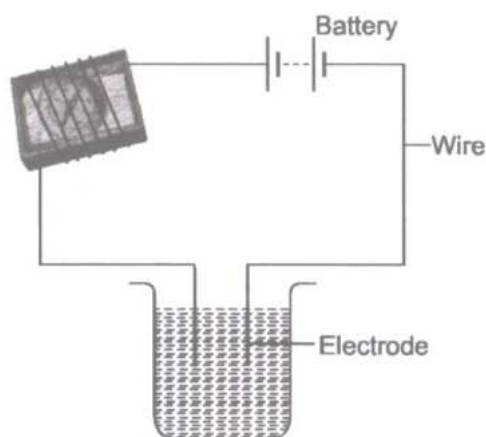
Electroplating is the process of depositing a layer of any desired metal on another metal by means of electricity. Advantages of electroplating :

- (i) It is used to coat a desired metal on another metal.
- (ii) It protects the metals from corrosion.
- (iii) It also prevents the metallic surface from rusting.
- (iv) Some cheap and dull metals are coated with costly and shining metals for ornamental use.
- (v) It can make more reactive metals like iron less reactive.
- (vi) Coating of chromium on metals gives lustre to objects.

II. Long Answer Type Questions

1. Prepare a tester to test conduction based on magnetic effect of the electricity.

Take the tray of a discarded matchbox. Wrap an electric wire a few times around the tray. Place a small compass needle inside it. Now connect one free end of the wire to the terminal of a battery. Leave the other end free. Take another piece of wire and connect it to the terminal of battery. Join the free ends of two wires momentarily. The compass needle should show deflection. The tester with two free ends of wire is ready.



A tester

2. Complete the following table and classify the liquids by using tester.

S.No	Material	Compass needle shows deflection (Yes/ No)	Conduct or / Insulator
1	Lemon Juice	Yes	Conduct or
2	Vinegar		
3	Tap water		
4	Vegetable oil		
5	Milk		
6	Honey		

S.No	Material	Compass needle shows deflection (Yes/ No)	Conduct or / Insulator
1	Lemon Juice	Yes	Conduct or
2	Vinegar	Yes	Conduct or
3	Tap water	Yes	Conduct or
4	Vegetable oil	No	Insulator
5	Milk	No	Insulator
6	Honey	No	Insulator

3. What are the two methods of testing an insulator or a conductor?

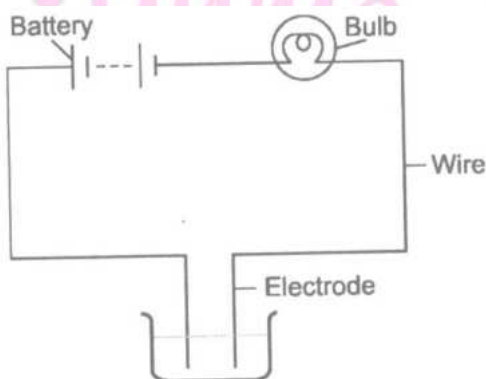
The following two methods are used to test the conduction/

(i) We use an electric lamp to test conductivity. An electric lamp is attached to the electric circuit. If the substance allows the current to pass through it, the bulb will start



glowing. Otherwise the bulb will not glow. This method does not work when current is very small. In such cases magnetic compass is used.

(ii) A magnetic tester is used to test conductivity when current is allowed to pass through it, it creates a magnetic field and the compass shows deflection. The deflection of compass shows that the current is passing through circuit (See Fig 14.6)

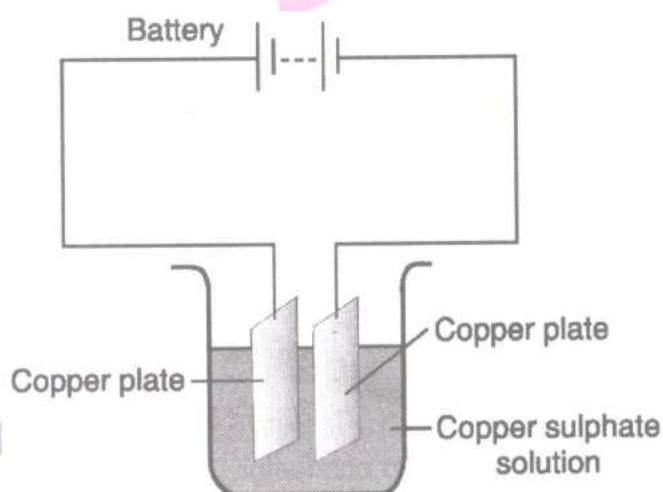


Methods to show the testing of conducting of lemon juice

4. What do you mean by electroplating? How does it take place?

The process of coating a desired metal on other metal surface by using electric current is called electroplating.

A metal plate and the substance to be coated are dipped in a current conducting solution with conducting wires. The object to be coated is attached to the negative terminal. When electric current is passed through the solution, the compounds of the conducting solution start breaking. The free metallic particles get deposited on the object at negative terminal of the battery. In this way we can get a coating of desired metal on any object by preparing suitable conducting solution and by using suitable electrodes.



A simple circuit showing electroplating

5. Explain the advantages of electroplating.

The advantages of electroplating.

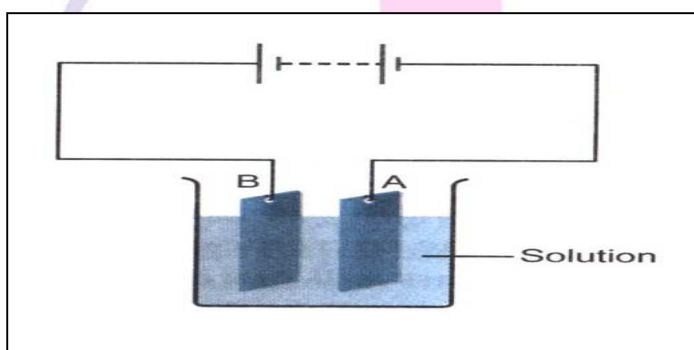
- (i) It is used to coat a desired metal on other objects.
- (ii) It protects the metals from corrosion.
- (iii) It also prevents the metallic surfaces from rusting.
- (iv) Some cheap and dull metals are coated with costly and shiny metals.
- (v) It can make more reactive metals like iron, less reactive.
- (vi) Coating of chromium on metals gives lustre to objects.

III. Long Answer Type Questions

1. An electric current is passed through a conducting solution. List four possible observations.

- a. Bubbles of gas may be formed on the electrodes.
- b. Deposits of metal may be seen on electrodes.
- c. Change in the colour of the solution may take place.
- d. The solution may get heated.

2. Observe the circuit given below;



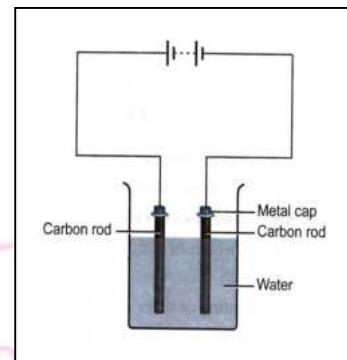
Boojho set up this circuit for purification of copper, what will be the nature of

a. Plate A, b. Plate B, c. The solution?

- a. Plate A : Pure copper
- b. Plate B : Impure Copper
- c. The solution : Copper sulphate

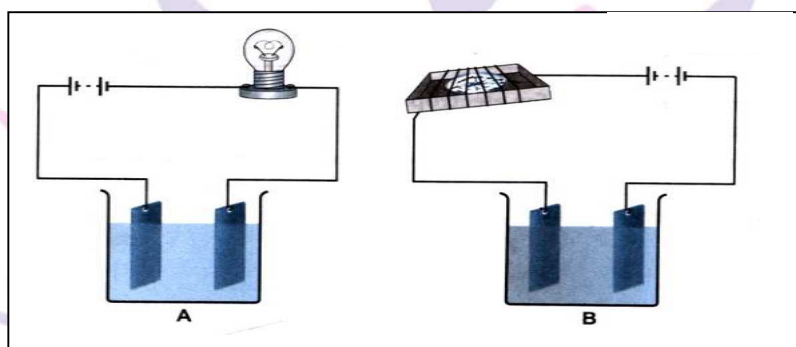
Copper from impure copper plate is transferred to the pure copper plate by the process of electroplating.

3. Boojho made the circuit shown alongside. He wanted to observe what happens when an electric current is passed through water. But he forgot to add a few drops of lemon juice to water. Will it make any difference to his observations? Explain?

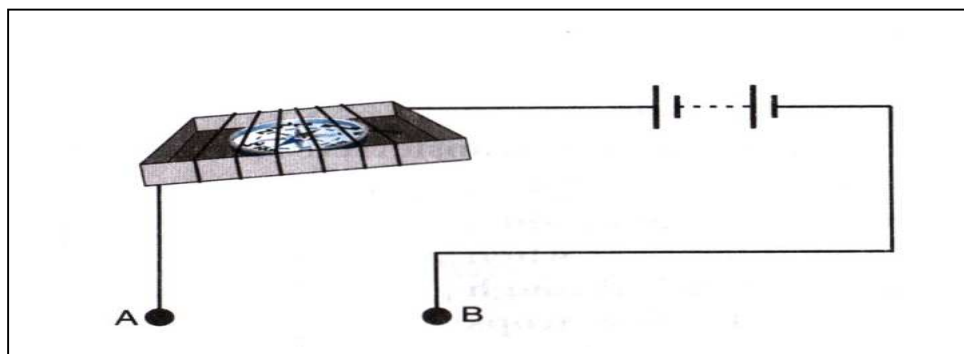


If the water is distilled water and lemon juice is not added. No current will pass through the circuit. This is because distilled water taken is salty, then a feeble current will pass through the circuit and bubbles will be seen on the negative electrode.

4. Observing that the bulb does not glow in the circuit shown below A, Boojho changed the circuit shown below in A, Boojho changed the circuit as shown in B. He observed deflection in the magnetic compass.



- What does the deflection in magnetic compass indicate?
 - Why did the bulb not glow in A?
 - What would be the effect of increase in the number of turns in the coil wound around the magnetic compass in B?
 - What will be observed if the number of cells is increased in the circuit shown in B?
- It indicates the presence of current in the circuit.
 - The bulb did not glow because the current was not sufficient to make it glow,
 - Deflection in the magnetic compass will increase.
 - Deflection in the compass will increase further.
5. You are provided with a magnetic compass, an empty matchbox, a battery of two cells and connecting wires. Using these objects how will you make a tester for testing an electric circuit? Draw the necessary circuit diagram and explain.



Whenever current flows through the circuit the magnetic compass needle shows deflection due to magnetic effect of current.

6. List four uses of electroplating.

- Chromium plating is done on various objects like car parts, wheel rims, bathtubs, etc.
- Plating of silver or gold is done on less expensive metals by jewelers.
- Iron parts in bridges and automobiles are plated with zinc.
- Tin cans for storing food are made by electroplating tin onto iron.

I. High Order Thinking Skills (HOTS) Questions.

1. When a compass needle is brought near a current carrying wire, then what happens?

When a compass needle is brought near a current carrying wire, then needle deflects.

2. It is dangerous to touch an electrical appliance with wet hands. Explain why?

Since, wet hands act as good conductor, so, we feel electric shock when we touch electrical appliance with wet hands.

3. A chemical compound is produced by the method of electrolysis. Give an example.

Sodium hydroxide or caustic soda is produced by the electrolysis of an aqueous solution (water solution) of sodium chloride.

4. Mention one important difference in the conduction of electricity by solids and liquids.

No chemical changes take place when electricity is allowed to pass through the solid while in liquids chemical changes take place when electricity is passed through them.



5. Explain, how we can purify the impure metals.

In the electrolysis process, we use a thick rod of impure metal as anode and thin strip of pure metal as cathode. A water soluble salt of the metal is taken as electrolyte. On passing electric current, the metal dissolves from the impure anode and goes into electrolyte solution which is then deposited on the cathode in pure form.

6. The bulb glows when the electric current passes through it. Explain why?

Due to the heating effect of current, the filament of the bulb gets heated to high temperature and it starts glowing. However, if the current through a circuit is weak, the filament does not get heated sufficiently and it does not glow.

7. State the reason, why do we need magnetic compass to test the conduction of electric current.

Sometimes the bulb does not glow on passing electric current. This is because the electric current flowing through the conductor is so small. So, in case of small current we need a magnetic compass to test the conduction.

8. We should throw conducting material used in electroplating far away from residential area. Explain why?

As the conducting solutions or materials contains various types of salts which may be poisonous and also usually acidic in nature. So, in electroplating factories, the disposal of used conducting material is a major problem and it should be disposed of in a proper way far away from the human population.

II. High Order Thinking Skills (HOTS) Questions.

1. Why chromium is used for electroplating? Why the objects which have chromium plating are not made of chromium itself?

Chromium has a shiny appearance, does not corrode so it is used for electroplating. The objects which have chromium plating are not made of chromium itself because chromium is very expensive.

Value Based Questions.

1. One day Rohan went to his friend's house. He was surprised to see that most of the electrical appliances at his house were functional. For example, tube light and fans in all rooms, two Tv's, computer, light of toilet and kitchen all were switched on. Rohan told his friend that this is not the way to use electricity. Now the questions arises whether this habit of consuming electrical energy is acceptable or not. Will it not affect the economical condition of family as well as the Nation? How?

No, it is highly unacceptable. It is the wastage of national energy resources and these kinds of habits should be punished or fined. It can affect the economical condition of family and nation both, as they have to pay much more amount as bill and nation has to produce more electricity by using more resources or they have to decrease the amount of power supply.

2. Last Wednesday, Suhail woke up late in the morning. So, he saw the time and suddenly realised that he got late for an interview, which he was supposed to give after reaching the venue by the right time. Immediately, he turned on the geyser but it did not work. He got more tensed, then he used an electric iron rod through which he got some boiled water for his bath. Actually, there was an earthing problem in the switch board about which he was unaware. He was barefooted and was just about to switch on the electric iron rod but was restricted to do so by his room partner living with him. If could be dangerous for Suhail.

i. Explain in brief what could have happened with Suhail if he had switched on the electric iron rod barefooted.

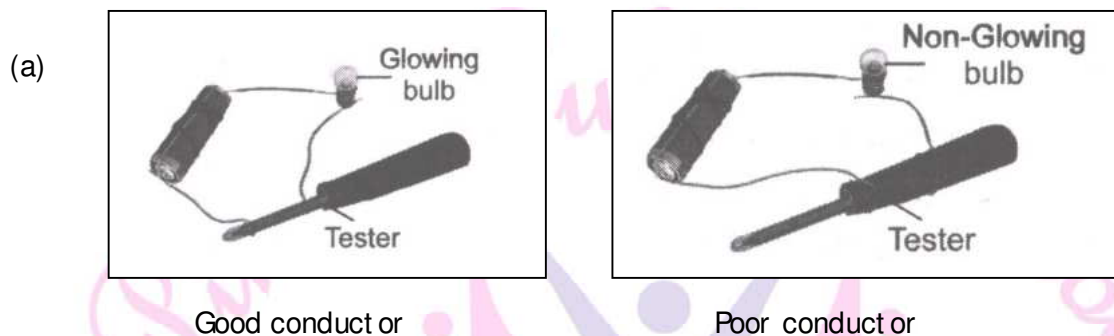
ii. Mention the values showed by Suhail's room partner.

i. If Suhail had switched on the electric iron rod barefooted, then he could have met with some accident, either in the form of electrical sparking or short circuit of switch board.

ii. Suhail's room partner seems to be very intelligent and very much concerned for Suhail as well.

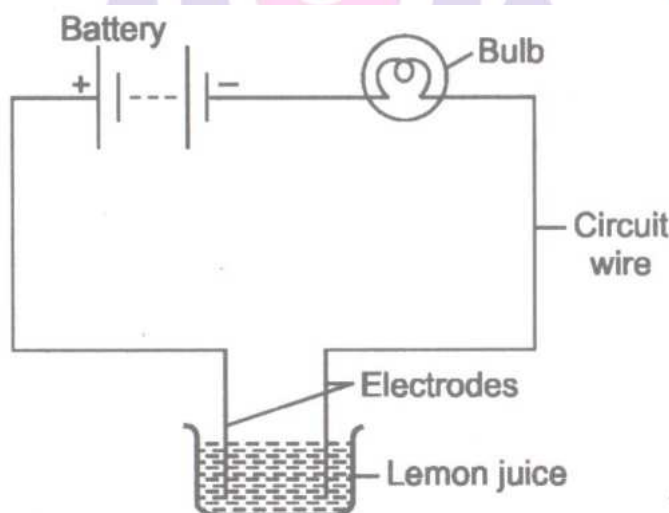
Skill Based Questions.

1. (a) Draw a diagram of a tester to show (i) Good conductor or (ii) Poor conductor.
 (b) What is the difference between a circuit of good conductor and poor conductor?

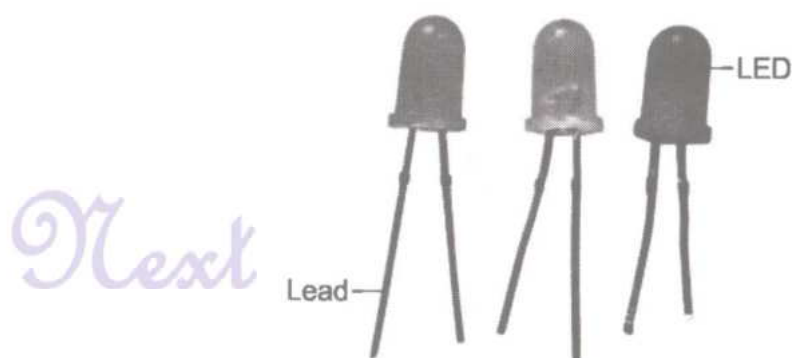


- (b) If the bulb is glowing in the circuit then it means that the object being tested is a good conductor. If the bulb does not glow it indicates that the object being tested is a poor conductor.

2. Draw a circuit diagram to show the conduction of electricity in lemon juice or vinegar.



3. (a) Identify the following figure and differentiate between LED and electric bulb.
 (b) Expand the LED.



- (a) The above figure is of LED.

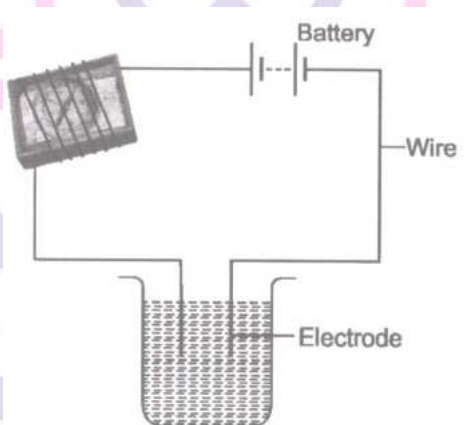
Difference between LED and electric bulb.

LED : It can be used to test even when a weak electric current flows through it.

Electric bulb : It can be used to test only a strong current which is sufficient to heat the filament of bulb.

(b) The full form of LED is Light Emitting Diode.

4. Draw a circuit diagram to show preparation of tester based on magnetic effect of current.



5. Draw a well labelled diagram of passing current through water and answer the following questions.

(i) Name the electrodes.

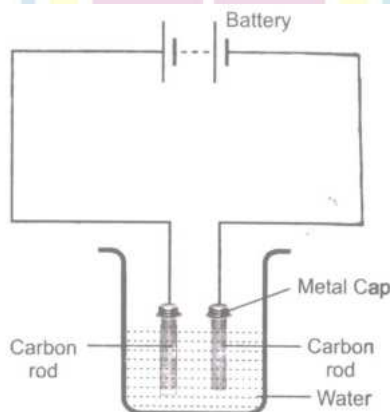
(ii) Name the material used to make caps of electrodes.

(iii) Which metal wire is wrapped around the electrodes?

(iv) What do you observe on passing electricity?

(v) Name the gases formed.

(vi) Can we call the change in water as chemical change?

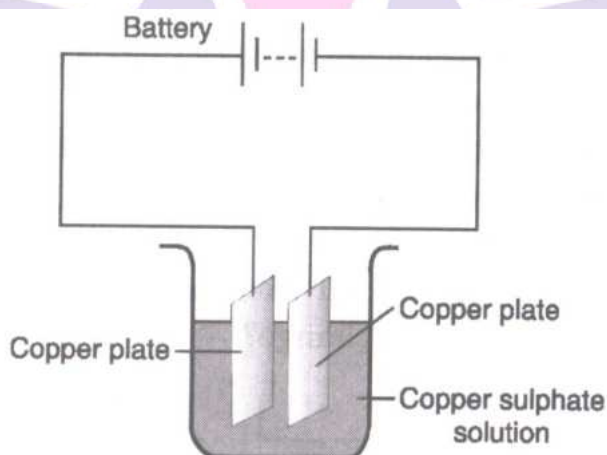


Passing current through water

- (i) Carbon rods are used as electrodes.
- (ii) Brass caps or any other metal.
- (iii) Copper wire.
- (iv) We observe the bubbles of gas near electrodes.
- (v) Oxygen and hydrogen gases.
- (vi) Yes, it is a chemical change.

6. Draw a simple circuit diagram to show electroplating and answer the following questions.

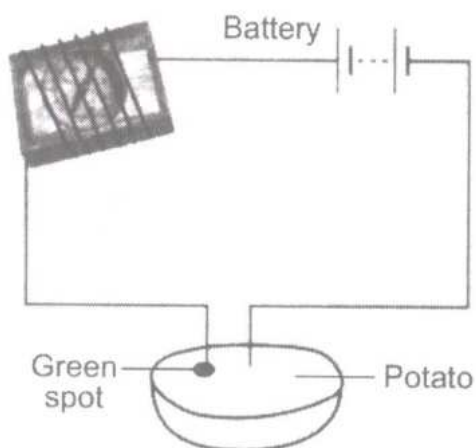
- (i) Write the name of electrodes.**
- (ii) Name the solutions used as electrolyte.**
- (iii) What is the colour of solution before passing electricity?**
- (iv) What is the colour of solution after passing electricity?**
- (v) Do you observe any coating on any one of the electrodes?**
- (vi) Name the process of coating.**



A simple circuit showing electroplating

- (i) Copper plates are used as electrodes.
- (ii) Copper sulphate solution.
- (iii) Blue colour.
- (iv) Colour is faded up (light or colourless)
- (v) We observe coating on one electrode.
- (vi) This process is called electroplating.

7. Draw a diagram to show the testing of potato as good conductor.



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