Electric Conductivity Of Liquids

Improve your learning

Q. 1. Give examples for good solid conductors and liquid conductors.

Answer : <u>Good conductors:</u> Some materials allow electric current to pass through them. These are called good conductors of electricity.

Examples-

Good solid conductors	Good liquid conductors
Nail (iron)	Drinking water
Wire (copper)	Lemon juice
Paper clip (iron)	Milk
Scissors (iron)	Mercury
Pencil lead (graphite)	

<u>Note: All metals are good conductors of electricity.</u>

Q. 2. Give examples for poor solid conductors and liquid conductors.

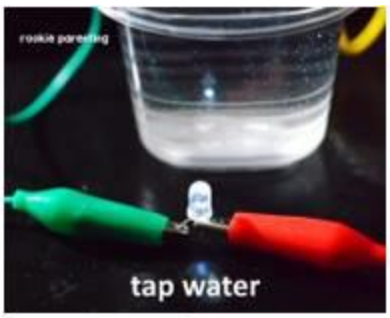
Answer : <u>Poor conductors:</u> Some materials do not allow electric current to pass through them. These are called poor conductors of electricity.

Examples-

Poor solid conductors	Poor liquid conductors
Wool	Vinegar
Wood	Honey
Rubber	Fuel
Plastic	Distilled water
Clothes	

Q. 3. What do you add to distilled water for making it to conduct electricity?

Answer : Distilled water does not allow electric current to pass. Hence, it is a bad conductor of electricity.



Bulb glows, it means tap water is a good conductor of electricity.

Bulb does not glow, it means distilled water is a bad conductor of electricity.

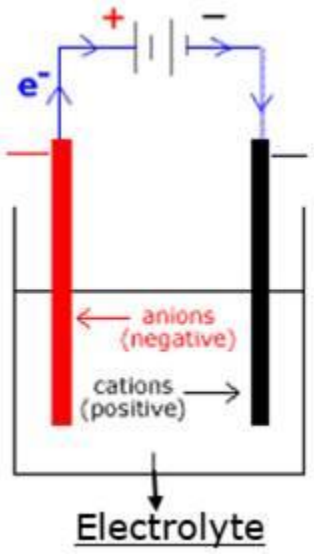
By adding water that contains salts or acids, it allows passage of electric current and turns distilled water into a good conductor of electricity.

Q. 4. What is an electrolyte?

Answer : Electrolyte is a solution of a substance through which electric current can pass.

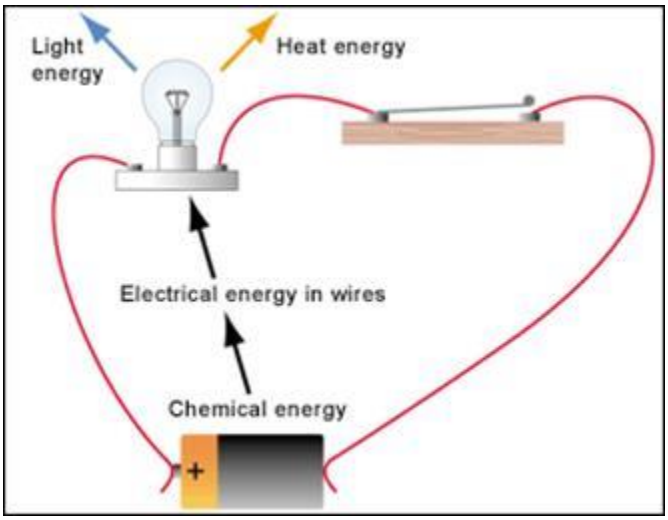
i. It dissociates into the ions which conduct electricity.

ii. Ions can be of two types: Cations (positively charged) and anions (negatively charged)



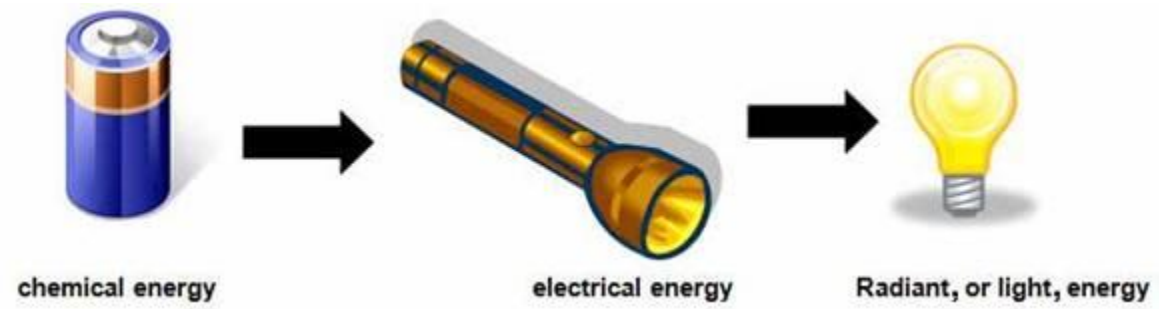
Q. 5. Which energy is cause for glowing of bulb in electrolytic cell?

Answer : In the electrolytic cell, the chemical energy is converted into electrical energy.



Hence, the electrical energy produced by the chemical energy is the main cause for glowing of bulb in electrolytic cell.

Example: A battery has chemical energy and when it is placed in torch, the chemical energy converts into electrical energy. As a result, the bulb of the torch starts to glow.



Q. 6. Write the uses of electroplating.

Answer : Electroplating: In this process, electric current is passed through electrolyte.

i. Two electrodes are dipped in the solution.

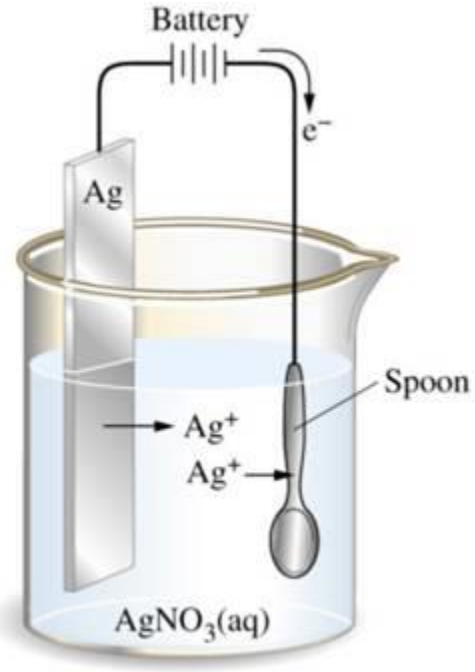
ii. Connected with a circuit and a battery.

iii. The electrodes and electrolyte are made from chosen elements.

iv. On passing electric current, splitting of electrolyte takes place and some of its parts deposits to one of the electrode at the top.

v. As a result, one of the electrode becomes electroplated.

Basically, the electroplating is the coating of one metal with another metal.



Electroplating of silver onto spoon

Uses of electroplating are:

i. It is widely used in machines (zinc coating)

ii. It is used for making ornaments (golden and silver coating)

iii. It is used for making fresh containers (iron and tin coating)

iv. It is used for making cars (nickel coating)

v. In handle of cycles and wheels, chromium coating is done to give an extra shine.

Q. 7. In case of a fire, before the fire men use the water, they shut off the main electrical supply for the area. Explain why they do this?

Answer : Before the firemen use the water, they shut off the main electrical supply for the area because:

i. Water is good conductor of electricity.

ii. If we keep the electrical supply on, the water will spread over the whole supply.

iii. As a result, the shot circuit can occur and anyone can get electric shock.

iv. Hence, to avoid the chance of getting an electric shock, first the fireman shut off the main electrical supply and then use the water.

Q. 8. We get some items made from iron wire in which iron wire is coated with plastic. Is plastic coated by the process of electroplating? Why plastic cannot be coated on a metal by the process of electroplating?

Answer : No plastic cannot be coated by the process of electroplating because:

i. As we know that electroplating is a process in which one metal is coated with another metal.

ii. Plastic is not a metal at all.

iii. In electroplating, the object to be coated must be a good conductor of electricity.

iv. But plastic is a material which is a bad conductor of electricity.

v. Hence, plastic cannot be coated on a metal by the process of electroplating.

Q. 9. Kavya observed that a discharged dry cell which kept in sun light by her father for few hours got ability to glow LED. She got many doubts and questions to raise. Can you guess those questions or doubts?

Answer : The questions are:

i. How sunlight recharge the discharged dry cell?

ii. What is the main reason behind this?

iii. Is this the only way to recharge the dry cell?

iv. How long it will remain recharge now?

v. Can we charge other things too by the help of sunlight?

Q. 10. Explain the process of coating copper on iron key. Draw the circuit diagram.

Answer : Coating an iron key with copper by electroplating method:

i. Dissolve crystals of copper sulphate in pure water to prepare concentrated solution (deep blue in colour)

ii. Pour the solution in a beaker and add a few drops of dilute sulphuric acid to it.

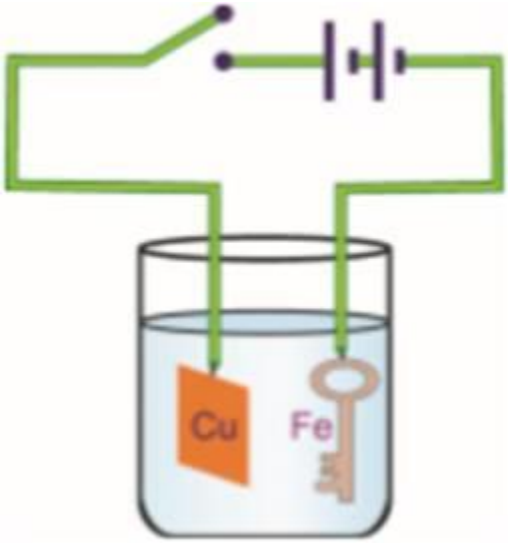
Note: Acid helps in increasing the conductivity of electrolyte.

iii. Tie one end of a connecting copper wire to the iron object (key) to be coated with copper.

iv. Connect its other end to the negative terminal of a battery.

v. Suspend the tied iron object into the copper sulphate solution.

vi. Suspend the copper plate into copper sulphate from positive end of the battery through a switch as shown in figure.



We observe that:

i. When electric current is passed, the free copper ions from the copper sulphate solution goes to the electrode of iron.

ii. The copper ions get deposited on the iron key.

iii. As a result, the iron key get coated with copper. This is the process of electroplating.

Q. 11. Make a battery from four lemons and test it with a LED in the circuit.

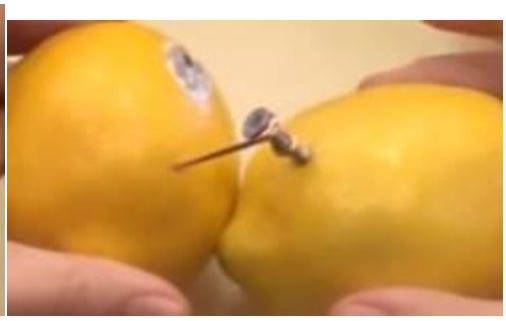
Answer : Requirements: Four pieces of copper wire, four zinc coated nails. Four lemons and a LED



Steps to prepare lemon battery:

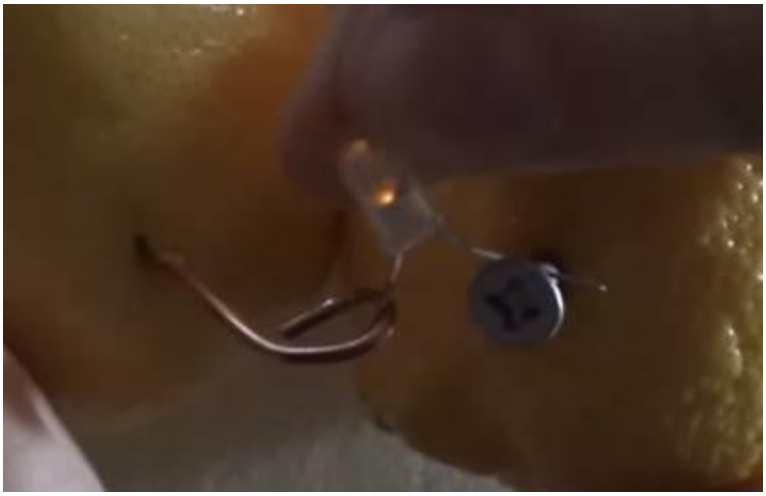
Step 1: First we will wrap the copper wire around the nails as shown in the figure below.


Step 2: Once all the nails are connected to the copper wire, we will connect each lemon to each other by screwing the nails.

Step 3: We will continue to do this with the rest of the lemons and set up the circuit as shown below.

Step 4: Now connect an LED bulb to one end of copper wire and another end of zinc nail.



You will observe that the bulb starts to glow.

How it works:

i. The zinc coated nails and copper wire will act as an anode and cathode respectively.

ii. The electrons will leave the zinc coated nails to the cathode and travel through the ionic compound to the copper wire which is a cathode.

iii. The acceptors are the electrons.

iv. This will create an electric current which we can use to power an LED.

Q. 12. Refer to the Activity 3 in the chapter. Start with distilled water. The LED would not glow. Add two drops of some acid to distilled water and check the glow of LED. Add two more drops and check the intensity of the glow. Repeat the

activity 5 to 6 times by adding 2 drops of the same acid each time. Do you see any difference in the intensity of glow with increasing acid content of water? What can be inferred from the above observations? Repeat the entire activity by taking a solution of baking soda and adding drops of it to distilled water instead of acid. Write differences and similarities.

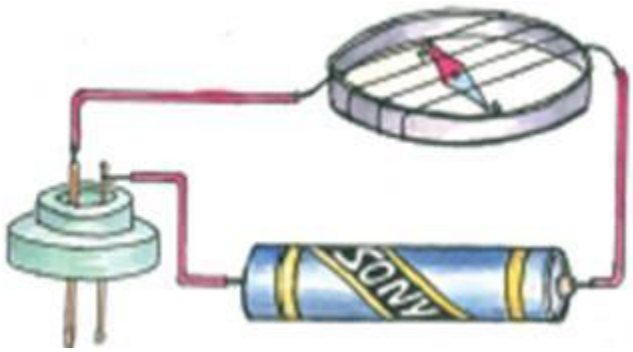
Answer : Difference-

Distilled water + Acid	Distilled water + Baking soda
If we add drops of acid to water, the intensity of glow decreases.	If we add baking soda to water, the intensity of glow increases.

Similarities-

The similarity is that both (acid and baking soda) increase the conductivity of the distilled water.

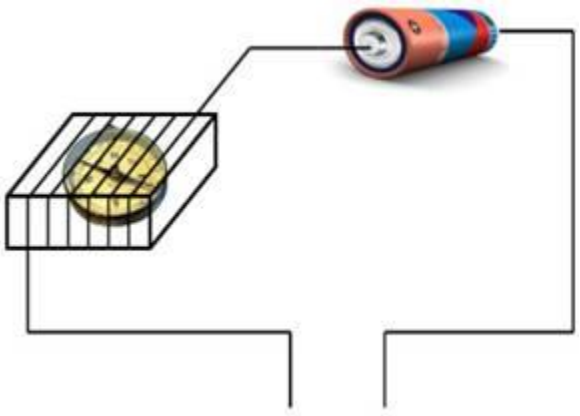
Q. 13. In many of the activities in this chapter, we have used a tester made up of LED. Can we avoid LED and use something else as a tester? Magnetic compass needle could be an alternative tester. We know that when we take a current carrying wire near magnetic compass needle, it shows deflection. Use this property to make a tester of magnetic compass needle. You may refer to the following figure.



Answer : Yes we can avoid LED and use something else as a tester. Magnetic compass needle can be used as an alternative tester.

i. If a magnetic needle is kept near a wire that conducts electricity, the magnetic compass shows deflection.

i. Even if weak current flows, the compass shows deflection.



Q. 14. How do you appreciate the efforts of Luigi Galvani and Alessandro Volta in discovering a cell and making a stored Electric energy available to human beings?

Answer : i. Galvani presented his theory to the world, saying that all living beings contained electricity and it was this electricity that was their main source of life.

ii. Alessandro Volta of Italy also performed experiments too.

iii. Volta said that it is possible to generate electricity if two different metals are placed in some liquids.

iv. These experiments showed the way to a steady source of electricity.

v. Volta made his first cell in 1800 using zinc and copper plates dipped in sulphuric acid.

vi. His discovery made him famous in the realm of science.

Q. 15. Collect the information and make list of good conductors and bad conductors. How do you use this information in your daily life works?

Answer :

Good conductors	Bad conductors
Nail (iron)	Wool
Wire (copper)	Wood
Paper clip (iron)	Rubber
Scissors (iron)	Plastic
Pencil lead (graphite)	Vinegar
Drinking water	Honey
Lemon juice	Fuel
Milk	Distilled water
Mercury	Glass

Good conductors are those which conduct electricity while bad conductors are those which do not conduct electricity.