NCERT QUESTIONS WITH SOLUTIONS

1. Fill in the blanks:

(i) The solution used in a Voltaic cell is called _____.

(ii) A current carrying coil behaves like a _____ .

Solution

(i) The solution used in a Voltaic cell is called **electrolyte.**

In voltaic cell the electrodes are dipped into a conducting solution, which allows the flow of ions this conducting solution is called an electrolyte.

(ii) A current carrying coil behaves like a bar **magnet.**

When current flows through a coil of wire, it produces a magnetic field around it the pattern of magnetic field lines around the coil is similar to that of a bar magnet. One face of the coil acts as a north pole and the other as a south pole.

2. Choose the correct option:

(i) Dry cells are less portable compared to Voltaic cells. **(True/False)**

Solution

False

Dry cells are small, sealed, and can be easily carried in torches, remotes, radios, etc. Voltaic cells use liquid electrolytes, which may leak and are difficult to transport.

Hence, **dry cells are more portable** than Voltaic cells.

(ii) A coil becomes an electromagnet only when an electric current flows through it. **(True/False)**

Solution

True

A simple coil of wire has no magnetism on its own. When current flows, it produces a magnetic field around the coil, turning it into an electromagnet.

If the current stops, the magnetism disappears.

(iii) An electromagnet, using a single cell, attracts more iron paper clips than the same electromagnet with a battery of 2 cells. **(True/False)**

Solution

False

The strength of an electromagnet depends on the current flowing through the coil. More cells provide more current in the electromagnet which makes stronger electromagnet.

Therefore, an electromagnet with 2 cells attracts **more** paper clips than with 1 cell.

3. An electric current flows through a nichrome wire for a short time.

(i) The wire becomes warm.

(ii) A magnetic compass placed below the wire is deflected.

Choose the correct option:

(a) Only (i) is correct

(b) Only (ii) is correct

(c) Both (i) and (ii) are correct

(d) Both (i) and (ii) are not correct

Solution

(c) Both (i) and (ii) are correct

(i) The wire becomes warm:

When electric current passes through a nichrome wire, part of the electrical energy changes into heat. Since nichrome offers resistance to the flow of current, the wire gets heated up.

(ii) A magnetic compass placed below the wire is deflected:

An electric current always produces a magnetic field around the wire. The magnetic needle of a compass gets affected by this field and changes its direction (deflects).

4. Match the items in Column A with those in Column B.

Column-I			Column-II
(A)	Voltaic cell	(p)	Best suited for electric heater
(B)	Electric iron	(q)	Works on magnetic effect of electric current
(C)	Nichrome wire	(r)	Works on heating effect of electric current
(D)	Electrom agnet	(s)	Generates electricity by chemical reactions

Ans. (A → s); (B → r); (C → p); (D → q)

Solution

(A) → (s)

A voltaic cell produces electricity through chemical reactions between electrodes and electrolyte.

(B) → (r)

It works on the heating effect of current to press clothes.

(C) → (p)

Nichrome has high resistance and a high melting point, making it best suited for use in electric heaters, toasters, etc.

(D) → (q)

When current flows through a coil, it produces a magnetic field, turning it into an electromagnet.

5. Nichrome wire is commonly used in electrical heating devices because it

(i) is a good conductor of electricity.

(ii) generates more heat for a given current.

(iii) is cheaper than copper.

(iv) is an insulator of electricity.

Solution

(ii) generates more heat for a given current.

Nichrome (an alloy of nickel and chromium) has a high resistance compared to metals like copper or aluminium.

When current passes through it, due to this resistance, it produces a lot of heat (heating effect of current).

It also has a high melting point, so it can remain hot for a long time without melting.

That's why it is used in heaters, toasters, and electric irons.

6. Electric heating devices (like an electric heater or a stove) are often considered more convenient than traditional heating methods (like burning firewood or charcoal). Give reason(s) to support this statement, considering societal impact.

Solution

Electric heating devices are more convenient because of following reasons:

(i) Electric devices don't produce smoke, unlike firewood or charcoal. Less smoke means fewer respiratory problems and healthier living.

(ii) No open flames, reducing the risk of burns or accidental fires.

(iii) Heats up quickly and doesn't require gathering fuel like firewood or charcoal.

(iv) Reduces deforestation and air pollution caused by burning wood or charcoal.

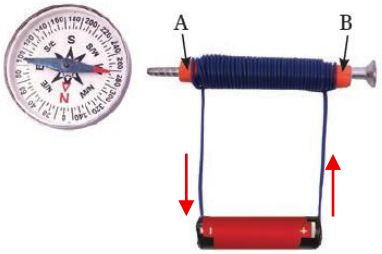
(v) Temperature can be adjusted easily, unlike firewood, where it's harder to control heat.

(vi) Works well in homes without outdoor space for burning wood or charcoal.

7. Look at the Fig. If the compass is placed near the coil, deflects: (i) Draw an arrow on the diagram to show the path of the electric current. (ii) Explain why the compass needle moves when current flows. (iii) Predict what would happen to the deflection if you reverse the battery terminals.

Solution

(i)



(ii) A compass needle is a small magnet that aligns itself with external magnetic fields. When the electric current flows, it creates a magnetic field around the coil and the iron nail. This magnetic field exerts a force on the compass needle, causing it to deflect from its usual alignment with the Earth's magnetic field.

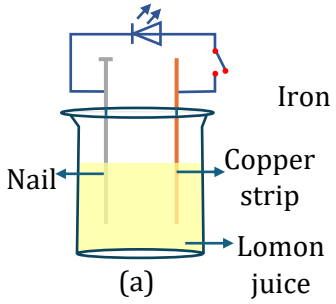
(iii) If you reverse the battery terminals, the compass needle will deflect in the opposite direction. Reversing the battery terminals reverses the direction of the electric current flowing through the coil. According to the rules of electromagnetism, reversing the current direction also reverses the polarity of the magnetic field (the North and South poles of the electromagnet are swapped).

8. Suppose Sumana forgets to move the switch of her lifting electromagnet model to OFF position (in the introduction story). After some time, the iron nail no longer picks up the iron paper clips, but the wire wrapped around the iron nail is still warm. Why did the lifting electromagnet stop lifting the clips? Give possible reasons.

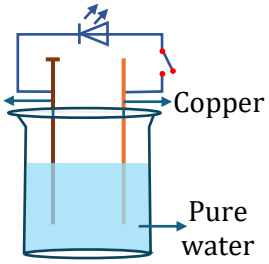
Solution

The lifting electromagnet stopped working because the battery became weak after supplying current for a long time. Due to this, the current reduced and the magnetic field became very weak. Continuous current also heated up the wire, increasing its resistance and further reducing the current. Since the iron nail is only a temporary magnet, it quickly lost its magnetism when the current weakened. Therefore, it could no longer attract the paper clips.

9. In Figure, in which case the LED will glow when the switch is closed?



(a)



(b)

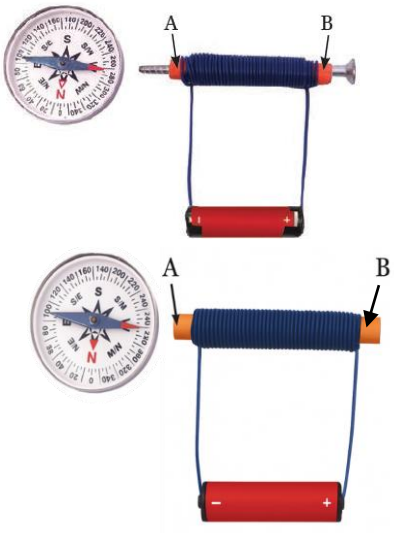
Solution

In a cell, the liquid used is called an **electrolyte**, and it is usually an acid or a salt solution.

In case (a), lemon juice acts as the electrolyte. Since lemon juice is a weak acid, it allows electricity to pass through. A chemical reaction happens between the iron nail and the copper strip, so current flows in the circuit and the LED glows.

In case (b), pure water is not a good conductor of electricity. It does not allow current to pass because it is not a good electrolyte. That is why no current flow and the LED does not glow.

10. Neha keeps the coil exactly the same as shown in fig. but slides the iron nail out, leaving only the coiled wire. Will the coil still deflect the compass? If yes, will the deflection be more or less than before?

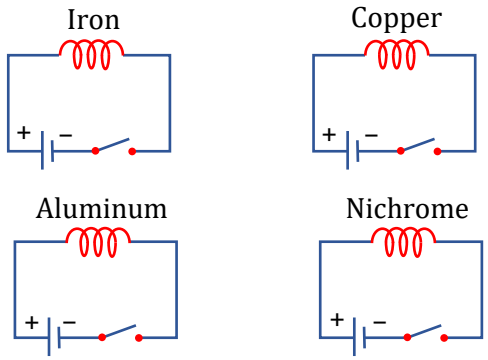


Solution

When Neha removes the iron nail and leaves only the coil of wire, the coil still produces a magnetic field as soon as current flows through it. This is because any wire carrying current behaves like a magnet, and when the wire is coiled, the magnetic effect becomes stronger. Therefore, the compass needle will still deflect, showing that a magnetic field is present.

However, when the iron nail was inside the coil earlier, it acted like a core. The nail got magnetized and made the magnetic field much stronger, turning the setup into a powerful electromagnet. Without the nail, the coil has no iron core to concentrate and strengthen the field. As a result, the magnetic field produced is weaker, and so the deflection of the compass needle is less compared to when the nail was present.

11. We have four coils, of similar shape and size, made up from iron, copper, aluminium, and nichrome as shown in Fig.



When current is passed through the coils, compass needles placed near the coils will show deflection.

(i) Only in circuit (a)

(ii) Only in circuits (a) and (b)

(iii) Only in circuits (a), (b), and (c)

(iv) In all four circuits

Solution

(iv) In all four circuits

When electricity flows through a wire, no matter what the wire is made of, it always creates a magnetic field around it. Because of this magnetic field, a compass needle kept near the coil will move (deflect).

So, in this case, whether the coil is made of iron, copper, aluminium, or nichrome, the compass needle will show deflection in all four circuits.

The difference is only in how much the needle moves — copper and aluminium (good conductors) give stronger deflection, while nichrome (higher resistance) gives weaker deflection.