

LESSON: 4 Electricity: Magnetic and Heating Effects

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**A. Choose the correct option:**

1. Which material is used to make electromagnets stronger?  
(a) Plastic (b) Wood (c) Iron (d) Glass
2. When comparing dry cells and rechargeable batteries, which statement is correct?  
(a) Dry cells can be reused multiple times like rechargeable batteries.  
(b) Rechargeable batteries are cheaper in the long run than dry cells.  
(c) Both work exactly on the same principle.  
(d) Dry cells are more environmentally friendly than rechargeable ones.
3. During a classroom demonstration, the teacher showed that a voltaic cell stops working after some time because  
(a) the metal electrodes get too hot (b) the plastic container develops cracks  
(c) the wires become loose over time (d) the chemical get used up
4. Why do engineers use electromagnets in scrap yards instead of permanent magnets?  
(a) Because permanent magnets are too expensive  
(b) Because electromagnets can be switched on/off when needed  
(c) Because permanent magnets don't attract iron  
(d) Because electromagnets work without electricity
5. In a dry cell, which part acts as the positive terminal?  
(a) The zinc container (b) The carbon rod (c) The plastic cap (d) The electrolyte paste
6. Which material is most commonly used in electric heaters due to its high resistance?  
(a) Nichrome (b) Aluminum (c) Copper (d) Iron
7. If the iron nail is removed from a coil in a magnetic experiment, what happens to the magnetic field?  
(a) It disappears completely (b) It becomes stronger (c) It becomes weaker (d) It remains the same

**B. Fill in the blanks:**

1. The magnetic strength of an electromagnet increases if an \_\_\_\_\_ core is placed inside the coil.
2. When many lemons are connected together with copper and zinc electrodes, they form a simple \_\_\_\_\_.

3. Devices like electric irons and kettles work on the \_\_\_\_\_ effect of electric current.
4. The moist paste in a dry cell acts as an \_\_\_\_\_.
5. \_\_\_\_\_ discovered the magnetic effect of current.
6. The solution used in a voltaic cell is called \_\_\_\_\_.
7. An electric bell uses the \_\_\_\_\_ effect of current to produce sound.
8. A voltaic cell uses two identical metal plates as \_\_\_\_\_.

**C. The questions given below consist of an Assertion and a Reason. Based on that, choose the appropriate option.**

- (a) Both Assertion and Reason are true and Reason is the correct explanation of Assertion.
- (b) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
- (c) Assertion is true, but Reason is false.
- (d) Assertion is false, but Reason is true.

1. **Assertion:** An electromagnet can lift heavier iron objects when more turns are added to its coil.

**Reason:** Increasing coil turns strengthens the magnetic field for the same current.

2. **Assertion:** A permanent magnet is preferred than electromagnet in a scrapyard crane.

**Reason:** Electromagnets lose their magnetic field when the electric supply is cut off.

3. **Assertion:** Nichrome has higher resistance than copper and does not melt easily.

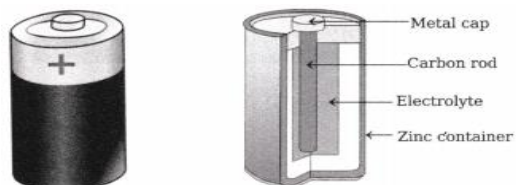
**Reason:** Nichrome is widely used in electric wires for household wiring.

**D. One word answer type questions:**

1. Name two metals used in lithium-ion batteries.
2. Which two metals are commonly used as electrodes in voltaic cells?
3. What type of metal wires produce more heat due to higher resistance?

**E. Answer the following questions:**

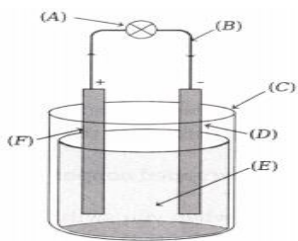
1. Observe the figure of a dry cell shown below and answer the following:



Dry cell

- a) Name the part that acts as the positive terminal of the dry cell.
- b) Name the part that act as the negative terminal of the dry cell.
- c) \_\_\_\_\_ is a thick moist paste in the dry cell.

2. Label the arrows marked in the diagram.



3. Match the terms in Column I with their related explanations in the Column II.

Column I	Column II
(a) Electromagnet	(i) Produces heat when current flows
(b) Heating effect of current	(ii) Zinc container and carbon rod
(c) Nichrome wire	(iii) Works only when current flows
(d) Structure of a dry cell	(iv) Converts electric energy to heat

### F. Case Study-1: The Lemon Battery Experiment

Riya and her friends are trying to make a simple electric cell using lemons as part of their science project. They insert a copper strip and an iron nail into a lemon, ensuring the two metals do not touch. They connect the lemon to an LED. The LED glows dimly. Riya is fascinated and realizes that the lemon juice acts as a crucial component of the cell. She notes down that a chemical reaction is taking place inside the lemon to produce electricity.



- (i) In the lemon cell, what is the role of the lemon juice?
- (ii) What would happen if Riya replaced the lemon juice with pure water?
- (iii) Why did the LED glow dimly?
- (iv) What components of this lemon cell can be compared to the electrodes and electrolyte of a Voltaic cell?